Mien-Chie Hung, Ph.D.

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Mien-Chie Hung, Ph.D.

Interview #48

Interview Profile

Date submitted: 14 February 2018

Interview Information:

Three interview sessions: 21 April 2014, 7 March 2014, 21 April 2014
Approximate total duration: 5 hour 15 minutes
Interviewer: Tacey A. Rosolowski, Ph.D.

For a CV, biosketch, and other support materials, contact:

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About the Interview Subject:

Mien-Chie Hung, PhD (b. 4 September 1950, Taiwan, Republic of China) came to MD Anderson in 1986 as an Assistant Professor in the Department of Tumor Biology and in the Graduate School of Biomedical Science. In 1992, Dr. Hung was the first to show that the adenovirus type EA1 gene has antitumor activity in HER2/neu cancer cells. Dr. Hung has been recognized internationally for his work on signaling transduction pathways of tyrosine kinase growth factor receptors and molecular mechanisms of oncogenes, including transformation and tumorigenesis. He has long been involved in translational research, and has developed therapies for breast, ovarian and pancreatic cancer. Since 2000 he has served as Chair of the Department of Molecular and Cellular Oncology. In 2010 he was appointed Vice President for Basic Research. As of February 2018, Dr. Hung was serving as Chair of the Department of Molecular and Cellular Oncology.

Major Topics Covered:

Personal and educational background; witty and humorous personal stories

Experiences of a Chinese immigrant and foreign graduate student

The working strategies, inspirations, and commitment of a basic/translational scientist

Research: signaling pathways and genes,

Department of Molecular and Cellular Oncology: history, evolution, personal vision for

Research culture at MD Anderson

Vice President of Basic Research

The Institute for Basic Science

Effective leadership and mentoring

Training young scientists

Original Interview Profile #48: Mien-Chie Hung, MD

Submitted by: Tacey A. Rosolowski, Ph.D.
Date: 24 April 2014

This interview with Mien-Chie Hung, Ph.D. (b. 4 September 1950, Taiwan, Republic of China) takes place over three sessions conducted in spring of 2014 (for an approximate duration of 5:15). Dr. Hung came to MD Anderson in 1986 as an Assistant Professor in the Department of Tumor Biology and in the Graduate School of Biomedical Science. Since 2000 he has served as Chair of the Department of Molecular and Cellular Oncology. In 2010 he was appointed Vice President for Basic Research. Dr. Hung holds the Ruth Leggett Jones Distinguished Chair. This interview takes place in Dr. Hung's office in the Clark Clinic on the Main Campus of MD Anderson. Tacey A. Rosolowski, Ph.D. is the interviewer.

Dr. Hung received his B.S. in Chemistry from National Taiwan University, Chemistry in 1973 and his Masters in Biochemistry from the same institution in 1977. He emigrated to the United States and received his M.A. and Ph.D. from Brandeis University in Waltham, Massachusetts in 1983. He went to Massachusetts Institute of technology for post-doctoral work (1984 – 1986). He was recruited to MD Anderson in 1986.

In 1992, Dr. Hung was the first to show that the adenovirus type EA1 gene has antitumor activity in HER2/neu cancer cells. Dr. Hung has been recognized internationally for his work on signaling transduction pathways of tyrosine kinase growth factor receptors and molecular mechanisms of oncogenes, including transformation and tumorigenesis. He has long been involved in translational research, and has developed therapies for breast, ovarian and pancreatic cancer. Dr. Hung was inducted as an Academician of the Academia Sinica in Taiwan in 2002 and as a Member of the University of Texas Academy of Health Science Education in 2006. In 2010 he was named a Fellow in the Biological Sciences Section of the American Association for the Advancement of Science. In 2011 he received the Presidential Award of the Society of Chinese Bioscientists in America and the University of Texas MD Anderson LeMaistre Outstanding Achievement Award.

In this interview, Dr. Hung provides a snapshot of the working strategies, inspirations, and commitment of a basic scientist. He gives detailed descriptions of the major projects he has undertaken on signaling pathways and genes, as also describes his paradigm-shifting work on how receptors can transmit signals to a cell nucleus where they influence mechanisms that have an impact on cancer. Throughout, he elaborates on the nature of translational research and the types of collaborative relationships that must be fostered in institutional culture to support such work. Dr. Hung provides a history of the Department of Molecular and Cellular Oncology and offers a view of MD Anderson as an institution from the perspective of the Vice President of Basic Research. Dr. Hung's sessions are enlivened by his wit and humor, qualities that often draw on his Chinese background and cultural connections.

About transcription and the transcript

This interview had been transcribed according to oral history best practices to preserve the conversational quality of spoken language (rather than conforming to written standards). It has been edited to enhance clarity.

The interview subject has been given the opportunity to review the transcript and make changes: any substantial departures from the audio file are indicated with brackets [ ].

In addition, the Archives may have redacted portions of the transcript and audio file in compliance with HIPAA and/or interview subject requests.

Mien-Chie Hung, Ph.D.

Interview #48

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Segment 00B

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Mien-Chie Hung, Ph.D.

Interview #48

Segment Summaries

Interview Session One: 20 February 2014

Segment 00A
Interview Identifier

Segment 01
Choosing Biochemistry: a Window into the Complexity of the Universe
A: Educational Path;

Story Codes
A: Character, Values, Beliefs, Talents;
A: Personal Background;
A: Professional Path;
A: Military Experience;
C: Funny Stories;
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
A: Inspirations to Practice Science/Medicine;

In this segment, Dr. Hung traces talks about his life and studies in Taiwan, before leaving for his Ph.D. program in the United States. He first talks about his family and what the perspective he gained on administration from the family business. He notes that his two years of military service (1973 – 1975) taught him discipline. He sings a few bars of "Fools Walk In" to demonstrate his good singing voice.

Dr. Hung then explains why he wanted to be a scientist and traces the growth of his interest in laboratory work and biochemistry from the National Taiwan University (B.S. Chemistry '73) and Masters ('77). He explains his Master's project: isolating a protein in snake venom to understand its structure and function as a cardiotoxin. Dr. Hung shares recollections of his student days. He defines primary, secondary and tertiary protein structure.

Segment 02
Experiencing Culture Shock in the United States
A: Personal Background;

Story Codes
A: Character, Values, Beliefs, Talents;
A: Personal Background;
A: Professional Path;
A: Experiences Related to Gender, Race, Ethnicity;
C: Mentoring;
A: The Mentor;

Dr. Hung emphasizes that he loves Taiwan, but simply had to emigrate to the United States in order to build a serious career in the sciences. He describes the process of finding U.S. institutions to apply to and explains how he ended up going to Brandeis University (Waltham, Massachusetts) for his Ph.D. program in biochemistry.

Dr. Hung explains the meaning of his first name (bright + strange or outstanding) and also his wife's name. He explains that Brandeis offered positions to them both, a strong factor in his deciding to go there.

Next Dr. Hung talks about the culture shock he experienced in the seventies then explains how important for international students to understand that they are representatives of their countries of origin.

Segment 03
A High Pressure Ph.D. Program and Research in Protein Biochemistry
A: Educational Path;

Story Codes
A: The Researcher;
B: MD Anderson Culture;
C: The Professional at Work;
C: Leadership;
A: Character, Values, Beliefs, Talents
D: On Research and Researchers;
C: Mentoring;
A: Influences from People and Life Experiences;
A: Personal Background;
A: Professional Path;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Discovery and Success;

Dr. Hung explains the competitive and high-pressure atmosphere at Brandeis and explains the six rotations through laboratories required of first year graduate students. He describes his work isolating hormone regulation genes. He explains why it is important for scientists to understand how to perform all stages of an analysis or research process as they create new knowledge and comments on graduate education today.

Dr. Hung then talks about his mentor, Pieter Wensink, who was researching the new processes of cloning. He explains that Dr. Wensink's lab was very small, friendly and supportive, and that Dr. Wesink and his wife, Dorothy, often hosted social events for the lab. He observes that he learned a lot about American culture as a result. He also explains that he has replicated this culture in his own laboratory. He also concludes that a laboratory is much like a family and explains how he acts on this idea in his own laboratory: "Once you are in my laboratory, you are my people and I take care of you."

Segment 04
Post-Doctoral Study at MIT and Work on Oncogenes: the neu oncogene and c-erbB2 gene
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;

Dr. Hung observes that he was always interested in how biochemistry research could connect to human disease. He explains that key scientific discoveries were made in 1982 that made the time perfect for someone in molecular biology to begin working on disease, particularly Dr. Robert Wienberg's work on oncogenes. Dr. Hung describes his interview with Dr. Wienberg, which took him to MIT for post-doctoral work ('84 – '86).

He next discusses project cloning an oncogene from the neuroblastoma of the offspring of pregnant rats. Dr. Hung cloned the gene in six months.

He next talks about how this work expanded into his work on breast cancer, using the oncogene model to predict mortality. He explains that the overexpression of genes resulted in breast cancer and many other cancers.

Segment 05
The Right Time in the Biochemistry to Move into Cancer Studies
A: Joining MD Anderson/Coming to Texas;

Story Codes
A: Professional Path;
A: Joining MD Anderson;
A: The Researcher;

A: Overview;
A: Definitions, Explanations, Translations;
C: The Value of the Oral History Project;

Dr. Hung explains that he was attending a symposium and he heard about a job at MD Anderson form some junior faculty members. He talks about the reasons he wanted to leave Boston. Dr. Garth Nicholson recruited him in 1986. He notes that he knew very little about cancer at the time, nevertheless, in the aftermath of genetic and molecular studies made in 1982, he knew that this was the right time for someone with his specialty to take on the challenge of cancer.

At the end of the session, Dr. Hung comments on the importance of collecting the stories of key researchers and others who have contributed to MD Anderson.

Session 2: 7 March 2014, about 1 hour 50 minutes

Segment 00B
Interview Identifier

Segment 06
Recruited to Bring Cutting-Edge Oncogene Research to MD Anderson
A: Joining MD Anderson/Coming to Texas;

Story Codes
A: The Researcher;
C: Funny Stories;
A: Joining MD Anderson;
A: Character, Values, Beliefs, Talents;
A: Personal background
B: MD Anderson History;
D: Understanding Cancer, the History of Science, Cancer Research;
D: On Texas and Texans;

Dr. Hung explains that Dr. Garth Nicholson recruited him to MD Anderson because of his focus on tumors.

Dr. Hung jokingly tells about all of the colleagues how said, "Don't go to Houston." He tells a joke from a scientist's perspective that compares China's long history with the US's very brief one. This joke, Dr. Hung explains, tells why Houston's supposed lack of history and culture did not matter to him.

Dr. Hung explains that, when he was recruited, his work was considered 'very modern and cutting-edge" because of his focus on oncogenes and cloning.

Segment 07
Early Work on Oncogenes and Adenoviruses: The First Gene Therapy
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;
A: Finance, Entrepreneur, Biotechnology;

Dr. Hung first describes how he set up his lab to have an impact on research into human oncogenes. His goal was to identify a transcription suppressor and his work on clarified that the EIB gene has oncogene activity, whereas EIA does not. Dr. Hung explains how "over-interpretation of data" can result in these types of assumptions about molecular and genetic function. His next move was to take this knowledge to breast cancer.

Next Dr. Hung explains that he and others formed an MD Anderson-based biotech company in the 90s to take therapy using EIA to (successful) clinical trials. He then explains how he began to think in new ways about the HER2/neu gene, looking for transcription factors.

Dr. Hung describes a clinical trial: the *first* trial of gene therapy for breast cancer and ovarian cancer. He explains the implications of this study.

He talks about controversies over gene therapy, then explains practical challenges of gene therapy research, many relating to the vector used to transport the gene-related agents to cancer cells.

Segment 08
The Rationale Behind Translational Research and Why MD Anderson Provides a Good Environment
A: The Researcher;

Story Codes
A: The Researcher;
C: Portraits;
A: Overview;
A: Definitions, Explanations, Translations;
C: Personal Reflections, Memories of MD Anderson;
B: Institutional Mission and Values;

B: MD Anderson Culture;
A: Personal Background;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: The Life and Dedication of Clinicians and Researchers;

Dr. Hung describes meeting Dr. Waun Ki Hong, then explains what it means to think in a translational way, where a researcher works purposefully for a clinical outcome (rather than allowing these to spring accidentally from work not explicitly conducted with clinical issues in mind). Dr. Hung also notes that, as MD Anderson, "important clinical colleagues" are dealing with significant clinical questions, creating an environment conducive to solving the most important clinical questions in cancer. Dr. Hung points out why the overexpression of the HER2 neu oncogene is a great example of the translational model of research.

Dr. Hung expresses how happy he is to work at MD Anderson, where he can pursue his passion for clinical research questions. He explains why he loves the song, *The Impossible Dream.*

Dr. Hung describes the mindset of researchers involved in translational questions, where basic science outcomes can influence patients. He notes that scientists are part of the human community and can make a contribution to human issues.

Segment 09
Training Basic Scientists: Grasping the Field and Preparing for the Future
A: The Educator;

Story Codes
A: The Researcher;
C: The Mentor;
C: Mentoring;
C: Research, Care, and Education;
C: Education at MD Anderson;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Discovery, Creativity and Innovation;

Dr. Hung notes that his laboratory graduates more Ph.D.s than any other at MD Anderson and that his mentees go on to solid careers. He next explains the unique features of the Department's Journal Club, which meets on Saturday mornings and gives the department an opportunity to review fifteen to twenty journal articles. Dr. Hung explains that is it usual to review a much smaller number of articles in great detail, but he wants his faculty and graduate students to learn how to assess articles for new concepts in the field that might be exploited. He also notes that this practice enables graduate students to learn how to present concepts to peers and colleagues, and is part of his pedagogic approach to broaden graduate students capacities to assess concept and make research decisions based on a view of activity in a field. He explains the important of training graduate students to address "diseases we do not know about."

Segment 10
Research into Receptors, Pathways, Cross-Talk and the Utility of Existing Drugs
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;
C: Healing, Hope, and the Promise of Research;

Dr. Hung begins this segment by explaining the structure of receptors and how explosion of knowledge about signal transduction set the stage for targeted therapy.

He talks about his work on tyrosine kinase and interventions in signaling cross talk, explaining this concept. Throughout this segment, Dr. Hung explains that he focuses on investigations into how existing drugs can intervene in molecular and genetic processes, as this avoids time-intensive drug research.

Next Dr. Hung talks about trials involving the HER2 gene and head and neck and colon cancers. He explains that his work on kinases addresses the needs of the twenty percent of breast cancer patients who are "triple negative" and whom clinicians simply don't know how to help.

"There are twenty thousand proteins in a cell," Dr. Hung says. "But we only need fifty" to make a difference to cancer patients. He explains the "huge paradigm shift" that has occurred and talks about the future of research on cancer, breast cancer, and pancreatic cancer.

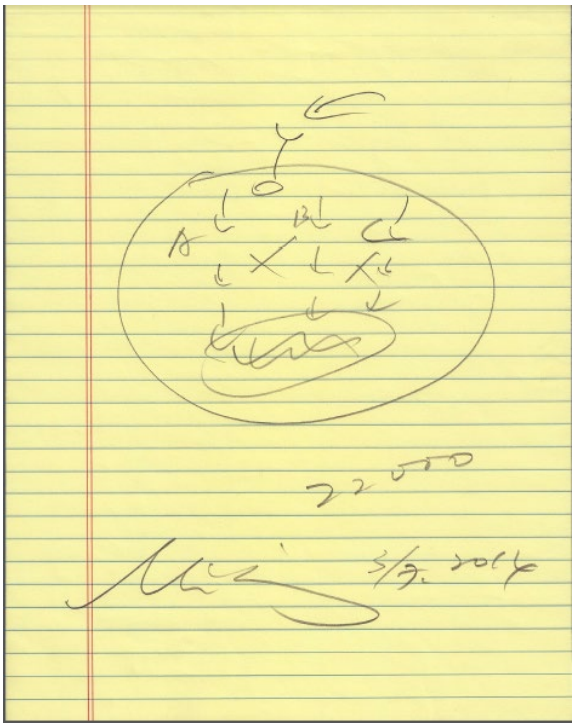


Figure I: Dr. Hung's sketch of a cell and the A, B, and C pathways that involve 20,000 proteins, only fifty of which are needed to make an impact on cancer.

Segment 11
Co-Director of the Women's Cancer Moon Shot Program: An Environment of Team Science and Translational Research
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;
C: Healing, Hope, and the Promise of Research;
B: Building/Transforming the Institution;
B: Multi-disciplinary Approaches;
B: Growth and/or Change;

Dr. Hung discusses Dr. Ronald DePinho's Moon Shot programs. He explains that ovarian cancer and breast cancer have been paired in one Moon Shot because of similarities in their molecular profiles. He explains how the Moon Shots Program is structured administratively and practically with leaders and researchers drawn from surgery, gynecology and other specialties. He notes that fundraising is taking place now.

Dr. Hung next talks about the collaborative mindset the Moon Shots require, creating changes to MD Anderson. He compares the Moon Shots and SPORE grants (Specialized Programs of Research Excellence, administered by the NIH).

Interview Session Three: 21 April 2014, about 1 hour 45 minutes

Segment 00C
Interview Identifier

Segment 12
A Move into Administration and Developing Translational Research at MD Anderson
B: Building the Institution;

Story Codes
A: The Administrator;
A: Contributions to MD Anderson;
B: MD Anderson History;

B: Growth and/or Change;
B: Institutional Mission and Values;
A: The Leader;
C: Professional Practice;
C: Leadership;
C: The Professional at Work;
D: Understanding Cancer, the History of Science, Cancer Research;
A: The Researcher;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;

In this segment, Dr. Hung discusses his first administrative experience as Director of the Breast Cancer Basic Research Program (1996 – 2008) and discusses translational research.

He notes that he worked with Dr. Gabriel Hortobagyi (Interview # 29), knowing little about clinical work on the time. He explains that in the early 1990s, the leadership at MD Anderson wanted to foster interactions between clinicians and basic researchers, a culture of collaboration began to develop and have an impact on patient care. Next Dr. Hung explains what he learned about himself as a leader who could have "a different level of impact" as an administrator. He observes that the timing for expansion of translational research was very good, as the field has amassed a critical amount of information. Dr. Hung then talks about the impact of a translational focus on research. He explains communication gaps between clinicians and basic researchers. He concludes with comments on MD Anderson's translational focus and the evolution of translational perspectives nationally.

Segment 13
A Twenty-Year Study that Promises a Paradigm Shift: The Yeast Two-Hybrid System
A: The Researcher;

Story Codes
A: The Researcher;
A: Character, Values, Beliefs, Talents;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery, Creativity and Innovation;
C: The Professional at Work;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;

In this segment, Dr. Hung describes his involvement in controversial research on the Yeast Two-Hybrid System. He sets the context by explaining the prevailing theory about how cell receptors interact with proteins, noting unexpected discoveries linking a receptor to activity inside a cell nucleus. Dr. Hung has built on this discover and traces the history of publishing his findings. He speculates on why they have not been accepted. He explains that he has always been convinced that there is something significant in this finding and notes that his laboratory has continued to

work on the mechanisms of how the signals move from the surface receptor to the nucleus of a cell. His laboratory has demonstrated that these signals influence DNA repair and transcription and therefore have implications for anti-cancer therapy. He notes that his laboratory has been able to link the Yeast Two-Hybrid system to functions involved in liver regeneration. In the remainder of this segment, Dr. Hung makes general statements about how basic scientist must focus on the reproducibility of data, rather than accepted dogma, to guide the discovery process.

Segment 14
The Department of Molecular and Cellular Oncology
B: Building the Institution;

Story Codes
A: The Administrator;
B: MD Anderson History;
B: Growth and/or Change;
B: Institutional Mission and Values;
A: The Leader;
C: Professional Practice;
C: Leadership;
C: The Professional at Work;
A: Character, Values, Beliefs, Talents;
B: MD Anderson Snapshot;
B: MD Anderson Culture;
A: The Leader;
C: Leadership;
A: The Mentor;
C: Mentoring;
B: MD Anderson in the Future;
D: Understanding Cancer, the History of Science, Cancer Research;
D: The History of Health Care, Patient Care;
D: Business of Research;

In this segment, Dr. Hung describes the history and development of the Department of Molecular and Cellular Oncology, a Department he has headed since 2000.

He sketches the history of the department's leadership and reporting structure. When Dr. Hung became Chair, he reported to Dr. Margaret Kripke [Oral History Interview]. He describes the very bold goals he set for the new department to quickly raise standards and the profile. He then explains how he was able to convince faculty to rise to this challenge. He affirms that his is a "model department," demonstrating collaboration between basic scientists and clinicians.

Next Dr. Hung briefly talks about a major lesson he learned about leadership after taking on the Chair of the Department: "never confront" and argue or become angry with faculty.

[the recorder is paused for about 2 minutes]

Next Dr. Hung briefly talks about MD Anderson's Mentorship Committee Program for junior faculty.

Finally, Dr. Hung shares his aspirations for the bright future of the Department under the new leadership of Dr. Ronald DePinho and his Moon Shots program. He says, "My dream is to go to CVS for cancer drugs," and explains that basic research is already helping the right patient to choose the right drug.

Segment 15
Vice President of Basic Research; The Institute for Basic Science
A: The Administrator;

Story Codes
A: The Administrator;
B: MD Anderson History;
B: Institutional Mission and Values;
C: Professional Practice;
C: The Professional at Work;
A: Character, Values, Beliefs, Talents;
B: MD Anderson Culture;
C: Leadership;
C: Portraits;
C: The Institution and Finances;
B: Philanthropy, Fundraising, Giving to MD Anderson;

Dr. Hung begins this segment explaining how he was offered the position of Vice President of Basic Research and accepted to have more impact at MD Anderson. He explains his roles, working with Dr. Robert Bast [Oral History Interview] and Provost Raymond DuBois on virtually every basic science activity. Dr. Hung explains their recruiting philosophy: "We need to hire people that are better than you and better than me!"

Dr. Hung next explains that the new president, Dr. Ronald DePinho, wanted a great deal of recruitment and Dr. Hung was involved in those activities. He shares impressions of Dr. DePinho and explains the positive points of Dr. DePinho's Moon Shots program.

[The recorder is paused for about 8 minutes]

Dr. Hung next talks about the Institute for Basic Science, created to raise funds for basic science research, an area that traditionally doesn't do much fundraising. He explains the administrative structure and changes and talks about the Institute's impact.

[The recorder is paused for about 4 minutes]

Dr. Hung summarizes the Institute's fundraising accomplishments and goals.

Segment 16
Leaving a Legacy in Research, Education, and MD Anderson Culture
A: View on Career and Accomplishments;

Story Codes
A: Contributions to MD Anderson
A: Career and Accomplishments
A: Professional Values, Ethics, Purpose
B: MD Anderson Impact
B: Institutional Mission and Values
B: MD Anderson Culture

Dr. Hung begins this segment with comments on how happy he has been at MD Anderson during his twenty-eight years at the institution. He is gratified to know he is "really part of a team" and that he has been able to sustain his basic-science focus while working on patient-related issues. Dr. Hung next notes that he would like to be recognized for his research that has yielded patient outcomes. He also notes the challenges that have come with running a large laboratory of forty to fifty people, and how he also is very active training and educating members of his laboratory. He talks about the importance of training the next generation of scientists –for MD Anderson and to apply knowledge at other institutions and in other scientific arenas. He also talks about how important it is for researchers to "learn science and how to behave." He notes that the Department's Ph.D. program is second in the nation.

Segment Summaries: Unabridged Version

Interview Session One: 20 February 2014, about 1 hour 45 minutes

Segment 00A
Interview Identifier
about 1 minute

Segment 01
A: Educational Path
about 22 minutes
Choosing Biochemistry: a Window into the Complexity of the Universe

In this segment, Dr. Hung traces talks about his life and studies in Taiwan, before leaving for his Ph.D. program in the United States. He first talks about his family. [CLIP, title: T*he Family Baking Business Provides A Broad Perspective Useful for an Administrator.* Dr. Hung explains that many faculty from academic families have a very focused perspective on administration. Coming from a family that was in business, he has a broader perspective that served him well when he became involved in administration at MD Anderson.]

Dr. Hung then notes that his two years of military service (1973 – 1975) taught him discipline.

[CLIP: C: Funny Stories; A: Character, Values, Beliefs, Talents; title: *Dr. Hung Demonstrates His Singing Voice with an Imitation of Elvis:* Dr. Hung observes that he always wanted to be a scientist, but had also thought about becoming a musician. He is proud of his good singing voice and sings a few bars of "Can't Help Falling In Love," imitating Elvis Presley's voice.]

[CLIP Dr. Hung explains why he wanted to be a scientist: it's the arena where an individual "can make the impossible become possible." He paints a picture of the complexity of the universe to underscore why his interest in science grew in high school.]

Dr. Hung explains why he was fascinated by chemistry in college (National Taiwan University, B.S. Chemistry '73) and found laboratory science "a lot of fun." As a senior he was introduced to biochemistry and loved the complex molecules coupled with the challenges of issues in the biological sciences. He stayed at National Taiwan University for his Masters ('77) and explains the Master's project he worked on: isolating a protein in snake venom to understand its structure and function as a cardiotoxin. He was able to modify this protein so it lost toxicity –a first experience manipulating a molecule for a therapeutic effect – and he imagined it could be a vaccine. Dr. Hung then shares some recollection of his student days: sleeping in the new building where the biochemistry labs were located because there was no air conditioning in his dormitory; using his hours in the lab to tend to the state of the art equipment required to study the secondary structure of proteins. He ends with this segment with definitions of primary, secondary and tertiary protein structure.

Segment 2
A: Personal Background
about 20 minutes
Experiencing Culture Shock in the United States

Dr. Hung emphasizes that he loves Taiwan, but simply had to emigrate to the United States in order to build a serious career in the sciences. He describes the process of finding U.S. institutions to apply to and explains how he ended up going to Brandeis University (Waltham, Massachusetts) for his Ph.D. program in biochemistry.

Dr. Hung explains the meaning of his first name (bright + strange or outstanding) and also his wife's name, Kinglan (golden orchid). He then explains that Brandeis offered positions to his wife as well as to him, a strong factor in his deciding to go there. Next Dr. Hung talks about the culture shock he experienced in the seventies, when there were few Asian students at Brandeis, which he describes as a "Jewish" institution at the time.

[Clip A*dvice to International Students: You Represent Your Home Country,* Dr. Hung talks about how important for international students to understand that they are representatives of their countries of origin and can influence Americans' perceptions of others from their homeland.]

Dr. Hung recalls feeling that other students looked at him strangely at Brandeis. He describes the cafeteria, with its two separate areas where students could serve themselves, then recalls an Anglo student asking him if he was Chinese-Jewish. Puzzled, Dr. Hung asked the student why he posed that question and the student answered, "Because you have kept Kosher for the past year." He ends this segment with recollections of a layover at an airport and his process of trying to figure out an American way of doing things.

Segment 3
A: Educational Path
about 23 minutes
A High Pressure Ph.D. Program and Research in Protein Biochemistry

Dr. Hung explains the competitive and high-pressure atmosphere at Brandeis and explains the six rotations through laboratories required of first year graduate students. He describes work on isolating hormone regulation genes in the egg yolk proteins of the drosophila fruit fly.

[CLIP Dr. Hung explains why it is important for scientists to understand how to perform all stages of an analysis or research process as they create new knowledge. Since the drugs or therapies that come from their research can be very expensive, this detailed understanding of processes can later help scientists figure out how to make these same products more cheaply.]

Dr. Hung observes that students can get kits to perform many basic research processes, but they do not understand the rationale behind them and so are missing something.

Dr. Hung then talks about his mentor, Pieter Winsink, who was researching the new processes of cloning. He explains that Dr. Winsink's lab was very small, friendly and supportive, and that Dr. Winsink and his wife, Dorothy, often hosted social events for the lab. He observes that he learned a lot about American culture as a result. He also explains that he has replicated this culture in his own laboratory.

[CLIP A: Character, Values, Beliefs, Talents, A: The Researcher, B: MD Anderson Culture, C: The Professional at Work, C: Leadership. Dr. Hung observes that everyone in Dr. Winsink's "fly lab" shared all responsibilities and he concludes that this is a very "healthy scientific concept" because everyone in a lab is also going to share knowledge. He also concludes that a laboratory is much like a family and explains how he acts on this idea in his own laboratory: "Once you are in my laboratory, you are my people and I take care of you."]

Segment 4
A: The Researcher
about 34 minutes
Post-Doctoral Study at MIT and Work on Oncogenes: the neu oncogene and c-erbB2 gene

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Healing, Hope, and the Promise of Research;

Dr. Hung observes that he was always interested in how research on biochemistry could connect to human disease. He explains that key scientific discoveries were made in 1982 that made the time perfect for someone in molecular biology to begin working on disease. Dr. Robert Wienberg at the Massachusetts Institute of Technology was working on oncogenes, one of the new areas of research that opened up in 1982. Dr. Hung describes his interview with Dr. Wienberg, who knew about him because of a "trick" he had designed to facilitate gene sequencing and cloning. (He explains this trick.) Dr. Hung observes that Dr. Wienberg's lab was very different from the laboratory that Dr. Winsink ran.

Next Dr. Hung talks about his work on a project that evolved from discoveries in a German lab that offspring of pregnant rats exposed to chemical carcinogens developed cancer. No one wanted to take on the project of cloning an oncogene from the neuroblastoma of the offspring: Dr. Hung took on this project and cloned the gene in six months (he published the paper in 1986). He explains how he did this and also why this gene is not relevant in human cancer, though the work did expand understanding of the neu oncogene and c-erbB gene.

He next talks about how this work expanded into his work on breast cancer, using the oncogene model to predict mortality. He explains that the overexpression of genes resulted in breast cancer and many other cancers.

Segment 5
A: Joining MD Anderson/Coming to Texas
about 8 minutes
The Right Time in the Biochemistry to Move into Cancer Studies

Dr. Hung explains that he was attending a symposium and he heard about a job at MD Anderson form some junior faculty members. He talks about the reasons he wanted to leave Boston. Dr. Garth Nicholson recruited him in 1986. He notes that he knew very little about cancer at the time, nevertheless, in the aftermath of genetic and molecular studies made in 1982, he knew that this was the right time for someone with his specialty to take on the challenge of cancer.

[CLIP C: The Value of the Oral History Project, At the end of the session, Dr. Hung comments on the importance of collecting the stories of key researchers and others who have contributed to MD Anderson.]

Session 2: 7 March 2014, about 1 hour 50 minutes

Segment 0
Interview Identifier
less than one minute

Segment 6
A: Joining MD Anderson/Coming to Texas
about 11 minutes
Recruited to MD Anderson for Cutting-Edge Oncogene Research

Dr. Hung explains why he chose to come to MD Anderson; he was recruited by Dr. Garth Nicholson because of his focus on tumors.

[CLIP C: Funny Stories, A: Joining MD Anderson, A: Character, Values, Beliefs, Talents. Dr. Hung jokingly tells about all of the colleagues how said, "Don't go to Houston." He tells a joke from a scientist's perspective that compares China's long history with the US's very brief one. This joke, Dr. Hung explains, tells why Houston's supposed lack of history and culture did not matter to him.]

Dr. Hung explains that, when he was recruited, his work was considered 'very modern and cutting-edge" because of his focus on oncogenes and cloning.

Segment 7
A: The Researcher
about 24 minutes
Early Work on Oncogenes and Adenoviruses: The First Gene Therapy

Dr. Hung begins this segment talking about how he set up his lab when he first arrived at MD Anderson. His goal, he says, was to have an impact on research into human oncogenes. He was looking at differences in the neu-oncogene in humans and animals. His question: "Can I identify something that will turn off the over-expression of this oncogene?" He began to look for a transcription suppressor. Next Dr. Hung describes the state of understanding of the Type 5 EIA and EIB genes: EIA was labelled as an oncogene when it in fact did not function in that way. His work resulted in clarification that EIB has oncogene activity, whereas EIA does not. Dr. Hung explains how "over-interpretation of data" can result in these types of assumptions about molecular and genetic function. Dr. Hung explains that the next research question was "If we can put this gene into a cancer cell, can it suppress breast cancer?" He describes work conducted with Dr. Dihua Yu on this question.

Next Dr. Hung explains that gene therapy had become 'very hot' in the 1990s. He and others formed a biotech company to take therapy using EIA to (successful) clinical trials. (Later in the segment he explains the fate of this biotech company.) Dr. Hung then explains how he began to think in new ways about the HER2 neu gene, looking for transcription factors.

[CLIP Dr. Hung describes a clinical trial: the *first* trial of gene therapy for breast cancer and ovarian cancer. He explains the implications of this study.]

Next Dr. Hung talks about how MD Anderson set up the biotech company dealing with this research and how it was eventually sold. He explains the impact of an event at University of Pennsylvania, where a child died as a result of gene therapy.

Dr. Hung explains some of the challenges specific to gene therapy, many relating to the vector used to transport the gene-related agents to cancer cells. He notes that, in the last decade, vectors have been greatly improved, and he explains the VISA vector system that was developed form the TSDA vector created at UCLA. He goes on to talk about the use of VISA to deliver Bik killer genes to cancer cells. He briefly describes the function of Bik genes, which turn on a cell's autodestruct mechanism, and explains that the VISA vector will deliver Bik genes *only* to cancer cells.

Segment 8
A: The Researcher
about 12 minutes
The Rationale Behind Translational Research and Why MD Anderson Provides a Good Environment

Dr. Hung describes meeting Dr. Waun Ki Hong, then explains what it means to think in a translational way, where a researcher works purposefully for a clinical outcome (rather than allowing these to spring accidentally from work not explicitly conducted with clinical issues in mind). Dr. Hung also notes that, as MD Anderson, "important clinical colleagues" are dealing with significant clinical questions, creating an environment conducive to solving the most important clinical questions in cancer. Dr. Hung points out why the overexpression of the HER2 neu oncogene is a great example of the translational model of research.

[CLIP Dr. Hung expresses how happy he is to work at MD Anderson, where he can pursue his passion for clinical research questions. He explains why he loves the song, *The Impossible Dream.*]

Dr. Hung describes the mindset of researchers involved in translational questions, where basic science outcomes can influence patients. He notes that scientists are part of the human community and can make a contribution to human issues.

Segment 9
A: The Educator
about 12 minutes
Training Basic Scientists: Grasping the Field and Preparing for the Future

Dr. Hung notes that he is #1 in graduating Ph.D.s from his laboratory and that his mentees go on to solid careers. He next explains the unique features of the Department's Journal Club, which meets on Saturday mornings and gives the department an opportunity to review fifteen to twenty journal articles. Dr. Hung explains that is it usual to review a much smaller number of articles in great detail, but he wants his faculty and graduate students to learn how to assess articles for new concepts in the field that might be exploited. He also notes that this practice enables graduate students to learn how to present concepts to peers and colleagues, and is part of his pedagogic approach to broaden graduate students capacities to assess concept and make research decisions based on a view of activity in a field. He explains the important of training graduate students to address "diseases we do not know about."

Segment 10
A: The Researcher
about 45 minutes
Research into Receptors, Pathways, Cross-Talk and the Utility of Existing Drugs

Dr. Hung begins this segment by explaining the structure of receptors: a portion of a cell receptor is accessible on a cell's surface, but it the receptor also penetrates into a cell's interior, a structure enabling it to communicate messages into a cell via "signal transduction." Signal transduction was first investigated in the mid-eighties and very little was known. The explosion of knowledge in this area in the intervening years has set the stage for targeted therapy. He explains how his work on tyrosine kinase fit into these developments in his field and also notes that investigations into signaling has led to an understanding of why cells metastasize.

Throughout this segment, Dr. Hung explains that he focuses on investigations into how existing drugs can intervene in molecular and genetic processes, as this avoids time-intensive drug research.

Dr. Hung next explains "signaling cross talk." Several signaling pathways may come together, intersecting, or "crossing," at different points along the entire process. Researchers may not be able to influence many portions of a clustered signaling pathway. But by intervening is a place below the location where two pathways cross, they can disrupt the entire process. This means that researchers can work with the existing bank of drugs, discovering how they can be used to disrupt cancer-promoting pathways, even if newly discovered pathways are resistant to what's available. "It's not a piece of cake," Dr. Hung says, "But we can do it." Dr. Hung gives the example of basal cell carcinoma and the Hedgehog pathway and then talks about mTor, a kinase that enhances gene expression leading to metastasis. Dr. Hung explains how drugs exist to intervene in all of the pathways that lead to these diseases. In addition, knowledge of signaling cross talk can enable researchers to predict which patients will not respond to a drug. His laboratory is involved in identifying markers that indicate who will respond and who will not respond to various drug treatments.

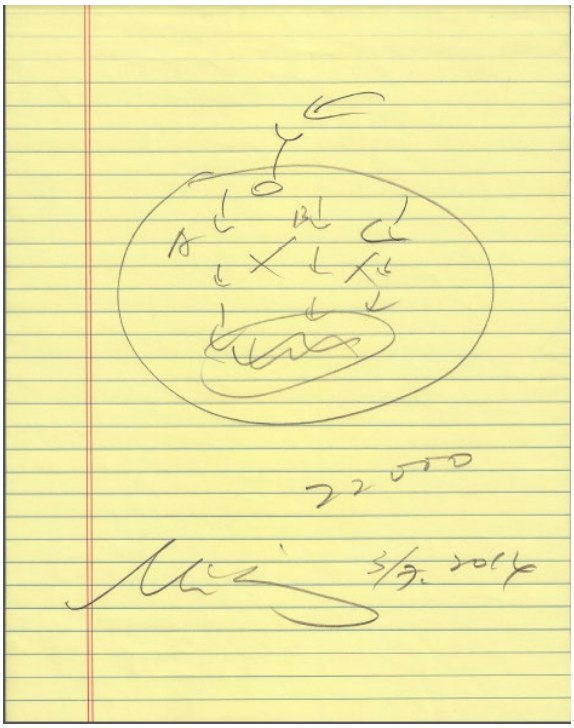
Dr. Hung talks about trials involving the HER2 gene and head and neck and colon cancers. He describes trials to test drug effectiveness after receptors are modified, learning more about why patients are resistant to drugs. He notes that fifty percent of breast cancer patients have modifications to receptors that make the drug resistant.

Dr. Hung next explains how his work is addressing the needs of the twenty percent of breast cancer patients who are "triple negative" and whom clinicians simply don't know how to help. His laboratory has identified several kinases that are activated in triple negative patients and they are investigating how their functions can be related to currently available drugs. Dr. Hung also explains that he sees his role as a "matchmaker," linking pathways to available drugs –ideally more than one drug, as patients become resistant to drug treatments. A pair of drugs can ensure the best therapy for the future. He notes that is model of translational research can also serve for pancreatic cancer.

Dr. Hung reiterates how useful it is to understand the complexity of signaling nodes in chemical/genetic communication, as these can be exploited to find ways of using existing drugs to intervene in cancer-promoting processes. His dream is that scientists will be able to identify all the cross-talk locations in a cell and identify in any patient which pathways are susceptible/not susceptible to existing drugs. He notes that "thirty years ago cancer meant you had done something bad in a former life." Today, he says, scientists can do anything as long as they have enough money. Whereas twenty years ago scientists knew nothing about signaling pathways, today chemical signaling pathways are being demystified. "There are twenty thousand proteins in a cell," Dr. Hung says. "But we only need fifty" to make a difference to cancer patients.

[CLIP Dr. Hung talks about the "huge paradigm shift" that has occurred. "We know what causes cancer." His scientific work has strategy behind and it is rewarding every day.]

Dr. Hung briefly talks about the future of research on cancer, breast cancer, and pancreatic cancer.



Segment 11
A: The Researcher
about 10 minutes
Co-Director of the Women's Cancer Moon Shot Program: An Environment of Team Science and Translational Research

Dr. Hung first explains why he thinks the Dr. Ronald DePinho's Moon Shot offers a good approach to these cancers and why MD Anderson is one of the few places where such a program could be successful. He then explains that ovarian cancer and breast cancer have been paired in this Moon Shot because of similarities in their molecular profiles. This means that their simultaneous study can possibly push research ahead more quickly. Dr. Hung next explains how the Moon Shots Program is structured administratively and practically with leaders and researchers drawn from surgery, gynecology and other specialties. He notes that fundraising is taking place now and that the focus will be on taking any knowledge now available and applying it in new ways so patients can see a benefit very quickly. Dr. Hung next talks about how the Development Office is involved in raising funds for the Moon Shots and how grants also support the work.

Dr. Hung next talks about the Moon Shots require a different mindset from participants, because they are team projects, not individual projects that allow individual ownership. This has changed MD Anderson culture to an extent, he notes, and the concept is moving ahead, now that the idea has taken hold. Dr. Hung next makes a comparison between the Moon Shots and SPORE grants, noting that MD Anderson has more SPORE grants than any other institution. He talks about these grants (Specialized Programs of Research Excellence, administered by the NIH) and how they created a new concept of collaboration between clinicians and basic scientists. The Moon Shots create that collaboration on a much bigger scale and solely to generate patient benefits.

Interview Session Three: 21 April 2014, about 1 hour 45 minutes

Segment 0
about 30 seconds

Segment 12
B: Building the Institution
about 19 minutes
Developing Translational Research at MD Anderson

Segment 12 Story Codes
- A: The Administrator
- A: Contributions to MD Anderson
- B: MD Anderson History
- B: Growth and/or Change
- B: Institutional Mission and Values
- A: The Leader
- C: Professional Practice
- C: Leadership
- C: The Professional at Work
- D: Understanding Cancer, the History of Science, Cancer Research
- A: The Researcher

In this segment, Dr. Hung discusses his first administrative experience as Director, Breast Cancer Basic Research Program (1996 – 2008). He notes that he worked with Dr. Gabriel Hortobagyi (Interview # 29) and explains that he learned a great deal via dialogue, as he knew very little about clinical work on the time. He explains why he chose to enter administration at that time. He also explains that in the early 1990s, the leadership at MD Anderson wanted to foster interactions between clinicians and basic researchers, as the NIH had developed the SPORE grant program. Dr. Hung observes that a culture of collaboration began to develop and have an impact on patient care, as the NIH was saying "I'm giving you money, but I'm forcing you to talk to each other." Next Dr. Hung explains what he learned about himself as a leader who could have "a different level of impact" as an administrator and describes his strategies for talking to faculty to encourage participation in translational research: He never asked researcher to alter their research programs, only to think about extending what they were already doing to patient-oriented questions. Dr. Hung observes that the timing for expansion of translational research was very good, as the field has amassed a critical amount of information. (Now the amount of information is so vast, he observes, that informatics needs to evolve.) Dr. Hung then talks about the impact of a translational focus: it is much easier to find grants, the researcher doesn't have to do much to justify work driven by basic clinical questions. He explains communication gaps between clinicians and basic researchers. He concludes this segment with the comment that MD Anderson must be translational because it is a cancer center (not an academic institution separated from patient-care issues).

Segment 13
about 19 minutes
A: The Researcher

A Twenty-Year Study that Promises a Paradigm Shift: The Yeast Two-Hybrid System

Segment 13 Story Codes
- A: The Researcher
- A: Character, Values, Beliefs, Talents
- A: Overview
- C: Discovery, Creativity and Innovation
- C: The Professional at Work
- D: On Research and Researchers
- D: Understanding Cancer, the History of Science, Cancer Research

In this segment, Dr. Hung describes his involvement in controversial research on the Yeast Two-Hybrid System. He sets the context by explaining the prevailing theory about how cell receptors interact with proteins, noting unexpected discoveries indicating that a receptor on a cell surface could relate to activity inside a cell nucleus. Though the experiments showing this were reproducible, the findings have not been accepted because they go against conventional paradigms. Dr. Hung traces the history of publishing his findings and speculates on why they have not been accepted. (He notes that the experiments are very complex, technically.) Dr. Hung explains that he has always been convinced that there is something significant in this finding and notes that his laboratory has continued to work on the mechanisms of how the signals move from the surface receptor to the nucleus of a cell. His laboratory has demonstrated that these signals influence DNA repair and transcription and therefore have implications for anti-cancer therapy. He believes that these mechanisms will be recorded in textbooks in the future, and notes that his laboratory has been able to link the Yeast Two-Hybrid system to functions involved in liver regeneration. In the remainder of this segment, Dr. Hung makes general statements about how basic scientist must focus on the reproducibility of data, rather than accepted dogma, to guide the discovery process.

Segment 14
about 28 minutes
B: Building the Institution
The Department of Molecular and Cellular Oncology

Segment 14 Story Codes
- A: The Administrator
- B: MD Anderson History
- B: Growth and/or Change
- B: Institutional Mission and Values
- A: The Leader
- C: Professional Practice
- C: Leadership
- C: The Professional at Work
- A: Character, Values, Beliefs, Talents
- B: MD Anderson Snapshot

B: MD Anderson Culture
A: The Leader
C: Leadership
A: The Mentor
C: Mentoring
B: MD Anderson in the Future
D: Understanding Cancer, the History of Science, Cancer Research
D: The History of Health Care, Patient Care
D: Business of Research

In this segment, Dr. Hung describes the history and development of the Department of Molecular and Cellular Oncology, a Department he has headed since 2000. He notes that he was recruited to the Department of Tumor Biology by Dr. Garth Nicholson and that after Dr. Nicholson left, there was talk of closing the Department. Dr. Hung explains administrative restructuring that occurred once the decision was made to keep the department: it was reorganized as the Section of Molecular Cell Biology reporting to Dr. Josh Fidler, Head of the Department of Cancer Biology. (Dr. Hung was the section chief.) After two years, Dr. Fidler asked that the Section be restructured as a separate department. Dr. Hung became Chair of the new Department of Molecular and Cellular Oncology, reporting to Dr. Margaret Kripke. He notes that Dr. Kripke asked him about his vision for the Department. Dr. Hung notes that, at the time, basic research was not as strong at MD Anderson. He describes the very bold goals he set for the new department, to quickly raise standards and the profile: he set upon a program of recruiting new basic scientists and asked that all faculty aim to place three articles in major journals per year. He then explains how he was able to convince faculty to rise to this challenge, serving as a role model and encouraging and advising faculty to work strategically.

Dr. Hung notes that his department is number one at MD Anderson in terms of publications. He also explains that, based on his experience with the Breast Cancer Research Program, he encouraged translational research, "playing matchmaker" and putting people together. Now faculty members in his Department each have a "disease commitment" for their research. He affirms that his is a "model department," demonstrating collaboration between basic scientists and clinicians.

Next Dr. Hung briefly talks about a major lesson he learned about leadership after taking on the Chair of the Department: "never confront" and argue or become angry with faculty. He notes that he educates all his faculty members in this lesson. He also explains that he tells his junior faculty that their projects are the most important priority to him (even over his own work). He explains why this support is so important to nurture the careers of junior people.

[the recorder is paused for about 2 minutes]

Next Dr. Hung briefly talks about MD Anderson's Mentorship Committee Program for junior faculty.

Finally, Dr. Hung shares his aspirations for the future of the Department. He feels it is very bright with the new leadership of Dr. Ronald DePinho and his Moon Shots program, designed to have a significant impact on patient care. Dr. Hung explains that he would like to see the Department's work on signaling pathways become the top in the nation, not only in terms of basic science, but providing collaborators for studies in clinical departments. He explains that he believes there is a good possibility to reach this goal because of the vast well of existing knowledge. He says, "My dream is to go to CVS for cancer drugs," and explains that basic research is already helping the right patient to choose the right drug. He then explains how adequate funding is key to pushing research forward.

Segment 15
about 34 minutes
A: The Administrator
Vice President of Basic Research; The Institute for Basic Science

Segment 15 Story Codes
- A: The Administrator
- B: MD Anderson History
- B: Institutional Mission and Values
- C: Professional Practice
- C: The Professional at Work
- A: Character, Values, Beliefs, Talents
- B: MD Anderson Culture
- C: Leadership
- C: Portraits
- C: The Institution and Finances
- B: Philanthropy, Fundraising, Giving to MD Anderson

Dr. Hung begins this segment explaining how he was offered the position of Vice President of Basic Research. He had been offered a position as director of another cancer center. Dr. John Mendelsohn (president at the time) invited him for a conversation. Dr. Hung explained he wanted to have more impact at MD Anderson and the position of Vice President of Basic Research was created for him. Dr. Hung explains his roles at the time, working with Dr. Robert Bast (Vice President of Translational Research) and Provost Raymond DuBois on virtually every basic science activity. He explains that he has had less of a role since the hiring of Vice Provost of Basic Science, Dr. Helen Piwnica-Worms. Dr. Hung explains that a key decision involved recruiting and he recounts a conversation with Dr. DuBois: "We need to hire people that are better than you and better than me!"

Dr. Hung next explains that the new president, Dr. Ronald DePinho, wanted a great deal of recruitment and Dr. Hung was involved in those activities. He next gives an overview of Dr. DePinho, whom he says serves as a role model who raises the bar. He explains the positive points of Dr. DePinho's Moon Shots program.

[The recorder is paused for about 8 minutes]

Dr. Hung next talks about the Institute for Basic Science. He explains that as VP of Basic Research he would have regular discussions with Dr. John Mendelsohn about strategy, and the Institute for Basic Science was created as a virtual institute designed to raise funds for basic science research, an area that traditionally doesn't do much fundraising. He explains the administrative structure and notes that there have been changes since Dr. Ronald DePinho assumed the presidency. He explains the impact of the Institute and talks about the yearly retreat that the Institute created: representatives from all member departments would present work in a setting that fostered communication and future collaboration. Dr. Hung then explains that the basic sciences were traditionally left out of the institution's major fundraising projects, but that changed with the founding of the Institute.

[The recorder is paused for about 4 minutes]

Dr. Hung notes that the Institute has raised from 50 – 70 million dollars. He sets this in the change in leadership, noting that the Moon Shots must be the highest priority for fundraising at this time. Dr. Hung next explains how the Institute would present basic science issues to potential donors to secure funds.

Segment 16
About 12 minutes
A: View on Career and Accomplishments
Leaving a Legacy in Research, Education, and MD Anderson Culture

Segment 16 Story Codes
- A: Contributions to MD Anderson
- A: Career and Accomplishments
- A: Professional Values, Ethics, Purpose
- B: MD Anderson Impact
- B: Institutional Mission and Values
- B: MD Anderson Culture

Dr. Hung begins this segment with comments on how happy he has been at MD Anderson during his twenty-eight years at the institution. He is gratified to know he is "really part of a team" and that he has been able to sustain his basic-science focus while working on patient-related issues. Dr. Hung next notes that he would like to be recognized for his research that has yielded patient outcomes. He also notes the challenges that have come with running a large laboratory of forty to fifty people, and how he also is very active training and educating members of his laboratory. He talks about the importance of training the next generation of scientists –for MD Anderson and to apply knowledge at other institutions and in other scientific arenas. He also talks about how important it is for researchers to "learn science and how to behave." He notes that the Department's Ph.D. program is second in the nation.

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Mien-Chie Hung, PhD

Session 1:February 20, 2014

About transcription and the transcript

This interview had been transcribed according to oral history best practices to preserve the conversational quality of spoken language (rather than conforming to written standards). It has been edited to enhance clarity.

The interview subject has been given the opportunity to review the transcript and make changes: any substantial departures from the audio file are indicated with brackets [ ].

In addition, the Archives may have redacted portions of the transcript and audio file in compliance with HIPAA and/or interview subject requests.

Chapter 00A
Interview Identifier

T.A. Rosolowski, PhD
[0:00:01.3]
And we are now recording officially so I will put the identifier on and then we --- we'll be ready to roll. So, I'm Tacey Ann Rosolowski, and today I'm interviewing Dr. Mien-Chie Hung. Am I pronouncing that correctly?

Mien-Chie Hung, PhD
[0:00:15.2]
Correct.

T.A. Rosolowski, PhD
[0:00:15.4]
Okay. For the Making Cancer History Voices Oral History Project run by the Historical Resources Center at MD Anderson Cancer Center in Houston, Texas. Dr. Hung came to MD Anderson in 1986 as an Assistant Professor in the Department of Tumor Biology and also in the Graduate School of Biomedical Science. He now serves as the Vice President for Basic Research and he also holds the Ruth Legit Jones Distinguished Chair. He is a distinguished

teaching professor and serves as Professor and Chair of the Department of Molecular and Cellular Oncology. Alright, and I'm getting the thumbs up.

Mien-Chie Hung, PhD
[0:00:51.8]
Good.

T.A. Rosolowski, PhD
[0:00:52.4]
Good. Sometimes I have to make some corrections there. This interview is taking place in Dr. Hung's office in the Clark Clinic on the main campus of MD Anderson, and I just had to add the little detail that this was once Dr. Stephen Tomasovic's office. And he is the originator of this project really, so that's kind of an interesting connection. This is the first of two planned interview sessions and today is February 20, 2014. The time is 3:12. So thank you very much Dr. Hung for taking the time for this.

Mien-Chie Hung, PhD
[0:01:26.8]
Well, thanks for coming. This is a --- I think this is an important project for our institution, so I appreciate that you put your effort on this project, and I'm certainly honored to be able to help.

T.A. Rosolowski, PhD
[0:01:38.4]
Oh, I'm delighted, and it's just --- it's so important to get all the different perspectives recorded, so thank you. And I know your time is --- is valuable and precious.

Mien-Chie Hung, PhD
[0:01:47.5]
No, this is important.

Interview Session: 01
Interview Date: February 20, 2014

Chapter 01
Choosing Biochemistry: a Window into the Complexity of the Universe
A: Educational Path;

Story Codes
A: Character, Values, Beliefs, Talents;
A: Personal Background;
A: Professional Path;
A: Military Experience;
C: Funny Stories;
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
A: Inspirations to Practice Science/Medicine;

T.A. Rosolowski, PhD
[0:01:50.5]
Alright. Well I wanted to start with just some basic biographical and some personal background, so can you tell me date of birth, where you were born?

Mien-Chie Hung, PhD
[0:02:01.9]
Okay. I came from Taiwan. I was born in 1950, September 4th, and grew up in Taiwan. I have all my middle school, little elementary school, I trained in Taiwan. I --- In Taiwan I graduated from National Taiwan University with a chemistry major at the --- for my Bachelor's degree. Then after that I also received a Master's degree, major in biochemistry in the same university. Then --- oh, by the way, I spent two years in the army. Every healthy man in Taiwan at that time was supposed to serve in the army.

T.A. Rosolowski, PhD
[0:02:44.8]
Let --- Let me ask you, before we go on to your later educational experiences. Tell me a little bit about your family. Were your family members involved in the sciences?

Mien-Chie Hung, PhD
[0:02:53.1]
Yes. Yes. No, actually I am the only so --- well, I should not say that. My elder brother was a major in chemistry, but later on he didn't really do science. He was doing business. Actually

my other brother is in New York. He's gone --- he's running a real estate pretty well --- good business man and my --- you want me to say a little bit about my family?

T.A. Rosolowski, PhD
[0:03:12.2]
Please do. Yes.

Mien-Chie Hung, PhD
[0:03:12.8]
Okay. You know, my parents ran a pretty successful bakery store, believe it or not. Unfortunately, I did not learn how to make, but some of my, brothers and sisters, they know how to do that, so we came from a business background. And, probably at this moment, I'm the only one who stayed in academics, and so I --- there are actually four brothers including myself and two sisters.

T.A. Rosolowski, PhD
[0:03:45.9]
Wow. Large family.

Mien-Chie Hung, PhD
[0:03:46.2]
And --- yeah, large family. At that time, it was not uncommon in Taiwan, because back to the old days, you know, people four or five kids in the family, big family at that time then. And right now, of course, it's unusual. And so …

T.A. Rosolowski, PhD
[0:04:01.4]
Let me ask you, do you feel like that business background that you had in your family, did that have any influence on you today?

Mien-Chie Hung, PhD
[0:04:07.3]
I think it's --- it's actually a plus. Because it's a broader view. Because if I think --- not a negative. I think if people come from an academic background --- their whole entire family, which is kind of nice-- but they look at things very academically. For example, inside our institution --- this is a big, multiple-discipline institution, right? So a lot of times we are doing basic research. So, when we stay in the basic research that we are looking for research per se. But when you're looking from an institutional point of view, in many occasions tbusiness concepts are important there and that help --- that help[s]. That helped at the time when I start to have a leadership position. When I look at things, I not only look at myself per se, but my

department, our institution and so on. So those business concepts that I grew up from my family --because when I grew up, I certain[ly] learned, you know, in the family --and that helped, that helped. And that helped me to very easily to fuse into this business kind of a model of a concept inside the institution.

T.A. Rosolowski, PhD
[0:05:17.3]
I was wondering about that because it --- it's funny how, you know, these experiences that seem they come from left field. Actually they can be very, very important to your effectiveness.

Mien-Chie Hung, PhD
[0:05:24.9]
Yes. Yes. Yes. And I personally feel that's actually very positive. Very positive.

T.A. Rosolowski, PhD
[0:05:31.4]
What about your experiences in the army? Did that have any effect?

Mien-Chie Hung, PhD
[0:05:34.6]
Say --- Say again.

T.A. Rosolowski, PhD
[0:05:35.5]
Your experiences in the army. How did that affect you?

Mien-Chie Hung, PhD
[0:05:37.3]
Yes. Yeah. At a time when, you know --- the relationship in Taiwan and China is, it's not as sensitive now. But at that time, we found it very sensitive. So every man in --- every young man in Taiwan, if you are healthy, you're supposed to serve two to three years [in the] army. So that two-year army experience was also very positive for my career. That is, I learned discipline. You know, in the army you --- you don't argue. When your captain tells you right turn, right turn --- there's no Why do I turn right? Of course, this is very different from science. Where science --- when I got to science, of course, I ask --- we ask questions, Why? We ask "why" all the time. But research-wise we still have to have some sort of discipline, and that's what I learned a lot from that when I was in the army. So that probably affected me because I'm a pretty good citizen, okay? And so, I usually --my immediate supervisors stop to me-- of course, this is a free country. Sometime I may ask, Why you want to do that, thing like that. But I usually --I follow the order.

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T.A. Rosolowski, PhD
[0:06:46.8]
What were the years when you were in the army?

Mien-Chie Hung, PhD
[0:06:49.5]
Okay. Let me think about this.

T.A. Rosolowski, PhD
[0:06:51.5]
I didn't see it on your CVm otherwise I wouldn't put you on the spot.

Mien-Chie Hung, PhD
[0:06:55.1]
Seven --- 19 --- Let me see. 1973 to 1975. If it's wrong I'll correct that. It's --- If it's wrong it's probably plus a couple of years. Then after that I went to a Master's program. And then after that I came to United States.

T.A. Rosolowski, PhD
[0:07:11.8]
Now tell me a bit about your education. What about the National University --- the National Taiwan University chemistry. Why did you choose to major in chemistry?

Mien-Chie Hung, PhD
[0:07:23.5]
Okay. So National Taiwan University -- I have to brag a little bit. At that time --and at this moment, it's still correct that it is the number one university in Taiwan, okay? And then it was not easy to get into that university. And --- the --- I --- ever since I was little --although my family was a business, running a business-- but I always wanted to be a scientist. You know, when you are an elementary school kid, every time when a new teacher comes in, the first thing they want to know you --they ask you, What you do you want to be in the future, right? So most of time, when I wrote it, I wrote the essay about how I imagined I wanted to be a scientist. Sometimes occasionally I would write --- I would say I want to be a musician ---. I don't know any of the instruments, but I like to sing. I'm a good singer. I sing karaoke, but I never have any professional training. I wish I had gotten it, but I didn't.

T.A. Rosolowski, PhD
[0:08:19.3]
I won't ask you to sing. I promise.

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Mien-Chie Hung, PhD
[0:08:20.8]
I can sing now.

T.A. Rosolowski, PhD
[0:08:21.9]
Do you want to?

Mien-Chie Hung, PhD
[0:08:23.6]
Dr. Hung singing *Wise men say, only fools rush in.* Anyway.

T.A. Rosolowski, PhD
[0:08:34.6]
[Laughing] Thank you so much. That's fantastic.

Mien-Chie Hung, PhD
[0:08:37.7]
No, no, no. Many friends told me --- ask me to do Elvis Presley. Although I'm getting old so my voice is not as good as before but, you know, it's okay. It's okay. But I --- I --- I always wanted to be a scientist, so …

T.A. Rosolowski, PhD
[0:08:52.0]
What --- Let me ask you, why? I mean …

Mien-Chie Hung, PhD
[0:08:54.0]
Oh. Hey. You asked the right person. Because I always imagined science is *the* field that makes a lot of things that are impossible become possible. And that's still --- regardless if you are a physicist, chemistry, biology, or biochemistry-- that's still true. I mean for example, that when --- when the first radio was discovered, it's impossible. At that time nobody could imagine it. How could you, right? But now look at about all these cellphones. I still remember that when I was a high school kid, and my elder brother was studying in United States, and he wanted to call home. He had to write a letter to my father saying, So and so time I'm going to call. It was very expensive. Whole family was waiting next to the telephone, right? Then he called. When it rang, then my father picked it up and said a few words --and now we're a big family. My mother, my brother, my sister, everybody says one sentence. Hello pretty much, then hang

up. That's all you can do. But every day…[Dr. Hung gestures]

T.A. Rosolowski, PhD
(approx. 0:10:01)
Yeah, the cell phone.

Mien-Chie Hung, PhD
(approx. 0:10:02)
Cell phone, right? And it's very cheap, too. So now that's something, and then I mention now, cancer? Well, cancer thirty years ago, people didn't even want to talk about it, because you think, I did something wrong with my last life. But right now we all know what S on the table. How many survivors in --- cancer survivors in the United States? Fifteen million, right? That's a large number, right? And so, those things turning from impossible to possible come from where? Come from science. That's probably not the only reason, but that's one of the major reasons drawing me to --- to want to be a scientist. Because you can make the impossible possible, and really --- know what happens in nature --- exists in nature and also create something which didn't exist.

T.A. Rosolowski, PhD
[0:10:51.9]
What --- When did you first start seeing that you had talent, you know, gift for this?

Mien-Chie Hung, PhD
[0:10:57.3]
I never see I have talent. Even now.

T.A. Rosolowski, PhD
[0:10:59.4]
Really? But I mean what --- what gave you ---

Mien-Chie Hung, PhD
[0:10:59.9]
No, I'm just joking

T.A. Rosolowski, PhD
[0:11:01.3]
What gave you the sense? Well you know some people are very --- they don't want to say they have any talent so maybe --- but I'm glad you're not one of them. So when did you start seeing you know like "Wow I can do this! I can make things happen in this field." How early was that?

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Mien-Chie Hung, PhD
[0:11:17.2]
Let me see. Let me think about it. I did always dream of being a scientist, especially when I was a high school kid. I was --- really loved chemistry and physics. At that time, biology was not -- life sciences came in a little bit later. So I did always dream that --for example, how big is the universe? We just --- just don't know, right? Peculiar. One, another one, --It's unlimited, but still at this moment, we still don't know. Right? We talk about bacteria. How small is that, and we talk about atoms. Remember at that time we said cell. It's a cell, atom, you have a neutron, right? But later on --I'm out of date now. They have how many particles? Those are smaller than this, and it's all very interesting. And that's just in nature. And so those ---those just attracted me, but I had not thought about whether I'm very good at that. Well actually, might be I should not say that. When I'm in high school and --- and we had to pass a very competitive entrance examination in Taiwan. And I told you that the university and the department I was in was top of the line. It was --- It was usually like we said the number one in that kind of department, okay? So, I was very --- yeah, I almost forgot it. I'm glad you asked. When I was a senior high school student just right --- right before the year to past the entrance examination, I think our --- my classmates considered me as a genius in mathematics. Or --- I forgot it now already because I --- and actually I think it's not because I'm genius. It just because I studied so hard, so I knew so much stuff. So I --- everything is in my brain so I can think very quickly. So many of my classmates couldn't imagine that --how come my mathematics was so good. I --- I remembered there was some --- one time the test was so difficult everybody was thinking they'd flunk or something, but I still got a ninety something points. And so. But that's --- That's rather irrelevant now. You know there was one period of time when my mathematics was very good, and then after I passed the entrance exam and that's when I went to the chemistry department. I liked chemistry. I was very fascinated that in chemistry, like first you add the reagents together, then you polymerize. Some solutions become solidified, and they change color, and you can make soap, right? And clean your --And that's --- in the lab we can do that. It's --- It's a *lot* of fun. It's a lot of fun there. And then until I become senior college student we started to be exposed to biochemistry, life science. *Oh*, then I really fall in love with it, because at that time large molecules, macro molecules [0:14:07.8] proteins, nuclear assays. So at the time when I studied chemistry it's also more about molecules. You have a science background, right?

T.A. Rosolowski, PhD
[0:14:14.0]
Mmhmm.

Mien-Chie Hung, PhD
[0:14:14.5]
Yeah. So also more molecules. But then when you start biochemistry, wait a minute your large molecule, a protein, from _____ [0:14:22.4] builds as a tertiary structure and these two

structures become a protein, and these proteins _____ [0:14:28.9] activity, and _____ activity make this subject become the other subject. Those things really attracted me.

T.A. Rosolowski, PhD
[0:14:34.2]
This may seem like a crazy question, but do you see these things in your mind like images --- pictures of these?

Mien-Chie Hung, PhD
[0:14:39.8]
Images?

T.A. Rosolowski, PhD
[0:14:40.6]
Like pictures in your mind of these big systems. Can you like close your eyes and like see them?

Mien-Chie Hung, PhD
[0:14:45.9]
Yeah. Real visual, those things, yeah.

T.A. Rosolowski, PhD
[0:14:46.5]
It's a visual. Yeah.

Mien-Chie Hung, PhD
[0:14:47.3]
Everything. Those things. Yeah.

T.A. Rosolowski, PhD
[0:14:49.9]
I'm just curious because some people in these fields are very visual thinkers. You know they just --- they get their ideas in a visual form, not just words or symbols but in images. Yeah.

Mien-Chie Hung, PhD
[0:14:58.4]
Yeah. And --- And at that time I really fall in love and when I was a senior high --- senior at college and the --- well a senior and junior, right --- junior and senior, that third and fourth year. So I fell in love in those biology and chemistry, and those large molecules, the protein structures, and the --- and the nuclear assays. At that time nuclear assays are not very --- limited, very, very limited. But when I came to the United States, I went --- I went to Brandeis for Ph.D. training,

and then at that time molecular biology --the cloning had just come out, so I was then poised for moving to that field.

T.A. Rosolowski, PhD
[0:15:36.6]
Now I want to make sure that we get all the relevant information about your undergrad and then your Master's program. Is there anything else you'd like to say about how that period of study influenced your future directions before we move on to your Ph.D. program?

Mien-Chie Hung, PhD
[0:15:54.8]
Because that, my undergraduate --especially in the Master's program is where I really studied biochemistry. Okay so my, my college chemistry, but in the third, fourth year in college I really lot --- liked life science. So I'm not a very good student in --- based on the transcript at that time. But every summer, I spent a lot of time reading those things which I feel are interesting. And so then after the two years of army service, I passed, you know grad school and entrance examination. Went back to the same department. Well not to the same --same college, but a different department called Institution of Biology Science and Chemistry. So I studied for a Master's degree. You know at that time what I studied --- remember I told you I was interested in protein structure, right? At that time people in Taiwan, you know what kind of protein they studied? They studied snake venom protein. So snake venom --- You know when a snake bites people, the reason --- Snake actually is a very nice animal. If you don't touch them, they don't bother you. But when they bite you, the --- the toxic stuff coming out, those are proteins. Those are snake venom proteins, and a lot of time --because Taiwan used to have a lot of snakes, but no longer could be the case. So at that time, we actually --- I saw --- I saw that the snake venom had a specific protein and tried to understand the structure of the protein and function of protein. The snake --- snake venom protein research in Taiwan is pretty well known because -- those geographical issues. I actually studied one of the proteins called cardiotoxin from the--- I guess I could say what kind of snake? It's one of the very ugly snakes. Usually when people talk about snakes they talk about them.

T.A. Rosolowski, PhD
[0:17:44.6]
Oh, like a pit viper?

Mien-Chie Hung, PhD
[0:17:46.5]
Something like that.

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T.A. Rosolowski, PhD
[0:17:47.3]
Yeah they have a really ugly face.

Mien-Chie Hung, PhD
[0:17:50.2]
And so then we --- we used the physical method to understand the structure, then we tried to understand the function, and it was very interesting. I was in heaven. I have one paper a long time ago. We modified this protein, kind of partially destroyed it, and so --- so when we modified this protein, the protein function was lost. Function meaning the toxicity. But the structure was still there. So at that time we used --- I used that one to e --- to immune the animal. So I was dreaming, hey this could be a vaccine. Because this one has no toxicity anymore, but the structure is there, so you still can inject it into an animal, and the animal would start producing antibodies, right? So --- But you know we didn't further pursue it, and also nobody was going to do this vaccine. Come on. It's different for a virus or _____ [0:18:48.9], no the N1 virus. I mean snake venom is --- snake --- there's not too many people being bitten by snakes anymore, so anyway.

T.A. Rosolowski, PhD
[0:18:54.4]
Still it's another example of making the poss --- impossible possible in science.

Mien-Chie Hung, PhD
[0:18:57.3]
Yeah, yeah. So --- So we all dreamed all this, and I wanted to understand what the structure was, and why this protein caused this function, and also can you modify it and make the toxic compound non-toxic, and can that help human health, okay? So that was interesting.

T.A. Rosolowski, PhD
[0:19:13.5]
The whole package.

Mien-Chie Hung, PhD
[0:19:13.6]
Interesting that --- It was just when I was especially in the Master's program, because my Master's program in that institution was in a brand new building which was actually the first building that had central air conditioning in our university. Before that we didn't have air conditioning. We had an electric fan but we don't have it. Therefore as a peer --- a master student at that time, I slept in the laboratory. Because I can go to --- my dormitory is not too far. I walk or ride a bicycle, but --- but the thing is in my dormitory I don't have air conditioning

there. Okay, so --- so I only went back to my dormitory once a mon --- once a week or two. We don't have laundry. Laundry we had to do by ourselves. I only went there to clean my laundry. I stayed because the building was brand new and everything had centralized air conditioning and we had large couch like this type. When I slept on the couch, it was better.

T.A. Rosolowski, PhD
[0:20:17.5]
All the comforts of home.

Mien-Chie Hung, PhD
(0:20:19..3)
It was better than my dormitory, so I just slept there. And then because it's a brand new building it was nice there, and they have a shower room --for safety reasons. Perfect when the students stayed there. And so we have --- our year I had quite a few classmates. We all worked very hard. We all stayed there in the lab because it's very comfortable. Especially in Taiwan, you know, Taiwan is the same. The weather is the same as Houston. Especially summertime. So I'm glad I talked to you because all this is history. I don't remember it now. If I don't talk to you I would not think about those things. Yeah, I stayed in the lab. The couch. I mo --- moved two couches together, and it was very soft and then --- then you sat next to the equipment. That was very fancy equipment and my supervisor told me the equipment lasted only a certain period of time. If you turned it on, you better leave it on for a long time, like 15 hours or something like that. You don't want to turn it on one hour, turn it off. The ---the light --- the life of the lamp is going to be shortened. And those were very expensive. Of course at that time everything was expensive in Taiwan. Well not especially just back to that time. So I slept next to the equipment. When I woke up early in the morning, first thing --- first thing before I went to brush my teeth and those things, I turned on the equipment, then turned over. You had to let the equipment warm up. Then I go to --- Then I go get ready and come back --- yeah, back to the office.

T.A. Rosolowski, PhD
[0:21:59.0]
Perfect --- Perfect lifestyle for the student.

Mien-Chie Hung, PhD
[0:22:00.6]
Per --- Per --- If you like to write down there what that equipment --- that equipment is still being used for. That is CDORD.

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T.A. Rosolowski, PhD
[0:22:08.8]
What is it? C?

Mien-Chie Hung, PhD
[0:22:09.6]
C-D-O-R-D. The ORD name is not used, but CD is still being used. Circular Dichroism --- Dichroism. This one is still available for those few people who study it. This is the equipment to study the secondary structure of the protein. You know, protein structure have what we called the primary sequence, secondary structure, and tertiary structure, and this equipment is the one which can provide a database to analyze the secondary structure.

T.A. Rosolowski, PhD
[0:22:43.0]
Why is the secondary structure important?

Mien-Chie Hung, PhD
[0:22:44.8]
Okay. All the structures are important. You know the immuno --- the protein is from immunosequence, right? So in immunosequence, the first one is just like a train. The first one is this one, the second one --- The first one is A, second one C, third one D and so on. This sequence we call the primary sequence. Then after that they folded it. They folded at certain times. Six structures. This region is a helix. Just like helix and this outer region is like this kind. So this --- this is a local --- this is a partial structure called a secondary structure. Then tertiary structure meaning the entire protein. That's called tertiary.

T.A. Rosolowski, PhD
[0:23:20.5]
Oh, okay like the gestalt of it. Yeah. Okay. Interesting. So the understanding of proteins at that time, and really the ability to do modern biochemistry, really relied heavily on this kind of technology being available.

Mien-Chie Hung, PhD
[0:23:37.2]
Oh, yeah. And --- And those technology I improved a lot now, and they still, for example -- tertiary structure, people use x-ray. And then people in _____ [0:23:45.3] and now it's become very, very popular. At that time it's --- it's a research tool, and it's not easy to determine a tertiary structure at that time. It's just a long project but now it's become just (snapping fingers) yeah, x-ray.

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Chapter 02
Experiencing Culture Shock in the United States
A: Personal Background;

Story Codes
A: Character, Values, Beliefs, Talents;
A: Personal Background;
A: Professional Path;
A: Experiences Related to Gender, Race, Ethnicity;
C: Mentoring;
A: The Mentor;

T.A. Rosolowski, PhD
[0:23:56.0]
Wow. Yeah. Right? Advances. So tell me about your decision to leave Taiwan and do your Ph.D. in the US.

Mien-Chie Hung, PhD
[0:24:04.5]
I --- You know that's a very easy answer, okay? Taiwan --- You want to be a scientist? You want to do science in Taiwan? Yes, I love Taiwan. I still love Taiwan. I to to Taiwan very often now because I am still on a lot of committees, but wait a minute. We don't have lots of resources. We don't have lots of good environments. Right after World War II --- Remember during World War II that --- you probably don't remember --- but the B29 from Taiwan, okay? Taiwan was very poor after World War II. Taiwan was owned by --- was governed by Japan. It was considered Japanese. At that time it was very common for people in National Taiwan University in the top departments, many of them, if they wanted to be scientists they had to go abroad. So it was common. This was an easy question. Why I should come to the United States? Because I wanted to be a scientist. And you want to be a top scientist, then you better go to the best place. Like in Taiwan I went to NTU, National Taiwan University, but in after training at NTU, I came to United States. It's still true right now, although right now we are more competitive. Now the whole world is coming up. But 20-30 years ago this was the place to do it. So then I …

T.A. Rosolowski, PhD
[0:25:14.1]
How did that happen? I mean di --- was --- did you make connections? You just tried? I mean what was the process?

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Mien-Chie Hung, PhD
[0:25:17.8]
Oh, yeah. At that time I studied for my Masters there because I --- I told you my undergraduate, I was not a top student. I knew I --- if I applied it was unlikely. When I was a Master student I stayed in the lab. I spent time. I produced a lot of data. We published quite a few papers, so from my Master thesis I published three or four papers. So it was very impressive to check the records. So then you --- then I applied for United States for --- I still applied to biochemistry programs, of course. I applied quite a few places, and then of course we had to go through those databases. And at that time there was no --- no Google, no Yahoo, right? So you had to go through the American Institution of Education to do something. There's a --- From United States, there's some institution in Taiwan, Taipei actually, then you can go there to borrow their library --- to the library to borrow --- to look in for the index of what university is the best, and in which field, and those kinds of databases. Now it's very easy because you can go to a website, but at that time you had look one by one, page by page. That's what I was looking for, which university was good in biochemistry. And then apply to them and --- and also looking for their criteria requirements. I had to pass TOEFL, GRE, and that kind of stuff.

T.A. Rosolowski, PhD
[0:26:39.3]
Right. How did you choose Brandeis?

Mien-Chie Hung, PhD
[0:26:41.6]
Ahh go --- good question. I actually applied to MIT, Brandeis, UC Berkeley, and Yale. MIT is the only one that rejected me. All the rest accepted me. And my wife and I were classmates, so both of us applied.

T.A. Rosolowski, PhD
[0:26:59.0]
Oh, okay. So you were married before you came to the US?

Mien-Chie Hung, PhD
[0:27:00.9]
Oh yeah, yeah.

T.A. Rosolowski, PhD
[0:27:01.8]
And your wife's name?

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Mien-Chie Hung, PhD
[0:27:03.5]
Kinglan Chen.

T.A. Rosolowski, PhD
[0:27:05.0]
K-i-m?

Mien-Chie Hung, PhD
[0:27:06.4]
K-i-n-g.

T.A. Rosolowski, PhD
[0:27:07.6]
K-i-n-j.

Mien-Chie Hung, PhD
[0:27:07.8]
This is another interesting story. Kinglan.

T.A. Rosolowski, PhD
[0:27:13.4]
K-i-n-j-l-a-n.

Mien-Chie Hung, PhD
[0:27:14.9]
K-i-n-g.

T.A. Rosolowski, PhD
[0:27:15.7]
Oh, G.

Mien-Chie Hung, PhD
[0:27:16.2]
L-a-n.

T.A. Rosolowski, PhD
[0:27:16.8]
L-a-n.

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Mien-Chie Hung, PhD
[0:27:17.6]
She should have spelled it J-i-n-g-l-a-n, because her Chinese name is Jinglan. But because in Taiwan Jing is King, it's gold, so she put Kinglan. But when everybody --- she's my classmate --- when everybody said Kinglan they thought she was me and I was her.

T.A. Rosolowski, PhD
[0:27:36.3]
Oh, interesting.

Mien-Chie Hung, PhD
[0:27:37.2]
Male.

T.A. Rosolowski, PhD
[0:27:37.7]
Yeah.

Mien-Chie Hung, PhD
[0:27:38.2]
King.

T.A. Rosolowski, PhD
[0:27:38.6]
Right. Sure.

Mien-Chie Hung, PhD
[0:27:40.2]
Ah anyway. So she --- she and I started Brandeis together. We were classmates. So my professor always mixed us up. Hung --- Hung --- Mien-Chie Hung is a she and then Kinglan --- and people still feel that way because it's --- I mean King, right? That's male. Right?

T.A. Rosolowski, PhD
[0:27:55.8]
Does your --- Does your name mean something in Chinese?

Mien-Chie Hung, PhD
[0:27:58.4]
Yes.

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T.A. Rosolowski, PhD
[0:27:58.8]
What does it mean?

Mien-Chie Hung, PhD
[0:28:00.4]
Mien --- I didn't spell that very well, but Mien-Chie. Mien actually means --- it's --- in Chinese characters it is the sun and the moon together. So in Chinese meaning --- so when I write the Chinese character, Mien it is the sun and the moon together. And then the meaning, it means bright, right? And Chie in Chinese is two meanings, either strange or outstanding, so I pick outstanding. It's an unusual one. Unusual could be strange right?

T.A. Rosolowski, PhD
[0:28:42.8]
In a good way.

Mien-Chie Hung, PhD
[0:28:45.2]
It could be outstanding.

T.A. Rosolowski, PhD
[0:28:47.5]
I always think strange is actually a plus.

Mien-Chie Hung, PhD
[0:28:50.6]
And my wife's name was Jinglan. Jing was King was gold and lan is an orchid. It's a flower. So meaning "golden flower." You know all those Chinese names always have meanings, so golden flower. At the time, when we were in Taiwan, because of our spelling it's based on some very limited type of a --- a--- a ---- dictionary. So I mean she picked up king and now even translated I will translate Jinglan. And also my name, I don't spell this way, either. I spell it Ming because of Ming --very clearly, Ming Dynasty. But here it's Mien. Actually my Chinese name is Ming-Chie. So I apologize. It's too late. I cannot change it anyway.

T.A. Rosolowski, PhD
[0:29:37.5]
You can't change it. Nice --- Nice stories though, and it's always interesting to hear what's behind those. So back to coming to Brandeis and why you chose Brandeis, since everyone else accepted you.

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Mien-Chie Hung, PhD
[0:29:49.9]
That's another interesting story. I have a lot of interesting stories if you want to talk. We may have to talk three times.

Okay so --- so obviously I applied and then we hade a lot of professors who came from United States. My advisor was from --- graduated with a Ph.D. from University of San Francisco, and there's another one from Illinois, and so on. So, I wanted to go to a university where I can do good science. UC Berkeley --- We have a lot of alumni who went to UC Berkeley, because California you know it's closer. But UC Berkeley's offer to both of us was a little bit late, and Brandeis offered us first. Yale University also offered us, but MIT turned us down. So one of my professors said, If I were you I would go to Yale, because everybody know Yale, and this is your Ph.D. Then after that you can do training and a Post Doc somewhere else. And Brandeis is a good university, everyone knows that but --- but Brandeis is a small Jewish university which is a high quality, but it's different from Harvard or Yale. Harvard or Yale everybody knows, which I think now I'm going to agree with him, but at that time --- this is a real story, okay? Remember I told you we had to look for those rankings, right? I went to the biochemistry ranking, and I picked the top ten. I still remember at that time the data. The top ten --- They picked ten universities of biochemistry in the top ten. Brandeis was number one. And let me finish that. The order maybe slightly changed, but I still remember Brandeis, Harvard, Stanford, Wisconsin, and so on, and so on, and so on. MIT. MIT was probably five or six or something. And it was a mistake. They picked the top ten, but alphabetical. Brandeis --- Alphabetical Brandeis is the first one. Brandeis University biochemistry is very strong at that time. It's very strong but it's not like it should be the number one. But they didn't rank as 1, 2, 3, 4. They just said the top ten is here, but top ten alphabetically is this. Then we say, Hey Brandeis is number one. What else? Harvard, Stanford. Brandeis to me is the same, anyway. And then this is the number one, and they accepted both of us.

And so we accepted, and we are good citizens. Then after that, UC Berkeley came in. And UC Berkeley --- in Taiwan it's very popular because our department had many --- we have many alumni there. We actually preferred UC Berkeley, but we did not know we could turn down an offer to go accept another offer. We did not even know it. We said, No, we accepted already. So, you know, good citizens. That's why I'm good citizen. I'm still good citizen. Very easy to deal with me. No negotiations. Otherwise, at that time, based on reputation and based on the --- the --- that particular area's reputation and also the --- the name of the university. UC Berkeley may be more popular. But anyway I'm not --- But we went to Brandeis and it's fine. We did well and had a lot of interesting stories there. I kept kosher for half a year.

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T.A. Rosolowski, PhD
[0:33:15.7]
You kept ?

Mien-Chie Hung, PhD
[0:33:16.8]
Kosher for half a year.

T.A. Rosolowski, PhD
[0:33:18.2]
Oh really?

Mien-Chie Hung, PhD
[0:33:19.5]
Not on purpose.

T.A. Rosolowski, PhD
[0:33:22.2]
Why?

Mien-Chie Hung, PhD
[0:33:22.8]
The first year when --- over there we stayed in the dormitory. We came from Taiwan. We never seen snow, and that was Boston, very cold. We wore a lot of stuff inside because we didn't know there's heat in there. So the first thing, we go to class. First thing I have to go to men's room, and take out everything and then go to class. Culture shock. Culture --- No this is all funny, and this is all real story.

T.A. Rosolowski, PhD
[0:33:50.9]
Culture shock is a real thing.

Mien-Chie Hung, PhD
[0:33:51.9]
Then we worked very hard. You can imagine, Brandeis doesn't have too many Asian students in 1978. That was before China opened, so only a few. We all knew each other --It's either from Singapore, or from Malaysia, or from Taiwan, or from Hong Kong. Only a few. So at the time, when I learned English in --- in Taiwan, one of my English teachers was from Montana. He said if you go to United States you will represent your country. Don't play stupid. So if you don't know how to do things, just follow other people, okay? And those kind of things. He gave me

some tips, which now I appreciate. So, we worked very hard. He said because you represent ---I still tell those foreign students now for first year students. If they come from a different country. It doesn't matter which country. I say work hard, because you not only represent yourself. Your represent your university and your country. Because if you do well, next time your --- a student from your university applies to be a student, GSBS [Graduate School of Biomedical Sciences] is more willing, which is true. You know after I graduated from Brandeis, then my --- the same university, the same department, people at Brandeis accepted them because I did well. And this is true. So we worked very hard.

So we are on biochemistry panel. And Brandeis --- Ever had a chance to visit Brandeis? You probably didn't. Okay. Brandeis is a small Jewish university with about a total 3,000 students, and a very nice campus with a castle, and there's a very nice cafeteria which is R-shaped. It's got two entrances, and biochemistry was close with it. So, in order to save our time we don't cook, we just eat there. So my wife and I always went to this tray. And then the tray here like I don't remember, we were --- black color tray, and here's a black color tray. We always eat here. And then I always feel people look at me kind of strangely, which I'm not surprised. That's in 1978 before China is opened, okay? So at that time I expected that because in 1978, if *you* [the interviewer] go to Beijing, all the kids are going to ask you, American, American? They never seen an American, okay? So when I was a Brandeis student, at lunchtime when people looked at me --you know, students--- okay, I don't have a problem with that. But after almost one semester, this one kid --- one guy undergraduate student comes to me and says, "Excuse me? Are you a Chinese Jewish?" Then I caught it. I still remember my --- my English teacher told me don't play stupid, okay? So you know this is Jewish university and he asked me if I was Chinese Jewish. How I'm going to answer. If --- I answer, yes, but I'm not but if I say no, do I offend him or something? So before I answered _____ [0:36:45.8] answer the question but why are asking this question? "Oh, because you kept kosher every day." [laughter] Black line is kosher line. Yellow line is common line. Then after that I realized. So next time, I go through the yellow line.

T.A. Rosolowski, PhD
[0:37:04.2]
The things you don't know. It's amazing.

Mien-Chie Hung, PhD
[0:37:07.9]
You know, if you talk to those people who ---not now, nowadays it's electronic. It's very convenient. You know communication is not so good. So for those people who come from different countries, everybody has a story. Everyone. Everyone has an interesting story and when you look --- heard it it's so funny, but it happened.

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T.A. Rosolowski, PhD
[0:37:27.1]
Yeah, and at the time it can be very stressful. It really can.

Mien-Chie Hung, PhD
[0:37:31.3]
We have time? Can I tell you another real story?

T.A. Rosolowski, PhD
[0:37:32.0]
Absolutely. Yes.

Mien-Chie Hung, PhD
[0:37:32.5]
Okay. The first day I came to United States, I went to Los Angeles. My wife and I, and of course we --- we buy the tickets, we buy --- buy the cheapest one. So that ticket is a red eye ticket. So I stopped by Los Angeles, but we did not travel a lot so we --- we stopped by Los Angeles, well in the morning. Then my flight is at midnight. So a whole day, more than ten hours. So what can we do? We didn't know anything. We're not going to hang around all day. And then in Los Angeles airport ---to me it's very clean, nice air-conditioned airport. You know, I came from a very poor place, Taiwan. Although Taiwan is not poor anymore, but at that time. And, we didn't have a lot of money. I didn't go to the fancy restaurants. So I buy something very minimal to eat. Then my wife and I together --and then I was thirsty, so I see a bunch of people hanging around. I go there. I was looking for somewhere to push like a drink of water. I couldn't see --- find it. And I don't speak English well. And also I don't want to play stupid because the first time --- first day in American and my teacher told me, don't play stupid. Okay because you play stupid not only yourself, your country. So I said okay fine. He asked me if you don't know how to do it follow people. Follow people. It's true.

So that's what I did. I followed people. So I see a guy walk over there, and water jumps up, and he took a drink. He was a white guy. I go there. And then I go there, because I thought he walk on this way. Then I was sitting here right? So I come on this way and think, hey, maybe I should go in wrong direction, so I go on this way. Water doesn't jump up. So I start going over and watch. Then I start to imagine, okay. As you said, right now it's a joke. A lot of times if you imagine America is very advanced. What does it take? Everybody say you have to pay taxes in America, right? Maybe America is so advanced those people who pay taxes, there's a code, and then the people who pay taxes get water. We never paid taxes. I don't know. I'm just imagining. All this --- All of these crazy ideas. I'm a scientist. Is it possible or something else? And later I see another person, a black lady, coming, and water jump up again. There was one time I was thinking about water because America --- that's in 1970 ---Martin Luther King, that

happened in 1950 or something, right? So that's just --- recent it's not long ago so --- so we all heard those stories. So I thought maybe because I'm yellow so they don't give me water, and I don't pay taxes, or what? All kinds of reasons, right? But then comes the black lady, and water jumps up. Right? So at first I was thinking maybe discrimination, maybe because of my color, no water. But then when the black lady color --- come and water came out, and then I say, well that's not the reason. Maybe because of tax, and that's because America is so advanced. And I sometime watched those science fiction movie and they code [0:40:57.0] recognize eyes, or skin, or whatever, and now it's happened, right? Oh. But first day I need water. Then you know what happened? In Taiwan those drinking water push [a button]--- here you use this [wave a hand]. And then walk over there is no body language. They just walk over there and water come up, but when I go there water doesn't come up. Real story.

T.A. Rosolowski, PhD
[0:41:29.4]
Yeah. Oh, yeah. No, I appreciate it.

Mien-Chie Hung, PhD
[0:41:31.3]
And I --- I --- I use this as a joke, but at that time you know the first day here. Very funny.

T.A. Rosolowski, PhD
[0:41:35.9]
It's terribly stressful. I spent time living --- living abroad too and just the things you don't know and it's --- it's tiring. You know it's, figuring out, figuring out, figuring out.

Mien-Chie Hung, PhD
[0:41:44.9]
At that time maybe I'm not really --- I'm not really scared or something but I'm just kind of, this is a new country. What happened? What is this? Anyway.

T.A. Rosolowski, PhD
[0:41:55.1]
How long did it --- How long did it take you to kind of feel like you were getting your bearings and figuring things out?

Mien-Chie Hung, PhD
[0:42:01.4]
Well, it was pretty fast, because my brother was in New York, so after that I actually flew to New York and then told him all these things. Oh, the other thing. When I went to New York, I took a taxi. My brother had said, hey just take a taxi here. So he already knew where to pick me

up and I took taxi. Then after I took taxi I went --- I went to see my brother and said the taxi driver looked at me all the time. He said, Oh, you did not give him tip. Because in Taiwan you don't give tip. That guy probably realized this guy is a foreigner, doesn't even speak English well, so he just looked at me and --- and he probably hated me, but he didn't say anything. He didn't give me a hard time but he's looking at me, and not a very friendly eye. So my brother says, Oh, because you didn't give him tip.

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Chapter 03
A High Pressure Ph.D. Program and Research in Protein Biochemistry
A: Educational Path;

Story Codes
A: The Researcher;
B: MD Anderson Culture;
C: The Professional at Work;
C: Leadership;
A: Character, Values, Beliefs, Talents
D: On Research and Researchers;
C: Mentoring;
A: Influences from People and Life Experiences;
A: Personal Background;
A: Professional Path;

T.A. Rosolowski, PhD
[0:42:50.8]
Now you'll --- Now you know. So tell me about Brandeis educationally. What did you discover? How did you fall into research?

Mien-Chie Hung, PhD
[0:43:02.9]
In the first year we --- just like our other school we had to do rotations, and these rotations --- our rotations were very tough. Here we do three rotations the first year. Over there we do six rotations. Very, very tough.

T.A. Rosolowski, PhD
[0:43:14.5]
Now tell me about that. I actually never heard about the rotations in a Ph.D. program.

Mien-Chie Hung, PhD
[0:43:17.8]
As a first year student, they don't want you to pick an advisor. They want you exposed to different areas.

T.A. Rosolowski, PhD
[0:43:23.5]
Okay.

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Mien-Chie Hung, PhD
[0:43:23.9]
And in our grad school you --- it's reasonable, three areas, three. So in each one you spend about three months. You spend three months in this lab, another three months in this lab, and then there are all different labs. So you kind of --- if you are very mature, you know what you want to do, but if you are not mature, you're a first year student, you may just kind of know. And then after that, it helps you to choose the lab which suit --- which is most suitable for you. And there is no best lab. It's just like a both have to choose.

T.A. Rosolowski, PhD
[0:43:51.4]
It's a fit. Right. And they use the same system now in the Graduate School of Biomedical Sciences, don't they?

Mien-Chie Hung, PhD
[0:43:58.7]
GSBS. That's what I'm saying. Ours is just three rotations. But at Brandeis, we had six rotations in the first year. So six rotations, meaning six weeks per rotation, and every rotation we had to write a report, and every rotation we had to give a talk. It was tremendous pressure. Brandeis in the biochemistry department, the first year is very, very tough. So we finished six rotations. And remember I was studying snake venom protein, and I was interested in protein chemistry, and that department is very strong in protein chemistry. That's why I went over there. But at that time, molecular biologists started --- cloning had just started, and my Ph.D. mentor, Pieter Wensink, he just came from Stanford and he's one of the pioneer people who developed cloning strategy, so he became very hot among our students. And I was not aware of that. I was still thinking about protein chemistry, and protein chemistry is a little bit of a more mature field. I'm not saying the out of their fields, a more mature field. So, I went to his lab for the last rotation. Sixth rotation, and every student wanted to stay in that lab. And I was the last one to go on the rotation, but I worked very hard and he knew my track record. I had multiple publications, so he knew where I stood on that. But when I was in the lab, I'd never done any molecular biology and cloning. I had very good background in protein chemistry and I had multiple publications, so I ended up not staying in protein lab --- protein chemistry. I stayed in molecular biology because --- and I think I made the right choice. Before I started to move into molecular biology --in a new area-- I picked up --- learned how to clone the gene and that kind of stuff. And that's actually affected my long-term career.

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T.A. Rosolowski, PhD
[0:45:53.4]
Why did you start moving in that direction? I mean what --- what did you find so appealing about it?

Mien-Chie Hung, PhD
[0:45:58.8]
Originally I was interested in micromolecular protein enzymes which --- like the snake venom which is very interesting. But molecular biology that was --cloning just came out, and cloning --- Now --- it's the old term now. But at that time, cloning meant you make identical stuff. In bacteria you can do that. You can clone a gene from bacteria. At that time, not yet. We knew we could clone gene from bacteria ,and our lab is starting to --drosophila, right? Fruit fly, right? Okay, now you clone a gene from a fly. Wow. A gene! Then, you can with your hands handle a gene. It's not a prot --- Proteins are interesting, too. But genes, at that time, are more modern and also give people an impression that it's more powerful, because you cloned it. You can *replicate*.

T.A. Rosolowski, PhD
[0:46:50.4]
What possibilities did you see in that replication? You know what did --- what was being imagined and what did you imagine you could do?

Mien-Chie Hung, PhD
[0:46:57.4]
For example, if I isolate a protein from snake venom, it takes a lot of snake venom to purify it. Then if I purify 1 mg, that's all I have. But cloning is different. You clone a gene from bacteria or from a fly. Once I have the clone in the plasma, I can make it. I can make it 1 mg today. I can make it another mg today --- tomorrow. It's much more powerful. You can just imagine why. Your study material is unlimited, right? That's a big difference. But proteins, you use it up, you're done. You're done. And you had to purify it again, and purifying may take you three months or something. But cloning --and we can in the bacterial culture and make it --- and make it, you know, fly genes in the bacteria and purify. And at that time it was called P1, P2, P3. It's still under restriction, but now it's much easier. At that time human gene had not been cloned yet, but everybody imagined genes can be --- human genes can be cloned and now it's a …

T.A. Rosolowski, PhD
[0:48:04.1]
It's like every day. Yeah.

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Mien-Chie Hung, PhD
[0:48:04.7]
Right? Right. And then --- And then we had to determine the sequencing and so on, and so on. So my Ph.D. thesis in --- in that lab actually I studied egg yolk protein gene.

T.A. Rosolowski, PhD
[0:48:15.8]
I'm sorry. What is the name?

Mien-Chie Hung, PhD
[0:48:16.1]
Egg yolk pro --- yolk protein --- yolk --- egg yolk. Yolk protein gene.

T.A. Rosolowski, PhD
[0:48:19.2]
Oh egg yolk, yeah.

Mien-Chie Hung, PhD
[0:48:19.9]
Yolk protein gene. Because in --- when we studied fly not --- not chicken egg. It --- And then …

T.A. Rosolowski, PhD
[0:48:25.6]
And that was a drosophila egg?

Mien-Chie Hung, PhD
[0:48:26.5]
A drosophila. And because the --- that's a --- that egg yolk protein gene was regulated by --- by --- female hormone, like estrogen but in drosophila I don't call estrogen it's called ecdysone. [0:48:37.3]. It's equivalent.

T.A. Rosolowski, PhD
[0:48:38.1]
Oh okay. Gotcha.

Mien-Chie Hung, PhD
[0:48:38.9]
So we studied hormone regulation gene, and so we had to determine how to clone the gene. We

had to determine the sequence of the egg yolk protein. I was the one who actually determined the fly egg yolk protein sequence.

T.A. Rosolowski, PhD
[0:48:49.9]
Really?

Mien-Chie Hung, PhD
[0:48:51.2]
So for that time you know not too many genes had been cloned. Not too many genes had been sequenced. So when I finished that egg yolk protein gene sequence --and about 5,000 base pair, I spent multiple years to deter --- because at that time-- 1976 is the first time those two people actually received a Nobel prize. One is [Walter] Gilbert in Harvard. The other is [Frederick] Sanger in England --- in Britain. They developed technology to be able to determine a DNA sequence. Remember protein sequences? Protein was done earlier. I told you about primary sequences, but the DNA sequence at that time was very difficult. But 1976 was the first time they developed those techniques. Then my Ph.D. thesis --so I actually determined sequencing. I used the _____ sequence [0:40:43.7] and determined 5,000 base pair from the egg yolk protein gene.

I remember when I finished that, they started to say, hey, all this data should be stored so it can be shared with everybody. I believe when I finished --at that time, the [number of] continuous 5,000 base pair sequences available in the world was less than ten. I know it's a single digit. I don't remember if it was eight or nine or something, but it was a single digit. The first one was a bacteria plasmin. It's 4000 base pairs. It's called PVR3322 and that back to the old days. And at the time when I finished that, I worked hard you know, I collected and then sequenced it. I redid it one by one. Nowadays when I talk to students, and now with the sequencing of the 5000 base pair, it's less than 0.0000001. The human genome sequence is three times 10^9 base pair, and I spent multiple years on 5,000 base pair. That was of course the old days. But now everything is by ---by robot.

T.A. Rosolowski, PhD
[0:50:49.9]
Well what's happening now couldn't have been possible without the kind of work that was being done then so…

Mien-Chie Hung, PhD
[0:50:54.8]
So I sometimes say --- I say it's very frustrating when people talk about sequencing. My

students –oh, anything they want to sequence. Nobody does sequencing now. They just send it to the core facility, then everything comes out.

T.A. Rosolowski, PhD
[0:51:06.1]
Do you feel that having to go through that laborious process gave you certain insights or advantages intellectually that students nowadays don't have?

Mien-Chie Hung, PhD
[0:51:16.3]
Yes. Because that --- those things from step by step --- even when we do sequencing, the equipment, but here is all _____ [0:51:29.7] robot right? If we wanted to sequence, that equipment --we'd have to design it ourselves. Not only design the equipment, but the gel, right? The glass plate --- We put a glass plate so we can run material --- images. And usually in the lab you can see that tear, a mini-tear and we have a tear very small and very easy to handle. At that time, for us to see the resolution, the gel I'm running, I'm not kidding, 90 cm. Very heavy. Luckily I can handle it.

T.A. Rosolowski, PhD
[0:51:56.1]
Well, I remember the electrophoresis plates. I mean they were huge.

Mien-Chie Hung, PhD
[0:51:58.1]
Yes. Yeah, yeah. And then so huge, and then sometimes because they were so huge, going around the gel the temperature is not even. They may crack. So, I still remember, we had to put all those temperature controls in, and if the temperature was too hot I had to turn it off, so that they can cool down, because otherwise if they are too hot they will break the glass plate. And if it break, it's a headache. The whole day disappears. Because then I have to clean, then I have to remake another chair 90 cm. Okay those are --- how do you say that? Those are very laborious. However, at that time, that's the only way you could do it. But when people start to do that, and learn that, and then start to "hey this is too much labor. Let's think about it and most modern way." Then they have multiple, multiple, multiple generations of sequencing and methods and now today, you don't even worry about it. You just pay $1 and --done. You're done. And that's how technology ---Therefore, that gave me a concept. Now if I develop an anticancer drug --at the time, when I was developing anticancer …. meaning this drug didn't exist but now we are developing one, it could be very expensive, but I don't care. I care, but that should not be our concern, because if --- what we should be concerned about is, does it work or not? If it works, it's very expensive, right? In the future, it will be very cheap. Just like sequencing. I have personally seen it. I spent five years with my friend, working day and night on the 5,000 base

pair and now it's 0.000001 set. In 30 years. Now if today I developed anticancer drug, if somebody said, ah, too expensive, nobody can use --no. Because you are dealing with a disease --no cure. Now if you said, this works. This magic pill works, and it's so unbelievably expensive. As long as it works, let's work on it and make it cheaper. Maybe not me. Maybe someone else has lots expertise who can make it large scale, or modified to make it cheaper. So that gave me a very strong concept that, at the time, when we are in the discovery phase in basic sciences, in the forefront of science, we are looking to make something which is impossible possible, and we are looking for something that doesn't exist that we want to make it exist. We have large goal but, we just want to get it work. And how expensive it is ---It's important, but it's not a major concern, because based on that experience I have. Nobody would argue with me.

T.A. Rosolowski, PhD
[0:54:38.9]
If you worry about the --- If you worry about the price it'll hold back the knowledge building. Yeah.

Mien-Chie Hung, PhD
[0:54:43.8]
Yeah. For example, telephone, at that time. Right now I can call anytime. It's very cheap, right?

T.A. Rosolowski, PhD
[0:54:48.2]
Sure. Sure. It also seems when you immerse yourself in that kind of study, I mean, you're not only learning about the biological mechanisms and the chemical mechanisms and the biochemical mechanisms, but it's just how do you handle the materials and the technology with which you're …

Mien-Chie Hung, PhD
[0:55:05.3]
Very, very interesting point. Nowadays --- I'm not saying that's a trend. Now we train students --because there are a lot of biotech companies, now everything is kit --- kit.

T.A. Rosolowski, PhD
[0:55:16.0]
Oh yeah. Right.

Mien-Chie Hung, PhD
[0:55:16.9]
It's --- A kit is good. It makes it easier for you to just say, Okay, I need to do this experiment.

When I buy a kit then I add A and B. Three --- Thirty minutes later I get what, C, right? --- I got what I want. It's okay. It's saved a lot of researchers' time, but for students sometimes those things, student missed opportunity to understand why A and B, 30 minutes later becomes C. That principle they knew --- they didn't know. Very frequently in the student committee, when we will ask, Okay, now how do you do that? I don't know. But how can you get it? Well because I buy the kit. And that you're missing the --- the rationale. You don't have to be --- It's okay to use kit, but you need to know that rationale behind.

T.A. Rosolowski, PhD
[0:56:04.5]
It's depth of knowledge in your --- of your own field.

Mien-Chie Hung, PhD
[0:56:07.4]
And --- And I --- we all agree kit helps a lot. It will save you a lot of time, especially those techniques which you are familiar with it, so you had to go through many practices and do all the work, and you now use a kit, that's fine. But, you need to know the principle behind the kit. Otherwise there's a lot students when you ask them, they will say, I don't know, there's a kit there. And when they say kit, they said that's the end of story. No, you have to know why this kit work. Then they tell me when something doesn't work, do you know how to troubleshoot it?

T.A. Rosolowski, PhD
[0:56:37.0]
It's like the difference between information and knowledge.

Mien-Chie Hung, PhD
[0:56:40.1]
Uh, yeah. Yes. Good point. Yeah. Good point.

T.A. Rosolowski, PhD
[0:56:42.8]
Yeah. Now when we were first speaking, you mentioned your mentor, Pieter Wensink, at Brandeis. And tell --- tell me about him because he obviously figured …

Mien-Chie Hung, PhD
[0:56:54.2]
Yeah, he is a very interesting figure. I think he received his Ph.D. degree from Johns Hopkins, but originally he was a major --- not in science. He was at Johns Hopkins night school. I think that he finished in night school. Let me try to remember. In Johns Hopkins he finished in night school and then become interested in science. And then --his college he finished in night school,

but later on he become interested in science, so he worked with a guy called, I forgot his name. [Carnegie?] [0:57:40.1]? One of the big names in Molecular. I don't remember. I'd have to look it up. And then he received Ph.D. training from that particular lab. Then after that he went to Stanford and worked with Hawkins. Hawkins is a big name in drosophila and --- and then, working on drosophila molecular biology, that's where he developed those cloning techniques. He's one of the pioneer people who developed the so-called plasmin bank. At the time when cloning started --people know it more as the library, meaning there's a library from the human gene so every gene --- we created a library and this library has virus compounds. Every virus carries one gene, so this mixture is called the human gene library. So you can using it to take out what you want from the library, just like we call a library to get a book we want. But before the library they called it the bank, the same.

T.A. Rosolowski, PhD
[0:58:41.2]
B-i-k?

Mien-Chie Hung, PhD
[0:58:42.8]
B-a-n-k. Bank.

T.A. Rosolowski, PhD
[0:58:43.9]
Pink. Oh okay.

Mien-Chie Hung, PhD
[0:58:44.5]
Bank. Plasmin bank. Plasmim. Plasmid is a bacterial DNA.

T.A. Rosolowski, PhD
[0:58:48.8]
Oh okay.

Mien-Chie Hung, PhD
[0:58:49.9]
And the DNA is cloned, and they do one by one, so they make a bank there. So this bank has everything there, but which one is the one you want? I don't know, but you have to think of a way to dig it out. So he's one of the pioneer people who did that in drosophila. And when he came to Brandeis as assistant professor, they had a generation of a young faculty together. He's one of them, and now, well he passed away two years ago. When he passed away I went back, and all his colleagues --and there are quite a few members of the academy now-- and we all went

down. So at that time, Brandeis hired his generation of young scientists, and he was one of the persons who was very well-known in the cloning molecular biology. I still remember he always had to _____ [0:59:41.6] to teach someone --- someone's school. And he also wrote the first cloning technology book. Although his book --- his first one is not the most popular. The second one later on and the third one are more popular, but hos was first one. So he, you know, anyway. That's enough of that.

T.A. Rosolowski, PhD
[0:59:59.7]
So how did --- how did he have an impact on you? I mean, obviously you were part of his lab but I mean how did he mentor you?

Mien-Chie Hung, PhD
[1:00:07.2]
Our lab is --- fly lab, it was I mean not a very big. We had seven or probably five students, two Post Doc Fellows, and one technician. Something like that. And then I was actually very much enjoyed it, because keep in mind, I came from other country and other cultures are different. Used to be that when a professor walked in, you had to stand up. [Dr. Hung stands up] Right? I would not call --- I would not call my professor by his first name, Pieter.

T.A. Rosolowski, PhD
[1:00:37.9]
Oh okay. Very formal. Yeah.

Mien-Chie Hung, PhD
[1:00:39.6]
Yeah. I would call him Dr. Wensink. But he --- well, he probably, just like --- and what's. And he was very friendly. Every --- every semester has one meeting in his house. It was very interesting. I still remember that. All of us would go to his house for dinner, and then we bought pizza, and then his wife, Dorothy --I saw her like two years ago when he passed away. And he --- they're still in the same house. And she would prepare a salad for us to eat salad. But the pizza, we had to contribute two dollars. So the second day [in the rotation in Dr. Wensink's lab]--- ah, but it's true. Second day and my advisor came –alright, okay, two dollars, two dollars. He collected from everybody two dollars at his house. Then we had one person to present the data just like that. Sometimes we joined with another professor from Harvard who also worked on fly, a very well-known person, Gerald Rubin, he's very _____ now. [1:01:36.1]. So they work together as Post Docs, so we joined our group meeting and sometimes we watched _____ [1:01:46.5]. And then --- and so we --- So their house was --- I was very familiar their house. Their house --we would go there once in a while.

And that's why two years ago, when another professor told me, Hey, Mien-Chie, sorry, Pieter passed away, then no question I flew back that day. I took a taxi, and it's still the same house. I'm glad I went back. I'm glad I went back, yeah. And I saw his wife and his --- his kids all grown up. At that time his kids were very small. So --- So, I learned a lot of American culture actually in that laboratory. He's a very friendly person, very nice person, and the lab was very friendly. And it's not like a big authority professor or something see, because after the second day get --- after going to his house he would come to collect two dollars, three dollars for the pizza, which is fair. I think because you don't ask him to pay everything. I mean --- But his wife provide the free salad, so they don't charge for [1:02:49.5] salad. Yeah, I enjoyed the lab.

T.A. Rosolowski, PhD
[1:02:52.6]
Did you --- Did you learn something from that? I mean what lessons did you learn from watching him entertain?

Mien-Chie Hung, PhD
[1:02:59.6]
In terms of technology, the entire molecular biology cloning strategy, I learned that in that lab. And not only from him, but also from the senior students. And that --- that lab has a very nice culture-- that we take turn for lab responsibility. I learned that too. So, we don't have to be the _____ [1:03:22.6]. We don't have some --- somebody who is professional to just take care of everything and then the students just do research. No. We have all the lab responsibility, so then we take turns. For example, like we have a pump. In the pump after you use it for a while, you have to change the oil, real dirty, right? And that --- I cleaned that pump for many years and then I volunteered that because we have a lot of female students, and I'm considered a little more uh …

T.A. Rosolowski, PhD
[1:03:50.0]
Stronger upper body strength?

Mien-Chie Hung, PhD
[1:03:50.4]
Yeah. And so I asked a few students to do that, and I said, well now --- we usually take turns, right? But I said, Well, I take this one so we can just distribute the work. So, teamwork. Team. Then you help each other. Teamwork. And then so …

T.A. Rosolowski, PhD
[1:04:10.9]
Was his lab unusual in that way? I'm sorry. I didn't --- You sound like you're thinking.

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Mien-Chie Hung, PhD
[1:04:17.7]
The fly lab is very different from what we're doing [now in a cancer institution]. The fly labs are very friendly. The fly people, they are different from people who work on cancer, because cancer is you know it's an important disease, right? It's _____ [1:04:32.3]. And also you may actually --- your discovery might result in you filing a patent, and you might be developing an anticancer drug. Fly people don't do that. Fly people just do science. So everything is shared. If anybody asks for any information, you share. Everything is shared. So I learned that. I think that's a very healthy scientific concept for a basic scientist. Because we are doing science to share science and to share our knowledge. We are not trying to say, I'm the only person in the world that can do this. Nobody can do this, or I'm the best. Come on. That's not science. And so, I have that concept. And that --- and so I spend 5 years that were very enjoyable. It was very enjoyable. And it's a --- not a very fancy lab but ---I don't know how to say that. The lab is more like a family, and that's certainly affected me ---and my lab is much larger now, okay? But I still --- I tell people in my lab, This is a family. Before you come into my lab, of course, you are not my lab. Then I mention that here that once you are in, you are my people. I have to protect you. I have to guide you. I have to help you. Just like that. Do you have a kid? Your kid's a genius, you will help him. You have a kid? You help them. Some sort of disease? That's still your kid. You just have to take care of it. You cannot say, Oh, you know, get rid of it. It's still a kid. Right? You don't just leave [1:06:08.3] a kid. And the only difference is when people --before they come into my lab I have a choice. I can take you, or I can say no, but once I take you, I take care of you. And then ---I have this reputation. I have trained a lot of people and I have a good relationship with all my trainees and my trainees, doesn't matter where they go. Oh, I already had five Ph.D. students, my own Ph.D. students, who are tenure track faculty in MD Anderson. And you can imagine how the honor in other university. Yeah. So, anyway, and so I --- I --- like a family running a lab --- Running a lab is like a family. More or less I've been influenced by that because we'd go to his house all the time. I know his wife well. I know his kids well. And then their house was just like our house. So, yeah and especially when I come from Taiwan. You know, Taiwan, student and professor…[gestures high and low]

T.A. Rosolowski, PhD
[1:07:08.9]
Yeah, really hierarchal. Yes. I'm sure it was a great --- a great introduction, as you said, to American culture and into the --- doing science in a different way. Yeah. Yeah.

Mien-Chie Hung, PhD
[1:07:23.9]
Well, yeah. Yeah. I do not think about this and you kind of bring me back to the old days.

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T.A. Rosolowski, PhD
[1:07:28.5]
Yeah. Good.

Mien-Chie Hung, PhD
[1:07:29.8]
Thank you. Thank you for bringing me to the old days.

T.A. Rosolowski, PhD
[1:07:31.4]
Well sure. You looked like you were enjoying remembering it.

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Chapter 04
Post-Doctoral Study at MIT and Work on Oncogenes: the neu oncogene and c-erbB2 gene
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;

T.A. Rosolowski, PhD
[1:07:31.4]+
Well, tell me what happened after you received your Ph.D. You did a Post Doc then at MIT which did not accept you before.

Mien-Chie Hung, PhD
[1:07:47.6]
Yeah. So when I finished, I was thinking about ---I was always interested in disease.

T.A. Rosolowski, PhD
[1:07:53.0]
Why?

Mien-Chie Hung, PhD
[1:07:54.0]
And --- I --- I'm interested in disease, life science. They are both basic science diseases. And then, remember I started on that with snake venom, or was thinking about it. But actually when I went to the lab I was very naïve. I was proposing that, can we clone snake venom protein gene from snake gene? Well we can, but then I was very naïve. Well why would you do that in that lab. That lab is a fly lab. They don't even have a snake. [laughter] Anyway, so anyway I just worked on fruit flies. And then, in 1982, the first human oncogene was cloned. In 1982 many, many things happened. The first human oncogene was cloned and, the first human oncogene was found to be carrying a single-point mutation different from a normal gene. The only

difference between normal and cancer is one mutation. And, that particular gene was found to be --- You know before 1980 many people studied cancer, and the hospital people studied cancer but they were animal-model [1:09:11.1] people and they studied animal tumors. In animal tumors, they cloned it. They identified those viruses associated with the oncogene. There are a lot of genes associate with viruses, and those are so-called virus-associated oncogenes. But those virus-associated oncogenes have not been recognized as related to human cancer because that's a --- the gene causes cancer in chickens, in mice, in rats. But how do you know if it's a rat or a human cancer? You don't know. But in 1982, the first human oncogene was cloned. And that gene was homologous to a virus-associated gene. So meaning those --- animal modela are rarer than that, and the cancer gene carry one single point mutation --all happen in the same year. So that's meaning cancer can cause by a mutation. A mutation can be caused by a carcinogen, rrght? Carcinogens cause cancer. It's all you hear. So suddenly NCI that year say,s We -- remember President Nixon in early 70s, '1 or '72, at the War on Cancer, right?

T.A. Rosolowski, PhD
[1:10:21.0]
War on Cancer. Yep.

Mien-Chie Hung, PhD
[1:10:22.3]
And I still remember at that time he came in at one point and committed 1.6 billion dollars [1:10:26.0] or something. Anyway. And NCI in 1982 says, this year our knowledge in cancer is more than ten years --- the last ten years. Because you suddenly know all those virus-associated oncogenes already have human cancer. And you know carcinogen-induced mutation is rarely human cancer.

T.A. Rosolowski, PhD
[1:10:49.0]
How --- What an incredibly exciting year. I mean it just exploded.

Mien-Chie Hung, PhD
[1:10:51.8]
And that oldest I mentioned was --- happened in several laboratories. And one of the major labs is Bob Weinberg's, who was my mentor at MIT. So that's the answer to your question why I went over there.

T.A. Rosolowski, PhD
[1:11:04.9]
Right.

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Mien-Chie Hung, PhD
[1:11:05.3]
Because I was so excited. And remember, I was trained in chemistry. I like a structure --- organic structure, organic compounds with the protein primary sequence. And all of a sudden hey, wait a minute, there's a molecule. There's a mutation, and this is a normal gene, and this mutation cause cancer? Holy smoke. Come on.

T.A. Rosolowski, PhD
[1:11:29.5]
Right. There's the beginning of translational research right there.

Mien-Chie Hung, PhD
[1:11:33.1]
Oh, I was, I'm going into that field. And at that time, they had two laboratories --- three laboratories and two of those were so-called transfection. Meaning take oncogene. Back in the old days when the gene caused cancer, you can transfer into a culture. Then after you transfer a culture cells and the normal cell becomes cancer cell. There are a lot of definitions of cancer cells. At that time there are two --- three labs, but two major labs, one in Harvard – Jeffrey Cooper, and the other one in MIT – Bob Weinberg. I applied to both labs. And that --- that time the lab --- those were very popular and I was lucky that I was accepted by both of them. But I was also lucky I chose Bob Weinberg.

T.A. Rosolowski, PhD
[1:12:19.0]
Why?

Mien-Chie Hung, PhD
[1:12:20.3]
Because they all do transfection, but Jeffrey Cooper, he studied another gene, and that gene turned out to be --- not a real human oncogene. So Jeffrey Cooper later on was not recognized in the field. But --- But at that time the technology is the same --- the same. I'm not saying he's --- you know it's just like …

T.A. Rosolowski, PhD
[1:12:40.5]
It was just the luck of it. Yeah.

Mien-Chie Hung, PhD
[1:12:41.8]
Yeah. Yeah. And so --- so I was --- and of course, at that time some friend told me Bob

Weinberg is probably better, and I went there. So but otherwise I was accepted by both, and I was thinking about which lab to go, and then anyway I decided to go to Bob Weinberg's lab. And then when I go to Bob Weinberg's lab I make the same mistake. I also learned something, too. When I interviewed with him --I don't know why he take me but I know one of his friends was our neighbor lab the co-lab. I just visited this. [phone interruption] I forgot it.

T.A. Rosolowski, PhD
[1:13:41.2]
You can add it later. That's the advantage.

Mien-Chie Hung, PhD
[1:13:43.4]
So he was in our neighboring lab. And he's a professor in my --- my _____ [1:13:49.5] right? He know I work very hard. I mean every night in the lab. There, you know, at Christmas time I'm probably in the chair. And he and Bob Weinberg were in the same lab. So at the time, of course, my advisor write a strong recommendation letter, but I believe. Oh, Michael Rashbausch. Michael Rashbausch. He's a very well-known scientist now. He's a member of the National Academy, Michael Rashbausch. He --- I believe he called Bob Wein --- Oh, Bob Weinberg called him and said, Hey there's a guy from you're institution, [ ] --- and then he probably tell him, This guy is work very hard. And also I have --- at that time I designed some --- a trick for cloning strategy. And he was very impressed. I know it because I was --- our lab and their lab had joint meetings. Then sometimes I say, Hey you can do this, this and this, and people in this lab was like, holy shit, how can he brought up two sequence? Oh, they'll say, oh those sequence, I spent so much time, right? But get 0.000001. But because I sequence so much, so I remember all those sequence. So because I remember that sequence so I --- based on that I designed a very small trick --- very small trick to allow --- it's a special technique to allow something originally very difficult to become doable. And that --- the reason we can do that is because I have a lot of sequence knowledge. And very people --- very few people memorize those sequence because it's very boring. But it was him right here, so therefore when I shared with their lab I mentioned that, and people told him he was not there. And they said, Oh he's a genius and this is great idea. How come you guys don't tell me? Okay, so anyway.

T.A. Rosolowski, PhD
[1:15:30.4]
What was the --- What was the trick?

Mien-Chie Hung, PhD
[1:15:32.2]
I don't know really how to explain that. Right now it's very easy now. I can do it all day. [Dr. Hung draws a sketch.] This is a plasmin DNA. For cloning people say this is bacteria plasmin

and this is a human gene. Okay? I want to put this piece of DNA, [in] this human gene. I'm going to put this one here. So I can replicate a human gene in bacteria so I can make whatever I want.

T.A. Rosolowski, PhD
[1:16:00.2]
Okay.

Mien-Chie Hung, PhD
[1:16:01.8]
For us to do that the DNA needs to use enzyme to cut it. And this enzyme is called _____ [1:16:06.5] enzyme. The person who discover it I think received a Nobel prize. And the _____[1:16:10.8] enzyme usually had to be --- this is A enzyme and this is B enzyme. To put this piece here, you need to have an A enzyme side and B enzyme side here so that you put it here.

T.A. Rosolowski, PhD
[1:16:21.0]
So it would just like be a puzzle?

Mien-Chie Hung, PhD
[1:16:22.7]
Yeah, so you can put it in.

T.A. Rosolowski, PhD
[1:16:23.0]
Yep. There you go.

Mien-Chie Hung, PhD
[1:16:24.4]
And this enzyme recognized sequence so-called protruding in like ATGC, double strand, let's say _____ [1:16:35.8]. And then you --- Double strand. Then you know the DNA sequence of G pair to C, you know. Okay, okay. So this enzyme has this --so only when you have another enzyme identical so we can pair them. So C pair to G, G pair to C, okay? But I discovered you don't have to be 100 match --- 100% match. You can miss one. And the reason I can design a pair ---and I know which enzyme was sequence, because I sequence all the time, right? And so --- so then you've missing --- you're missing one it's still right. So now originally this had to be A to A, B to B right? Now I can make it more flexible. A can go to maybe D, and B can go to F or something like that and of course the frequency is lower. However, for cloning you just need one.

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T.A. Rosolowski, PhD
[1:17:26.8]
How neat.

Mien-Chie Hung, PhD
[1:17:27.1]
And also you have enzymes. And so when I say that and I can read a sequence right away. I say this sequence in back, and the other enzyme come this, so they are paired and then it makes sense. And it --- And when I proposed that my advisor said it's not going to work because you have one missed pair. However, because there's an enzyme, there so actually it worked.

T.A. Rosolowski, PhD
[1:17:45.6]
And that's --- that again shows the advantage of just going through the process. Yes.

Mien-Chie Hung, PhD
[1:17:49.5]
Details. Yes. If I use everything kit …

T.A. Rosolowski, PhD
[1:17:52.1]
Yep. You would have never discovered that.

Mien-Chie Hung, PhD
[1:17:55.9]
This is not going to be important because we can sequence everything now. But at that time there's no trick.

T.A. Rosolowski, PhD
[1:18:02.0]
Now is --- was it significant? I mean did --- did it give you interesting information to know that they didn't have to match?

Mien-Chie Hung, PhD
[1:19:11.7]
Oh no, no. Because this becomes very powerful. Because before --- back to the old days, there's no _____ [1:18:17.6]. But you have --- for you to clone this, this is the only choice, period.

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T.A. Rosolowski, PhD
[1:18:21.7]
Right, right.

Mien-Chie Hung, PhD
[1:18:23.0]
But now I make it more flexible, so it [doesn't] have to be that way. You have some --- not --- not random but, yeah, this is not the only option. I can give you another five options.

T.A. Rosolowski, PhD
[1:18:33.8]
But did you learn something about the chemistry or the biochemistry to know that they didn't have to match? I mean was it not just convenient, but did it give you more inf – more knowledge?

Mien-Chie Hung, PhD
[1:18:41.4]
No. No. It just --- It's just a sixth sense. See --- Okay, now for DNA and DNA to pair, you have to be this one, this one, this one. And then I asked, How about if we have one missed pair? And then four out of --- three out of four pair? It should be better than no pair, right? And then keeping in mind this required an enzyme. The enzyme is beautiful. The enzyme can make it frequency --- increase much higher. And plus we are talking about cloning. Cloning I don't need every one of them to come out to what I want. I only need one out of 100 to come --- 1 out of 100 and that is it. There's no other way to screen it. I pull out that one, then the beauty of cloning is once I have that one I have everything.

T.A. Rosolowski, PhD
[1:19:25.6]
You have everything. Right. Yeah.

Mien-Chie Hung, PhD
[1:19:27.8]
And so he was very impressed on this one and Michael --he still talks about it.

T.A. Rosolowski, PhD
[1:19:31.8]
That's cool. Yeah.

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Mien-Chie Hung, PhD
[1:19:32.4]
And --- And actually when I came here as assistant professor, Jeff Rosen in Baylor, he's still there. One time we talked about collaboration. We talked about cloning strategies and he said, Oh, there was a paper in the university of all this, [about] this and this, and I said, Oh, that was my paper. Because this [became a] powerful thing and at that time --it's no longer –[it's] ancient history now. So anyway. So Bob Weinberg obviously called Michael Rashbausch, and Michael give me a lot of good recommendations so Bob took me in and --- and when I went into his lab the first thing I was --- because he's in news all the time --- in --- in 1982 he was even in a picture of Continental. His picture was in *Continental Airplane*. So he was very hot at that time. But he cloned human oncogene, identified mutation, and --- oh, at that time people thought he was going to get the Nobel Prize. He didn't get it, but anyway. And when I went into his lab for the first time, I didn't prepare that [anything]. He asked me, he said, What do you want to do? I thought I come here and he was going to tell [me] what I'm supposed to do, right? And when I was in Brandeis in the last year I was involved in the project to put the gene into the fly. Gene into the fly and that --- that --- at that time it was brand new. Right now it's doing all the time now. So I said, Maybe I'll put oncogene to fly. And he said, Then what? I said, Well, fly develop cancer. He said, Okay then fly develop cancer, then what? Put anymore models and publish it. And he said --- he said well --- again, I agreed with him just like similar to when I talked to my Ph.D. advisor I want to do snake cloning --because the lab doesn't do that. Weinberg's lab is doing human oncogene, mouse oncogene, why doing fly study? He doesn't even have fly in the lab? Right? So I was not thinking. So anyway he --- And it doesn't mean that you put oncogene and develop fly cancer is wrong. People did that later on, and it turned out be a model. But you should not do it in his lab. His lab is for some other more interesting project to do. So anyway. So in his lab then I --- And his lab is very different from Pieter's lab. His lab is very hot, about 18 or 20 people and everybody is very hot and then they all popular in the top journal and work very hard and then everybody there _____ [1:22:06.6] and that the culture was very different from Peter's lab. Peter's lab everybody was so friendly. But in our lab he said, Talk to people. There was one --- I talked to this woman. They are all very nice and they all talk to you, but everybody is the same pretty much say, Don't touch.

T.A. Rosolowski, PhD
[1:22:26.5]
Right. Reserved. Not sharing. Yeah.

Mien-Chie Hung, PhD
[1:22:29.0]
Don't touch. And at that time in their lab ,they had a lot of hot labs. They had --- They had paper in *Nature* all the time, and it was all very hot. And I really admired that and so I --- They have one interesting project, which they called P185. The P185 is a very interesting animal

model, and some guy, a post doc fellow before me, tried to clone that P185 gene for two years with no success.

T.A. Rosolowski, PhD
[1:23:03.5]
What did the gene do? What does it?

Mien-Chie Hung, PhD
[1:23:04.8]
Let me --- Let me explain it to you.

T.A. Rosolowski, PhD
[1:23:05.7]
Oh, I'm sorry.

Mien-Chie Hung, PhD
[1:23:07.3]
That is from a German group. That German group has studied a very interesting chemical carcinogen. And put it in the pregnant rat. Then after that the offspring about 80% all developed brain tumor. Well ,that's --- that give you a reason. So remember we said, Pregnant women don't smoke, because it's going to affect your baby! And that's one of the good example. And so they developed new brain tumor, so-called neuroblastoma or glioblastoma, okay? And they developed the cell line from that tumor. And Weinberg's lab at that time is very hot, as I mentioned doing those transfections, very hot. To be able to clone an oncogene from a tumor. Either from human tumor --- the first one human tumor or from mouse tumor or whatever. So they are interested to clone that neuroblastoma gene. The gene cloned because they say, This is from pregnant rat. You give carcinogen, and then offspring developed tumor --- brain tumor and then brain tumor developed culture cell line and this culture cell line is a tumor. So there must be an oncogene there, so they want to clone it, and there was a post doc fellow who tried to do it. But that post doc fellow --he's very smart, but then he's not a molecular biologist. He's a protein chemist, so he didn't really clone it. But I was trained as a cloning person in drosophila. So end up --and also, that particular tumor cell line --- before me there were a couple students and post doc fellows who tried to identify what chain actually caused the oncogene and they have --- to make a long story short --- they have --- they take this tumor cell to develop antibody, to see whether it is something abnormal. If only something abnormal and the antibody detect a protein size 185K --- 185,000 ____ so you did it for _____ [1:25:09.9] molecular weight. So because this protein it just is a human tumor --not in the tumor cell, but not introduced into the body, so tumor cell has a specific protein. So they call it the P185. This P185 is the cause of the cancer so they want to clone it. But --couple people work on two or three years but didn't clone it. And I couldn't find a project. And this is very difficult project

and nobody want to do it. And this part is what I want you to know. My weight at that time was 185 pounds. My weight is 185 pounds. And that protein was P185. So I said sh --- in Chinese has those kind of numbers.

T.A. Rosolowski, PhD
[1:26:00.2]
The numerology. Yeah.

Mien-Chie Hung, PhD
[1:26:02.8]
And also I'm good at cloning, so I decide to clone that gene. But people in the lab told me, Don't do it because another person already spent two years there. But the thing is that the background is different. So I picked that project. So in half a year --- half a year I clone it.

T.A. Rosolowski, PhD
[1:26:24.3]
Half a year?

Mien-Chie Hung, PhD
[1:26:25.2]
Half --- Yeah. Half a year. It's a little difficult, but if you know how and then --- and that was for neuroblastoma and glioblastoma. So we cloned neu oncogene, N-E-U. But in that year --- I went into his lab in 1984, January. I probably cloned it in the summertime but in September that --in Boston, he has a one symposium, he talked about it. At that time we had not published yet, so he talked about [the] neu oncogene, and the news came out and said new oncogene, N-E-W because of new, but what we meant is that neuroblastoma neu. But it --- actually the news reporter thought it was new oncogene, n-e-w, not a neu oncogene, you know.

T.A. Rosolowski, PhD
[1:27:14.5]
So tell me how you clo --- how you did clone it since you brought a different background.

Mien-Chie Hung, PhD
[1:27:19.9]
So remember I told you library.

T.A. Rosolowski, PhD
[1:27:22.8]
Mmhmm.

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Mien-Chie Hung, PhD
(1:27:3.6)
Okay. The first thing I had to make a genome library from that tumor cell. That tumor cell has -- that oncogene there, right? So I had to make a library. So make all the gene piece by piece, right? So I have a library. The library can be plasmid, can be cosmid, can be virus, can be many things. So at that time I used the cosmid --- the cosmid because the cosmid can carry. My advisor used the plasmid. Plasmid can carry only 5-10 KB kilobase pair[s] but cosmid has been modified and can carry 40 kilobase pair[s].

T.A. Rosolowski, PhD
[1:27:59.9]
Now what is cosmid exactly?

Mien-Chie Hung, PhD
[1:28:01.7]
Cosmid is a modified --- it's a modified factor of DNA --- a modified factor from the bacteria plasmid. Are you familiar with bacteria plasmid?

T.A. Rosolowski, PhD
[1:28:14.8]
Not really, no.

Mien-Chie Hung, PhD
[1:28:15.3]
Okay. Bacteria has a genome. But bacteria has also those extra chromosomes, very small, and those extra chromosomes in bacteria can make multiple copies, so that's why we can clone the gene and make a lot of DNA. And those are --- And those plasmin are small genome. It's different from your genome. It's extra chromo --- It's not your chromosome. It's extra. The plasmin size is very small, and I told you the first sequence in _____ [1:28:41.4]. It's bacteria plasmin PVR322 and --- but they don't people modify in order to allow the capacity to carry more because plasmin only can carry a few kilobase pair. How about your gene is 20 kilobase pair. We will never be able to clone a functional gene, right? So now people just modify it become that plasmid can carry maximum 40 kilobase pair from 4 kb to 40 kbp. That would be different. And so that they call cosmid.

T.A. Rosolowski, PhD
[1:29:11.8]
Oh okay. The modified --- Yep. The modified version.

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Mien-Chie Hung, PhD
[1:29:13.1]
The modified. And I was lucky because that functional gene, it's just 33 kilobase pair. So if I used plasmid like bank, it's not going to work. So I used cosmid and make it the library from the --- that cell which carried that oncogene --but the thing is we don't know which one. And we are thinking about ways to fish it out. And at that time –we're making a long story now. At that time the --- there's --- You know EG receptor?

[1:29:43.0]
Okay. The --- Mendelsohn, Okay. EG receptor called in by a gene called ErbB gene, and --- and at that time, genetics in English group had just cloned the gene. And it's --- it's originally associated with virus called vErb gene [1:30:01.3] --- remember I told you those people study animal virus and they carry oncogene right? V stem for virus --- So _____ [1:30:08.5] stem from that particular gene pool, and they told me that ErbB gene was found to be human EG receptor. And we are suspecting this P185 [would be] a very homologous to EG receptor. There's some indirect evidence so we end up use V- ErbB as a DNA probe. Keep in mind V-ErbB is from a virus. It's a chicken virus. Yeah, it's an animal virus. It's not human. It carries the oncogene so --- but all the oncogene, they are homologies so you can use the hybridization technique. So we used it to hybridize it --- the library which I made from that mouse tumor, right? And then to see which one hybridize with that. And then I freeze that. And then after I clone it turn out to be 33 kilobase pair. One piece function gene with the biology I kept. And the biology I kept it had to be done by transfection. In other words I transferred into a normal cell and of that normal cell I found cancer cell.

T.A. Rosolowski, PhD
[1:31:18.5]
Cancer cell. Wow.

Mien-Chie Hung, PhD
[1:31:19.0]
Yeah, so we have cancer twice. So now I know I cloned that gene. And so --- in that gene they don't --- another student who took that project to identify what caused this gene [to be] different from a normal gene and to --- now they see what kind it is. One single point mutation.

T.A. Rosolowski, PhD
[1:31:42.0]
One single point mutation.

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Mien-Chie Hung, PhD
[1:31:43.1]
Yeah, just like the first human oncogene.

T.A. Rosolowski, PhD
[1:31:44.3]
In the first human oncogene.

Mien-Chie Hung, PhD
[1:31:45.3]
The first human oncogene was in 1982. Our paper was in 1986. And so that --- this is rat --- is a animal neuroblastoma right and then it's single point mutated. And the funny thing is when I came here the first time, you know Arthur Yung [Oral History Interview] here? He has collaboration with me because he work in neuroblastoma. And this is neuroblastoma so we were actually interested and we had some collaboration at that time. We tried to study whether this gene is available in human tumor. Turned out to be that's not the case. And you know why? Interesting. In the animal case, you require one single point mutation in DNA to change the amino acid from glucamine into glycine. One single point mutation change that specific amino acid. You know the animals can change, right? But do you still remember since we started biochemistry there's a wobble effect? I.e. genome _____ [1:32:47.0] recognized one amino acid. Remember that?

T.A. Rosolowski, PhD
[1:32:52.3]
No. I didn't actually study biochemistry, but yeah.

Mien-Chie Hung, PhD
[1:32:54.3]
Okay. So --- Okay. The _____ [1:32:56.1] ATGC three of them recognized one sequence. However, there are some of them co-op will say first one and second are different. The third one it can be A, B, C or A, B, D, or A, B, E. They all recognize the same sequence.

T.A. Rosolowski, PhD
[1:33:11.7]
Oh, okay.

Mien-Chie Hung, PhD
[1:33:12.9]
They all recognize the same sequence. So in this particular case, in the rat P185 gene, one single point mutation changed [the] amino acid. But in human case we require two. So --- And once

you require two mutations, the frequencies become very low. So the gene which I was involved cloning --called this P185 or called neu oncogene-- turned out to be --- in human it's a human EGF receptor homologue so it's called HER2.

T.A. Rosolowski, PhD
[1:33:46.8]
Oh that's where the HER2 gene. Okay.

Mien-Chie Hung, PhD
[1:33:49.5]
HER2 stands for human EGF receptor #2 and you sometimes also see people call it erbB-2 because erbB is that virus-associated compound. ErbB is really erbB and then homologous EGF receptor. And then HER2 is human EGF receptor #2. And neu come from neuroblastoma. That gene was causing neuroblastoma in rat. So that's why in the literature you see HER2/neu or HER2/erbB-2? These are all the same gene. That's where it comes from.

T.A. Rosolowski, PhD
[1:34:21.2]
Huh. Okay.

Mien-Chie Hung, PhD
[1:34:24.6]
But in the human case we don't see that identical mutation because of that --- two change --- the same aminos change and require two mutation and that frequency is very low. And that HER2/neu in human cancer turned out to be involved [in] breast cancer, ovarian cancer, pancreatic cancer. And these kind of cancer --and they cause cancer not by mutation but by _____ [1:34:48.1] by large scale production. Extra mutation make it 1 equivalent to 100 because it can still activate it, but since they aren't cause by mutation, they're caused by overexpression or overimplication.

T.A. Rosolowski, PhD
[1:35:04.3]
Now, okay because I mean we were --- when I was reading about your work on tyrosine kinase …

Mien-Chie Hung, PhD
[1:35:11.5]
Yes. Yeah. Tyrosine kinase.

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T.A. Rosolowski, PhD
[1:35:12.8]
Right. I read that that really --- you're --- you're talking about this paradigm shift. That everybody had thought about oncogenes as being kind of the ground zero, but you were actually discovering that there was actually an understanding of the way the receptors worked and not --- am I --- am I getting this correct? There was like a shift in emphasis.

Mien-Chie Hung, PhD
[1:35:33.8]
I think this maybe the next one.

T.A. Rosolowski, PhD
[1:35:35.4]
Okay. Well, I mean, I'm just trying to make the connection with…

Mien-Chie Hung, PhD
[1:35:40.9]
No. This is different one.

T.A. Rosolowski, PhD
[1:35:41.6]
Okay. Okay.

Mien-Chie Hung, PhD
[1:35:42.0]
This --- This is later on.

T.A. Rosolowski, PhD
[1:35:43.2]
Well, oh good. Well let's --- let's --- let's continue to tell your story then. Yeah.

Mien-Chie Hung, PhD
[1:35:45.5]
Okay so --- so EGF receptor as you know --- EGF receptor is the receptor of cell service protein and HER2 is also cell service as a receptor.

T.A. Rosolowski, PhD
[1:35:53.4]
They're receptors. Okay.

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Mien-Chie Hung, PhD
[1:35:53.7]
And receptors meaning they were exposed outside of cell and also inside of cell. They are responsible for communication outside of cell and inside of cell. Outside of cell you have something come in, and you try to pick up. Say --- So say this is a cell. Receptor like that, but this one is outside. Something come in then they transition here and that's usually on the inside from the receptor. Okay and EGF receptor is a portal type of receptor. HER2 is his brother, and HER2 also present turn out to be cause breast cancer. That's why I study a lot of breast cancer -- breast cancer/ovarian cancer. And then EGF receptor similar. So up to now I'm still working on these two molecules, and these two molecules turn out to be overexpression or mutation or cause human cancer. And in the case of brain tumor, turned out to be EGF receptor has a lot of mutation. All this family, all these receptor and tyrosine kinase, they do something similar. In the rat neuroblastoma, was erbB-2 mutation. In human brain tumor, turned out to be EGF receptor frequently mutating.

T.A. Rosolowski, PhD
[1:37:02.8]
So it's like you discovered this kind of central mechanism and then it was following the implications of that in all these different directions.

Mien-Chie Hung, PhD
[1:37:12.3]
Yeah, and then not only me because we --- we got many people involved in this work right? So --- And then I was part of --- Well I was responsible for cloning rat genome in neu oncogene, but later on --because the gene is too big, so it's really heavy. It's difficult to handle, so there's another shorter version called CDNA. It's complimentary DNA. And then Cory Buckman is an honor student in Michael's lab, and I collaborate with her so she was responsible for cloning the CDNA. And CDNA turned out be more usable because it's smaller. It's 5 kilobase pair. So 5kb and 7 kilobase pair. Five kb is smaller and easier to handle. So now we all use the CDNA version. So that was where --- So when I was in the lab, I was primarily responsible for cloning the rat neu genomic oncogene by one piece of DNA so this can be functional. And then Cory Buckman cloned the CDNA, and they told me, We'll use CDNA to study.

T.A. Rosolowski, PhD
[1:38:14.3]
Now did that end up being your Ph.D. project?

Mien-Chie Hung, PhD
[1:38:17.0]
No. That was my Post Doc.

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T.A. Rosolowski, PhD
[1:38:18.6]
Oh okay. Your Post Doc. Right. Oh that's right. I'm sorry. I'm sorry.

Mien-Chie Hung, PhD
[1:38:19.3]
My Ph.D. was on …

T.A. Rosolowski, PhD
[1:38:21.0]
Sorry. I'm sorry. I was glitching out. Yes. Okay.

Mien-Chie Hung, PhD
[1:38:22.9]
So my Post Doc Fellow. So then, because of this gene they told people discovered by other people that it's overexpression in human cancer. As a matter of fact, Dennis Lemon in Los Angeles, he wrote a true classical paper in *Science* in 1985 or 1986 that showed --- at that time very few people studied that even back to the old days. Now many people do that. This showed --When you look at this erbB-2 or HER2/neu, and look at the human tumor breast cancer and looking for survival --here is the time, and here is the survival rate, and then they found out breast cancer and even take a breast tumor tissue from the patient and just looking for erbB-2 or HER2/neu for expression. Implication: both breast cancer and ovarian cancer it was overexpressed in the patient.

T.A. Rosolowski, PhD
[1:39:21.0]
Wow.

Mien-Chie Hung, PhD
[1:39:22.3]
And it was no overexpression patient in all breast cancer.

T.A. Rosolowski, PhD
[1:39:27.2]
So dramatically influenced.

Mien-Chie Hung, PhD
[1:39:27.4]
So this is one of the very few studies at the very beginning using the molecular oncogene marker

to predict the patient survival. Now everybody is doing that now. It's very easy now but at that time, it's difficult. So that was '86 or '85 at that time the two paper in *Science*. One is breast cancer, one is ovarian cancer. Say implication is overexpression of these particular HER2/neu is caused patient survival. And you know there is _____ [1:39:56.8] because of that. Well it's a long story. But now you know [Herceptin?], right? And you know, Mendelsohn's drug, and Herceptin [1:40:04.5]. So all these antibody attack this molecule and it turns out to be anticancer drug. So Denny sometimes jokes and says, Hey you got cloning so I have a job. But he was the one who --- he was not the one who developed molecular antibody, but he's the one who pushed Bob to try to say, Hey this is going to work so let's do the clinical trial. He's not the scientist who discovered it, but he's the clinician who pushed just like Mendelsohn. Mendelsohn is different. Mendelsohn play both scientist and clinician role. He discovered --- He invented the antibody and then helped do clinical trial. Dennis is not that. He didn't invent that. He was just pushed it. He was in Los Angeles, so he had the advantage, close to Hollywood. So there was a movie. He was in that story to make a movie, and although scientists may not agree with what the movie said but you a movie is a movie.

T.A. Rosolowski, PhD
[1:41:07.6]
So tell me how you ended up at MD Anderson because that's like in the midst of all of this.

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Chapter 05
The Right Time in the Biochemistry to Move into Cancer Studies
A: Joining MD Anderson/Coming to Texas;

Story Codes
A: Professional Path;
A: Joining MD Anderson;
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: The Value of the Oral History Project;

Mien-Chie Hung, PhD
[1:41:13.6]
Yeah. So you know after I cloned the gene, and then for Post Doc two and a half year --- two year and eight months, I was starting to look for a job. Then I was --- went to a symposium called --- at that time called Oncogene in Frederick. It was the first annual oncogene --- at that time it was very popular and --- and it no longer exists now. And I met two person in MD Anderson. Gary Gelick. You know Gary? Okay. And the other one Peter Steck, who passed away. Peter Steck used to be in the --- Arthur Young's department. He's the one responsible for cloning the p10 gene. Both of them are junior faculty, and I was Post Doc, and they were instructors or something. They called a meeting --and I gave a talk there and then I was looking for a job. And they said, Hey MD Anderson has a position. So I start to --- and also at that time I --- after Post Doc --- after cloning a gene you know I was ready. So I was looking for a job. I got some offers. Then at that time I end up at MD Anderson. There are many, many reasons. I do have some offer from Boston, but I was a student there. I was Post Doc there. You know what I'm saying? And here cancer center and I want to do cancer. [Whispering] And I don't know cancer. I don't know cancer. I'm a molecular biologist. I went to school for molecular biology. I went to Weinberg's lab doing the mouse tumor and cloned the oncogene. Doesn't mean I know cancer. I don't know anything about cancer. And I really want to do cancer. Also my department chair, Garth Nicholson --- that was before Tomasovic in this department. Garth Nicholson created this department called Department of Tumor Biology and he recruited Steve Tomasovic from California and so he recruit me here. I said --- Yeah in 1986. _____ [1:43:16.3] and remember 1986, the business crashed down. From 85 to 87 a half million people per year in Houston left. Were you here at that time?

T.A. Rosolowski, PhD
[1:43:30.4]
No. No. No I'm a recent.

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Mien-Chie Hung, PhD
[1:43:31.6]
So when I came here, everybody looked at me like those people from Mars or something. So when I came here everybody left but it was a medical center.

T.A. Rosolowski, PhD
[1:43:44.1]
Now, what did working on cancer represent to you? You know I mean obviously intellectual challenges but were there --- was there anything else?

Mien-Chie Hung, PhD
[1:43:53.0]
You mean why I choose cancer?

T.A. Rosolowski, PhD
[1:43:54.2]
Yeah.

Mien-Chie Hung, PhD
[1:43:55.8]
As I told you that when I was in Master's --- when I choose a Master's I really want to do life science related to cancer. I thought about cancer at that time, but at that time cancer is not on the molecular level. Cancer is very vague. Cancer is cancer, but you don't know what cancer. That's when I went to --because of geographical issues I went to snake venom protein study. That kept me in molecular structure detail training. And then in 1982, when the first human oncogene was cloned and single point mutation was discovered, I feel this is the right time for a chemist or biochemist, because you know the structure. Well, cancer is important disease, there's no question about it. But, if that is not ready for this field to go in I --- I don't know why I go in there. I just feel, well gene is there. Molecule is there and that single point mutation and which one cause cancer. This one doesn't cause cancer. Hey, wait a minute. And that's a _____ [1:44:57.8] molecule then it's time to come in. And then again, I don't know cancer. I'm a molecular biologist. So for faculty position, MD Anderson --MD Anderson at that time was popular because it was the #2 cancer center. Molecular biology, we don't have too much study yet. Our research is not as strong as we have now. But still, there are a lot of cancer staff here, and also I want to be out of Boston. I was student there and Post Doc there. So I'm from Taiwan. I never see snow. And hot year snow season and when it snowed we had to shovel.

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T.A. Rosolowski, PhD
[1:45:41.8]
I bet you're glad you're not there this year.

Mien-Chie Hung, PhD
[1:45:43.1]
And then --- Especially this year. And then --- And then every time I was a student and a Post Doc I don't have a brand new car. And my used car --and I always have the snow tire in my trunk. I also had to bring all the salt in the trunk because when it snow I get stuck.

T.A. Rosolowski, PhD
[1:45:58.2]
And a shovel.

Mien-Chie Hung, PhD
[1:45:59.0]
Oh yeah. Right?

T.A. Rosolowski, PhD
[1:46:02.2]
I'm from that part of the world too so …

Mien-Chie Hung, PhD
[1:46:03.5]
Yeah. It's time. So anyway, the first year when I came here, it was funny. My brother told my mother and my mother said where he'd go and he said Boston. _____ [1:46:18.2] it's just like from Taipei to _____ [1:46:23.0]. Okay Taiwan is very small. Taipei is the most popular and the Pinto is a very _____ [1:46:28.0] Why he is in Boston? Everybody know. Why Boston? Go to Texas. You know John Wayne. You know western. And so that year in 1986, around Thanksgiving time, my mother and my elder brother visit me and I show them Houston is not John Wayne. Houston is a real city, so they was, Oh, okay. Keep in mind they were from Taiwan. What they know about Texas? Texas, Texas.

T.A. Rosolowski, PhD
[1:46:55.2]
Well you know even --- even today people have a lot of assumptions about Houston because it's in Texas, so yeah.

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Mien-Chie Hung, PhD
[1:47:02.1]
I still remember '86 at Thanksgiving time they came. I came in August and they came after and then after they said, Oh city. I said, Yeah it's a big city. It's a real city. It's not like what you think you know everybody is riding horse. It's not. It's different. They all drive the car.

T.A. Rosolowski, PhD
[1:47:19.2]
Well it's almost 5 o'clock. Do you want to stop for today and then next time we can continue with MD Anderson?

Mien-Chie Hung, PhD
[1:47:23.9]
Sure. Oh, by the way I do appreciate you talk to me about this because all these are history. Some of them I have --- there are a lot stories behind that and that remind me of old days and special memories when my mentor passed away and everything.

T.A. Rosolowski, PhD
[1:47:40.0]
Yeah. I'm sorry. I mean he --- he obviously was very, very important and great model for how to do even collaborative science and setting up a lab.

Mien-Chie Hung, PhD
[1:47:47.5]
Yeah. Yeah. It's okay and you get --- we're all very busy and we don't think about this. Only when you chat with --- and dig out old stories and you know it's been 28 years.

T.A. Rosolowski, PhD
[1:48:02.1]
Well it's a pleasure and I'm looking forward to talking to you again.

Mien-Chie Hung, PhD
[1:48:04.5]
Sure. Yeah, I really enjoy it because yeah it's myself. I didn't expect this. I originally thought you wanted to talk about MD Anderson or something. I didn't realize. This is more like writing a biography.

T.A. Rosolowski, PhD
[1:48:17.0]
Yeah. That's --- yeah. That's an oral history interview. Yeah.

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Mien-Chie Hung, PhD
[1:48:20.1]
So thank you. Thank you. I enjoy and then --- and this brings a lot of stuff back to the old days and some of them to --- touch my heart. Some of them remind me something which I may not say here but that's …

T.A. Rosolowski, PhD
[1:48:33.8]
Yep. And there'll be another opportunity so, I don't know what I don't know, and if I'm not asking a question that I should be asking you know feel free to say, Hey wait a minute, we're missing something and I'd like to --- so feel free to bring up topics or stories that I may have --- may have missed.

Mien-Chie Hung, PhD
[1:48:49.3]
And they --- I know what this is now so I can more well prepare next time.

T.A. Rosolowski, PhD
[1:48:53.1]
Well I don't expect you to do any homework. That's my job, but thinking about things that might be appropriate.

Mien-Chie Hung, PhD
[1:48:57.2]
And --- And --- And --- And --- And those stor --- those stories I told you you know I told Josh Filder, okay, and Josh say Mien-Chie you're just like me, okay? One time I reported him. He said you know why you're smart? I said first, I'm not smart. No way, he said, you are smart. I know you're smart. You know why you're smart? Because you kept up your kosher food. First I refused and he said you're smart. I said no, no, I'm not smart. I just work hard. He says no, no, you're smart. You know why you're smart? Because you kept yourself kosher.

T.A. Rosolowski, PhD
[1:49:29.4]
That was a really funny story. I mean sad because I can imagine what it would be like to go through that but a really funny story in retrospect.

Mien-Chie Hung, PhD
[1:49:36.9]
Yeah, you see and that drinking water. I mean geesh. Holy smoke.

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T.A. Rosolowski, PhD
[1:49:40.3]
Yeah. All of those things.

Mien-Chie Hung, PhD
[1:49:41.5]
Holy smoke. Because am I yellow or what? No a black lady has water then how come not me? Whoa. American is American. I reckon they can recognize everybody individually. So I don't pay taxes there's no water.

T.A. Rosolowski, PhD
[1:49:57.9]
Well I really look forward to our next conversation, Dr. Hung.

Mien-Chie Hung, PhD
[1:50:00.8]
Sure and thanks for coming.

T.A. Rosolowski, PhD
[1:50:01.9]
Sure. So I'm turning off the recorder at 5 o'clock.

Mien-Chie Hung, PhD

Session 2: March 7, 2014

Chapter 00B
Interview Identifier

T.A. Rosolowski, PhD
[0:00:04.6]
No, not yet. Now, we're on and I will just put on the identifier. I am Tacey Ann Rosolowski. Today is the 7th of March 2014. The time is about seven minutes after two. And I'm in the Clark Clinic in the Yellow Zone, which I say because I don't know about the zones. So I'm always exploring these new areas. And I am in the Department of Cellular and Molecular --- Molecular …

Mien-Chie Hung, PhD
[0:00:27.7]
Molecular and Cellular.

T.A. Rosolowski, PhD
[0:00:28.5]
… and Cellular Biology.

Mien-Chie Hung, PhD
[0:00:31.4]
Oncology.

T.A. Rosolowski, PhD
[0:00:31.7]
Oncology. [Department of Molecular and Cellular Oncology] Talking to the Chairman of that Department, Dr. Mien-Chie Hung. This is our second session. So, thanks very much. It was great fun to talk to you the last time and I'm looking forward to our conversation today.

Mien-Chie Hung, PhD
[0:00:43.5]
Yeah.

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Chapter 06
Recruited to Bring Cutting-Edge Oncogene Research to MD Anderson
A: Joining MD Anderson/Coming to Texas;

Story Codes
A: The Researcher;
C: Funny Stories;
A: Joining MD Anderson;
A: Character, Values, Beliefs, Talents;
A: Personal background
B: MD Anderson History;
D: Understanding Cancer, the History of Science, Cancer Research;
D: On Texas and Texans;

T.A. Rosolowski, PhD
[0:00:44.4]
So, we ended last time by --- you talked about your work on the HER2/neu oncogene and we also got up to the point when you had found out about the position at MD Anderson and you were excited about channeling your expertise in your area into this new area of oncology. So before we get to talking about --- more about your research program when you got here, tell me your impressions of MD Anderson when you arrived.

Mien-Chie Hung, PhD
[0:01:13.9]
Okay. So after post-doc training at MIT and then looking for job, I do have a few other offer from other place. I chose MD Anderson. The major reason is because MD Anderson is --- the reputation of MD Anderson in cancer. And I did --- I did at that time since I --- I was involved in the cloning of an important oncogene. So I do feel that cancer --- I --- ever since when I was little, I been dreaming about medical research. If you remember, I mentioned last time my Master's thesis in Taiwan studied the snake venom, because that particular program in Taiwan at that time, nobody --the program was, it's not really a medical school so --- and also, snake venom, you know, Taiwan is a local issue…

T.A. Rosolowski, PhD
[0:02:04.4]
____ , right.

Mien-Chie Hung, PhD
[0:02:05.5]
… but now I have opportunity to work on cancer. Especially, I love cloning oncogene. At that

time, I already committed that I wanted to stay in the cancer field. And so that was the major reason I choose MD Anderson because I do feel I'm a basic scientist, and I'm a molecular biologist, cell biology and I clone a gene, I can do all those stuff. But in reality, based on my clinical friends' comments, is I don't know cancer. I never see patients, treats patients, so that's true. But we come from understanding cancer from animal models, from cellular models, from molecular models. But in reality, you had to go to cancer center. And to really collaborate with clinicians and start with the cancer research. And that's why --- the major reason I chose MD Anderson.

T.A. Rosolowski, PhD
[0:02:54.2]
Now, were you looking at other cancer centers at the time?

Mien-Chie Hung, PhD
[0:02:58.3]
At that time, I was --- when I looking for job, is more like at university.

T.A. Rosolowski, PhD
[0:03:01.9]
Okay.

Mien-Chie Hung, PhD
[0:03:02.1]
University faculty position. And many of them are more --- primarily molecular cell biology and, of course, many basic science department --molecular cell people doing cancer, too. But at that time, MD Anderson, this particular department was led by Garth Nicolson. He built up this Department of Tumor Biology, which is a basic science but also focused on tumor, and that's what I'm interested in. It's different from many other places. When I ____ 0:03:30, it's Department of Molecular --- Molecular Biology or Department of Microbiology. It's nothing wrong with that, which is good, which is --- but my heart is in cancer. So Department of Tumor Biology is perfect for me. And plus, I like to know the clinical input. And then MD Anderson would be almost the ideal place that I can think about. Of course, before I came here, and just very frank with you, that my colleague --- post-doc colleague in MIT – it is a joke, if you want to put in or not, it's your call. They are ___ say, Mien-Chie, you don't want to go to Houston. I say, Why? They say, Too hot.

T.A. Rosolowski, PhD
[0:04:10.1]
Yes.

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Mien-Chie Hung, PhD
[0:04:10.6]
And I say, I come from Taiwan. I never see snow before I come to Boston.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:04:14.8]
And weather in Houston is the same in Taiwan. So that doesn't exist. Second day, my friend come back, say, Mien-Chie, you're my friend; I really ____ 0:4:21, don't go there. I said, Why? He said, Too hot. It's not a problem. He said, There is no culture there. Okay, many people grew up in northeast, you know that …

T.A. Rosolowski, PhD
[0:04:31.9]
Yeah, yeah.

Mien-Chie Hung, PhD
[0:04:33.7]
… Houston no culture. So, you know, my answer --- and we still make it a joke. I say, I'm Chinese. Chinese have 5,000 year of birthday --- 5,000 years of history. And United States, at that time had just passed 200 years or so. And we all scientists. And scientists pay attention to the number. Five thousand plus/minus 200. We did an experiment error.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:04:57.0]
So, I'm sorry. To me, there is no culture in United States. Boston and Alaska is the same. Of course, we joke. We still joke at that. When we see each other, we joke at that. So then, I said, Don't try to convince me not to go. I'm going there.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:05:10.5]
Then the third day, come back, say, Okay, now we going back there. So, you're my friend. So

next time when you come, you have to drive a Cadillac with two horns and with the, you know, hat and with the boots.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:05:23.0]
And we still make that joke.

T.A. Rosolowski, PhD
[0:05:24.4]
It's a good one.

Mien-Chie Hung, PhD
[0:05:25.5]
Five thousand plus/minus 200 …

T.A. Rosolowski, PhD
[0:05:27.2]
Plus/minus 200 (laughter).

Mien-Chie Hung, PhD
[0:05:27.6]
So, Alaska and Boston is the same to me.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:05:31.7]
So, it's a joke. It's a joke.

T.A. Rosolowski, PhD
[0:05:33.1]
(Laughter) No, and it's --- but it's true. And you're --- and you're right. I mean, even today --- I mean, up north, people think --- because when I was moving down here, the idea is, well, it's all like rodeos and ____ 05:42 …

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Mien-Chie Hung, PhD
[0:05:42.9]
Yeah, yeah, yeah.

T.A. Rosolowski, PhD
[0:05:43.9]
…. like you have no brains, you know. (Laughter). So, there really is prejudice …

Mien-Chie Hung, PhD
[0:05:49.1]
It is…

T.A. Rosolowski, PhD
[0:05:50.2]
… or lack of information.

Mien-Chie Hung, PhD
[0:05:50.5]
And yeah. And of course, nowadays is different because now with --- with all these E-stuff, the --- everything go to website to see. And all the communication become much faster --- much easier. But, remember I told you why I chose to Brandeis at that time, because of the communication.

T.A. Rosolowski, PhD
[0:06:04.8]
Right.

Mien-Chie Hung, PhD
[0:06:05.0]
Now, that wouldn't happen today, right? But anyway, so --- so --- that's --- in reality, that's, you know, things have changed. And so, indeed that happened. And then at this mo --- and now, especially for foreigner, when come from different country, frankly speaking, you --- you don't have that kind of feeling. But for people who grew up in northeast and grew up in ___ 0:06:24 family, they might have doubt, I mean I understand that. I understand. Just like in Taiwan, even that town is so small. People grow up in Taipei City and compared to some rural areas, of course they ….

T.A. Rosolowski, PhD
[0:06:35.7]
Right.

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Mien-Chie Hung, PhD
[0:06:36.9]
… ____. It's nothing right or wrong. It's just like that's the way it is.

T.A. Rosolowski, PhD
[0:06:37.9]
That's just --- right, it's just the misperceptions people have.

Mien-Chie Hung, PhD
[0:06:41.0]
And I'll just share with you the --- all this real happen, things, and I make it as a joke. And that joke, we still checking to each other. When all those friends get together, we still checking.

T.A. Rosolowski, PhD
[0:06:51.2]
It's really --- it's a funny joke. (Laughter) It really is a funny joke. Now, tell me, who was it that you spoke to the most when you were arranging to come here? Who recruited you?

Mien-Chie Hung, PhD
[0:07:02.6]
Ah, my Department Chair at that time was Garth Nicolson, G-A-R-T-H N-I-C-O-L-S-O-N. He is actually one of the --- he is a very well-known scientist that ever --- ever since he was very young, that he convey a so-called mosaic model. And his model was actually in the general biochemistry textbook. I knew his name when I was a student.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[0:07:28.3]
So he was Department Chair of the –in this office. And then after that, Steve Tomasovic [oral history interview] took it over. So he recruited me. So I came here, and the department is not huge, maybe 10 faculty or so, but all focused on cancer, different areas. And at that time, I was considered as a more modern --- it's out of date now, but at that time, I was modern because oncogene was new, and then molecular biology was new ….

T.A. Rosolowski, PhD
[0:07:54.1]
Right.

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Mien-Chie Hung, PhD
[0:07:54.9]
… so I was kind of modern molecular oncogene person, and that was in mid 1980s, right? And the first human oncogene was cloned in 1982. So oncogene was hot. So at that time, I came here. I think I made a right choice because this the place that has a lot of the passion in cancer, and I as a very naïve junior faculty whose expertise was in molecular biology cloning oncogene, but don't really know cancer, and never really see how --- how patient been treated and so on. So I think I come to the right place and to go to the real world and then --passing now 27 years now-- I do feel that I make the right choice. And I enjoy it.

T.A. Rosolowski, PhD
[0:08:38.4]
Now, obviously when you presented your credentials to the department, they were well aware that you really did not have experience working in a clinical situation or with clinicians …

Mien-Chie Hung, PhD
[0:08:49.8]
No.

T.A. Rosolowski, PhD
[0:08:50.3]
… so how, I mean, how were they seeing you at the time? What did they expect you to bring to the department?

Mien-Chie Hung, PhD
[0:08:57.2]
Okay, that's a little bit different. This department, there's no MD. …

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:09:01.4]
This is the basic science department.

T.A. Rosolowski, PhD
Yeah.

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Mien-Chie Hung, PhD
[0:09:03.5]
So actually, we're the same.

[0:09:04.8]
It --- it's different from clinical department. They may view I don't have a clinical outcome. So this department, they will probably do not ask the question you ask. Because that's what they are looking for. And, for me to come here, there's certain issue they welcome because at that time, oncogene is very new, and not too many people clone oncogene. Now, the entire human genome is done, whatever gene is already known. At that time, it's very rare. So, when I came here, I was very --- very, very welcome. Because that's a new area in cancer research. And then I happen to hit something very heavy and come from a pedigree who is, you know, good pedigree. And so, I was being treated very well and being very welcome.

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Chapter 07
Early Work on Oncogenes and Adenoviruses: The First Gene Therapy
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;
A: Finance, Entrepreneur, Biotechnology;

T.A. Rosolowski, PhD
[0:09:50.1]
Now, I don't know very much about the history of translational research. Was that even a phrase that was used …

Mien-Chie Hung, PhD
[0:09:57.1]
Not yet, at that time.

T.A. Rosolowski, PhD
[0:09:58.6]
Yeah, because you were already thinking in those terms.

Mien-Chie Hung, PhD
[0:10:01.4]
Yeah. I think for translation, to me, to affect me is later on.

T.A. Rosolowski, PhD
Okay.

Mien-Chie Hung, PhD
[0:10:08.2]
At the very beginning when I came here as an Assistant Professor, what I'm trying to do is set up my laboratory and get my own grant, right. And then, soon as set up laboratory, you had to

recruit a student, recruit post-doc fellows, recruit research assistant so you have group, that we can work together and go the direction you want to go. And I certainly would like to, at that time, I didn't say to myself, what I should do. I said to myself, I want to have some impact on the human oncogene area. And then, since I was involved in --- the HER2/neu oncogene in cloning, and as I mentioned earlier, that --- this gene at that time, in the mid 1980s, it happen just been known to be overexpressed in breast cancer and ovarian cancer. Therefore, I was kind of interested in that. In addition to that, at the time when I cloned this gene, this come from an animal model which pertained to rat to, you know, carcinogen, and then offspring frequently develop neuroblastomas. So --- so I actually ended up one project and collaborated on neuroblastoma with Dr. Alfred Yung [oral history interview] here . And he's ___ --- he's still here.

T.A. Rosolowski, PhD
[0:11:18.4]
Yeah, I'm going to be interviewing him soon.

Mien-Chie Hung, PhD
[0:11:19.2]
And --- and then --- but it turned out to be this particular gene is not really involved in that human neuroblastoma because that --- in the animal case, you only need one single permutation to get that, one nucleotide change to get this in the same aminal chain. But in human, it requires two.

T.A. Rosolowski, PhD
[0:11:37.2]
Interesting.

Mien-Chie Hung, PhD
[0:11:39.1]
Now when you need --- you cut to the chase, it's very, very long. However, having said that, this gene is important for causing cancer. It's still valid. Although it --- in the animal model, it cause a neuroblastoma, glioblastoma. In human, that isn't really the case but enough. It was found to be overexpressed in breast cancer and ovarian cancer. So at that time, I thought --- I was a molecular biologist. So I thought, If we can identify something through regulated transcription – you know what transcription, right? Okay, so the gene had to be transcribed. So overexpression causes human cancer, breast cancer, ovarian cancer. And so, molecular biology, I was thinking cannot identify something to shock overexpression if --- if this --- this gene overexpress --cause cancer-- then if I can control its expression, cannot control being an anticancer agent. With that very naïve thought, then we are looking for a transcription factor to suppress gene expression. And for short period of time, that worked. Quite a few year, I --- you know, I don't long ____

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0:12:50.2 if you fi --- if you identify. Another gene from virus is called E1A, capital E-1-A. It's probably not in there, yet. E1A. ____ which was original --- it come from adenovirus.

T.A. Rosolowski, PhD
[0:13:10.2]
Okay, yeah, there we go. Yeah, actually I do have that.

Mien-Chie Hung, PhD
[0:13:15.1]
Yeah.

T.A. Rosolowski, PhD
[0:13:15.6]
Type 5 E1A.

Mien-Chie Hung, PhD
[0:13:17.1]
Yeah, type 5 E1A.

T.A. Rosolowski, PhD
[0:13:18.0]
Right, right.

Mien-Chie Hung, PhD
[0:13:18.0]
Which was originally from adenovirus. And traditionally in the literature, the E1A gene is considered as oncogene. But we found this gene from type 5 adenovirus. Transcriptional depress HER2/neu. So then we argue, if that's the case, if E1A can suppress HER2/neu, then E1A is a gene can suppress tumor. But in the literature, this is an oncogene. So went through literature carefully to looking for, then we realize that E1 --E1 is represent early region 1. When a virus vector --- when a virus infects a human being, there is a region where transcription starts first. Then after that, they have a late gene so they become virus. So the E1 region is considered as oncogene but the gene which really have it transforming – transforming meaning oncogenic activity, is E1B, it is not with E1A.

T.A. Rosolowski, PhD
[0:14:18.5]
Interesting.

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Mien-Chie Hung, PhD
[0:14:20.2]
Especially for this type of 5. There are many, many serotypes. Adenovirus type 5 E1A actually does not really have oncogenic activity. However, E1B does. And also other serum type. This --- the --- this virus has a different kind of serum --- that's the E. The serum type adenovirus was --- the other serum type, I don't remember specific number. That E1A --- some of E1A maybe be associated with some transforming activity. When I say transforming, it's in the lab say related to cancer, okay? But the adeno type 5 E1A, it --- they don't understand this. There is no oncogene. There is no oncogenic activity. It was just historically, E1, historically --- E1 it's --- and this happened many, many times in the literature. People, based on some published data -- and then the published data is correct, but people sometime over-interpret it. And so, E1 is oncogene. So E1A is oncogene, E1B is oncogene --- oncogene. So when we start to say E1 can suppress HER2/neu, then would that be a tumor suppressant gene, then that become an issue.

T.A. Rosolowski, PhD
[0:15:25.5]
And a lot of questions are coming up for me. Now, basically, what you were discovering was a new level of scrutiny that you had to apply to this data in order to understand the mechanisms.

Mien-Chie Hung, PhD
[0:15:41.3]
Yeah.

T.A. Rosolowski, PhD
[0:15:42.2]
Okay.

Mien-Chie Hung, PhD
[0:15:42.5]
And also, while we understand mechanism, identify a particular transcriptional factor, a particularly protein called E1A, that comes from a virus, that can suppress HER2 overexpression. And HER2 overexpression causes breast cancer and ovarian cancer, so we thought, well, if we can put this gene into the cancer cell, can this cancer cell because of the suppression? And then, that was a very naïve concept. Then we did it. And it took a lot of effort. And here, I should mention, this --- it's involved in many --- many people's cooperation --- was initially discovered from one of my students and that's her PhD thesis …

T.A. Rosolowski, PhD
Oh, wow.

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Mien-Chie Hung, PhD
[0:16:26.1]
… and she's --- she's a faculty here.

T.A. Rosolowski, PhD
[0:16:27.4]
Oh, is she?

Mien-Chie Hung, PhD
[0:16:28.0]
… Dr. Dihua Yu.

T.A. Rosolowski, PhD
[0:16:28.3]
Oh, okay, yes.

Mien-Chie Hung, PhD
[0:16:29.6]
So she --- she's still here ___, okay. ___

T.A. Rosolowski, PhD
[0:16:34.6]
Yes, I know her name.

Mien-Chie Hung, PhD
[0:16:35.8]
Okay.

T.A. Rosolowski, PhD
[0:16:36.4]
Yes. Great. Thank you.

Mien-Chie Hung, PhD
[0:16:37.4]
And then I'm going --- those people and Alfred Yung, you know it, too.

T.A. Rosolowski, PhD
[0:16:29.7]
Yes.

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Mien-Chie Hung, PhD
[0:16:40.1]
And so that actually her PhD thesis.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[0:16:42.6]
And then --- but then, after that, this is a concept that we need to work with the company and to really --- because now this is a gene. E1A is a gene. So for me to put a gene into a cancer cell, this become gene therapy. And this gene therapy, and then we start to --- I file patent, then our technology officer writes me. So remember in early 1990, gene therapy is very hot. So I was through our --- our technology officer, Bill Doughty [0:17:16.0], who retired already and with another guy, Gabriel Lopez.

T.A. Rosolowski, PhD
[0:17:22.2]
Yeah, don't know that name.

Mien-Chie Hung, PhD
[0:17:23.7]
He's in Experimental [Therapeutics]. He's still here. Lopez --- Gabriel Lopez.

T.A. Rosolowski, PhD
[0:17:28.9]
Lopez, okay.

Mien-Chie Hung, PhD
[0:17:30.1]
So then we actually, through their link, we form a small biotech company …

T.A. Rosolowski, PhD
Oh, wow.

Mien-Chie Hung, PhD
[0:17:37.9]
… and to move this into the clinical trial. And that --- and when we moved this over from the company, and the company actually originally called R-Gen. "R" represent --- and then it was located in The Woodlands. And then this R-Gen was in two years, pretty successful. So we

been approved by FDA to do the clinical trial at that time. Time is different now. That kind of situation nowadays may not be that hot but at that time, another company want to buy it.

T.A. Rosolowski, PhD
[0:18:11.9]
Ah, okay.

Mien-Chie Hung, PhD
[0:18:10.6]
Two years. That's okay. And investor probably and we all get --- everybody get their own fair share.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:18:18.2]
And then when we --- at that time, we want to move to clinical trial, then I started work with Gabriel Lopez. And I develop --- you know how to spell it, right?

T.A. Rosolowski, PhD
[0:18:26.2]
Spell it for me, please.

Mien-Chie Hung, PhD
[0:18:26.4]
Gabriel Lopez

T.A. Rosolowski, PhD
[0:18:27.8]
L-O-P…

Mien-Chie Hung, PhD
[0:18:28.8]
Gabriel Lopez-Bernstien. He's a MD Anderson faculty.

T.A. Rosolowski, PhD
[0:18:37.8]
Okay, great. Thank you.

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Mien-Chie Hung, PhD
[0:18:40.4]
And then, when we move to clinical trial --- Gabriel has a lot of experience to --- to, you know, communicate with FDA and those --- those kind of stuff. But because we try to deal with the breast cancer, so now my close friend, Gabriel Hortobagyi [oral history interview]. You know Hortobagyi?

T.A. Rosolowski, PhD
[0:18:53.8]
I do, yes. I've interviewed him.

Mien-Chie Hung, PhD
[0:18:54.5]
Okay. He's the first Breast Medical [Oncology] Chair. So three of us, you know, worked together very closely and then Dr. Hortobagyi, who at that time was a breast cancer surgeon, too. So, he took the lead to -- for the clinical trial. Then FDA approved it and then we started.

T.A. Rosolowski, PhD
[0:19:14.9]
Let me ask you, what was the thought process that led you to examine the E1A in this way? You know, what --- what were your thinking, to turn it around and look at it from a different perspective?

Mien-Chie Hung, PhD
[0:19:35.7]
Let me think about it, how we discover that. There's a long story about how we _____.

T.A. Rosolowski, PhD
[0:19:44.9]
Actually, just for a second, do you mind, Dr. Hung, if I move this back a little? Because I'm a little worried. Sometimes, when your voice drops, I'm worried that the sound will ____

Mien-Chie Hung, PhD
[0:19:52.9]
No, we don't ….

T.A. Rosolowski, PhD
[0:19:55.6]
We can move it back here, and I think just moving it away from the microphone helps. Perfect. Yes, that's already better. Alright. Okay.

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Mien-Chie Hung, PhD
[0:20:05.7]
Remember I told you that when I realized HER2/neu was overexpressing cancer, and I was molecular biologist. So, I was thinking, looking for the known transcriptional factor …

T.A. Rosolowski, PhD
[0:20:17.9]
Okay.

Mien-Chie Hung, PhD
[0:20:19.4]
… that may be down regulated HER2/neu. So we looking for quite a few, and this is the one that jumped out. So, it's not like we just pick up this one. It worked.

T.A. Rosolowski, PhD
[0:20:30.3]
Right. Okay.

Mien-Chie Hung, PhD
[0:20:31.1]
We were just looking for --- looking for transcriptional factor. And remember that was back to the early days. Not many, many transcriptional factors available. So it --- and it's --- it was manageable. So we can actually test it --- then when we tested it we find this one.

T.A. Rosolowski, PhD
Okay.

Mien-Chie Hung, PhD
[0:20:48.1]
And then --- then when we moved into clinical trial to initiate, and then ____ and that --- this is a early stage of gene therapy. So, as a matter of fact, this trial which was led by Hortobagyi and Gabriel Lopez and myself was involved with --- both of us co-PI and Hortobagyi PI. So this actually is the first human breast cancer, ovarian cancer gene therapy. I.e, the first time people put a gene into breast cancer and ovarian cancer patient. And I think it was started in 1994 or '95, around that time.

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T.A. Rosolowski, PhD
[0:21:33.2]
Now, what were the implications of that? You know, I mean, the success of that. What did you see? What did you perceive?

Mien-Chie Hung, PhD
[0:21:39.3]
I was very excited …

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:21:39.8]
… because we did some animal experiments. I still remember some of my --- one of my --- some students who did experiments and originally were not quite sure it's real. But when you do it, say, Hey, that one is real. Tumor shrinks.

T.A. Rosolowski, PhD
[0:21:55.5]
Laughs.

Mien-Chie Hung, PhD
[0:21:58.8]
Tumor shrinks.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:22:00.3]
And so we see it, but if it cures the animal, it doesn't mean it can cure humans. That's a different ball game.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:22:06.3]
But you --- you see that it's very impressive, very impressive. As I mentioned, this started with

Dr. Dihua Yu's PhD thesis. And then now, she's very --- very successful. She's a faculty member here. And then --- yeah, so --- so when R-Gen was moving in clinical trial and at the time when we moved to clinical trial, it was supported by R-Gen. But when Phase 1 started, it was then another company bought it, after that, they passed to. And then, the other company was a Seattle company called Targeted Genetics. And later on they --- they ran out of funding and so this project was not pursued. They returned the patent to MD Anderson, that's where it is.

T.A. Rosolowski, PhD
[0:22:44.6]
So when you say this other company bought it, what does that mean?

Mien-Chie Hung, PhD
[0:22:49.3]
Okay, when MD Anderson, the company was MD Anderson-based, right? MD Anderson is like, it's a major shareholder and then --- another company licensed genetic technology, so kind of --- this company then disappear and merged with them. And some of the ---

T.A. Rosolowski, PhD
Okay.

Mien-Chie Hung, PhD
[0:23:09.8]
… this company. The officer CEO or whatever become the consultant so they can develop project together. But MD Anderson still owned the patent rights. But then MD Anderson ___ always says because we're licensed, because our purpose is not making money. Our purpose make --- to benefit the patient. So they can help us to develop the drug, then the patient would be happy to see that. But in the future they don't do it, if they don't have activity they have to return to us. Okay. So then that was diverted. And then, let me share with you --- then, you may know 1998, there's a big event in gene therapy.

T.A. Rosolowski, PhD
[0:23:45.0]
I didn't know.

Mien-Chie Hung, PhD
[0:23.45.9]
There's one 18-years-old kid in University of Pennsylvania, under a clinical trial. I forgot the name of the disease, but it's --- it's not a major disease, it's a genetic disease. But he just kind of volunteered to be in the clinical trial. In that clinical trial, somehow was not done well --- controlled well-- the patient died. But keep in mind that's another deadly disease. So that

patient, he ___ but he died, right, so --- so suddenly that gene therapy field was being (ripping sound).

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:24:20.2]
Because the purpose to develop new therapy to --- to cure patient. But before that, we kill patient. So anyway. And also, gene therapy, we faced some technical problems. No, problem, yeah, issue. That is, when you develop gene, it's different from chemo. Chemo, when you treat a human being, every cell is exposed. So cancer cells are exposed. Except that chemo is a problem, has side effects because normal cell can be killed. And then when we do gene therapy, the same, too --but gene therapy is even worse. When you do gene therapy, the gene may not go in to the cancer cell only; they'll go to normal cells, right? And also, the gene that --you want gene --- that you want to put into --- we have to make sure it's going to every cancer cell. But technically, it's difficult. And even right now, it's still difficult. And so it's different from chemo. Chemo is --- when exposed to the drug, every tumor cell is exposed to the drug. But when we do a transcription to allow a gene to go in to cancer cell, not every cancer cell--- let's say this tumor has one million cell there, it may be only 20% have this gene go in…

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[0:25:28.2]
… 80%. Then, you might not be able to totally kill them.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:25:33.5]
And --- and also, we don't have selectivity to go to the cancer; it may also go to normal. Right? And so…

T.A. Rosolowski, PhD
[0:25:39.9]
Now, just educate me here. What is the impediment to getting the genes --- the gene therapy into every cell?

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Mien-Chie Hung, PhD
[0:25:45.6]
Okay, so technically --right now people using either virus vector – it's called vector or liposome vector or non-virus vector – we have to still use that. And technically, it's still in the development. It's still not 100% yet. But now, it's much improved. In addition to that, now gene therapy has been silent for more than one decade now. It's coming up now. Remember gene therapy have some advantage that --human genome sequenced now, right? So who has what mutation in the future, so it's not difficult. So if you know what gene is mutated, what gene is the problem, you can always use gene therapy. But technically, it impor --- as you pointed out, how to develop gene into right place, and how to make sure that gene gets in all the cells, if it for cancer for cell --- all the cells have those genes. And they are several different ways one can handle that. And now in the last decade, there are a lot of improvements. Many, many people have made contributions. We have contributed a little bit. We tried to design a gene expressed only, or primarily, in cancer cells, but not in normal cells. So in that way, when you do therapy, you prevent side effects. So that --you want gene therapy, the company has other interest in the company. And also up to 2000 --- before 2000 there's a biotech company going up. But stock market up to 2000 is going up. You probably remember that.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:27:12.3]
So --- so there are many biotech company didn't really survive well. So the company will survive well. And --- but then up to that scientifically, we still continue to develop. So now they told us just more recently we have developed expression vector, which allows the gene to express only in cancer cell. So we've now successful enough to develop that into pancreatic cancer, breast cancer, lung cancer, and liver cancer. And that one, some of the stuff is being licensed just more recently. So if we talk about chronologically, then that's not chronological. That's developed later on.

T.A. Rosolowski, PhD
[0:27:49.1]
Right. Let's talk about that there then.

Mien-Chie Hung, PhD:
[0:27:51.3]
Then we can talk about biological.

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T.A. Rosolowski, PhD
[0:27:52.2]
Right.

Mien-Chie Hung, PhD
[0:28:52.9]
So, the E1A gene therapy was kind of --- after it's sold to Targeted Genetics and then the clinical trial, then they are running the show. But that was the first trial. First, the human breast cancer, ovarian cancer trial. But unfortunately at that time, the vector is not efficient and then also, the gene expression system is not highly selective for cancer. And actually, we can talk about this one. I can finish gene therapy_____ And therefore, we continue to develop and later on, we develop an expression factor which we now call VISA ____ 0:28:30.

T.A. Rosolowski, PhD
[0:28:30.5]
V-I-S-A? Okay.

Mien-Chie Hung, PhD
[0:28:33.0]
It's an abbreviation. The VISA vector is a special design. That special design was modified from an earlier vector developed by UCLA. They called it TSTA, but we modified it and it become a VISA. And the --the purpose is to allow a gene to selectively express in cancer cell, not in normal cell. So now, if we can put this --- if this gene is a killer gene …

T.A. Rosolowski, PhD
[0:29:06.6]
Right. You can just put it right …

Mien-Chie Hung, PhD
[0:29:08.3]
… and then we --- we also identify killer gene from it's called BIK.

T.A. Rosolowski, PhD
[0:29:12.4]
Right. Oh, okay.

Mien-Chie Hung, PhD
[0:29:14.4]
BIK. But, part of the reason, we chose the BIK. BIK is one of the genes which can cause cancer cell --- which cau --- can cause cell damage. It's very broad. And this kind of gene, they are ---

they are family. Many of them. Part of the reason we particularly chose this one, it's because we noticed there's some amino acid in this gene where we can mutate it and make this gene much more portent than the ___ 0:29:41. So that's what we called DT. You probably see that BIKTT. These stand for aspartic acid. It's one of the amino acids. Because there are two mutations, mutate into aspartic acid. We find out this mutant. It's a highly potent inducer of cell death, with regard to normal cell, cancer cell. It's very, very potent. In that situation now, it's – this gene, it's very potent for killing cells. It can kill normal cell, it can kill cancer cell, but we have a VISA vector which carries this gene to cancer cell only. It's just like a --- a --- astronaut, take space shuttle. This shu --- this space shuttle ….

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:30:29.4]
…send it to the moon. We go to the moon, we don't go to Mars.

T.A. Rosolowski, PhD
[0:30:33.3]
We don't go to Saturn. (Laughter)

Mien-Chie Hung, PhD
[0:30:33.8]
So this vector allows it. So this vector allows this gene selectively express in the cancer cell by normal cell.

[0:30:41.7]
So now this one has been licensed by a ___ company called TTY.

[0:30:50.2]
Just recently. This is a couple years ago. And they are working this one very heavily, try to move things forward. And this one …

[0:30:57.5]
… we work with MD Anderson clinician, Jim Abbruzzese. He just left and the other one who's still here, that is Milind Javie [0:31:09]--I may have to spell it for you.

T.A. Rosolowski, PhD
[0:31:10.9]
Thank you.

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Mien-Chie Hung, PhD
[0:31:12.2]
Milind Javie. He's still here. He was a junior faculty at that time and Jim Abbruzzese was the chair.

T.A. Rosolowski, PhD
[0:31:19.9]
Okay, I haven't heard of him.

Mien-Chie Hung, PhD
[0:31:21.3]
He --- he --- he's less well known. He's much more junior. And so we work together and now this VISA vector for pancreatic cancer has been approved by the FDA to do clinical trial. And we are in the process of moving to a clinical trial.

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Chapter 08
The Rationale Behind Translational Research and Why MD Anderson Provides a Good Environment
A: The Researcher;

Story Codes
A: The Researcher;
C: Portraits;
A: Overview;
A: Definitions, Explanations, Translations;
C: Personal Reflections, Memories of MD Anderson;
B: Institutional Mission and Values;
B: MD Anderson Culture;
A: Personal Background;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: The Life and Dedication of Clinicians and Researchers;

T.A. Rosolowski, PhD
[0:31:35.1]
Let me go back just a little bit, Dr. Hung. There were two questions I wanted to ask you. Kind of about --- well, let me back up. When I was talking to Waun Ki Hong [oral history interview], he was saying that he had discovered a model for research. And I read somewhere you saying that your approach to the oncogene was a kind of model. Being to use that as a kind of model. Is that --- and I wanted to ask you about that. I mean, have you developed over the course of these early studies a sort of style or philosophy or way of putting together a study which is going to end up being translational in the long run? Could you talk to me about that?

Mien-Chie Hung, PhD
[0:32:22.5]
So let me try to understand you --- your question more specific. Say, when Ki – oh, by the way, you know the story, right? Ki Hong and I?

T.A. Rosolowski, PhD
[0:32:37.4]
You said you were brothers (laughter).

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Mien-Chie Hung, PhD
[0:32:31.3]
And he always says my last name is spelled wrong, and I agree with him because spell H-O-N-G probably more correct than Hung.

T.A. Rosolowski, PhD
[0:32:37.7]
And he's your big brother, right? So he gets to boss you around (laughter).

Mien-Chie Hung, PhD
[0:32:43.0]
Well, he can ____. As a real big brother. As a real big brother. Actually, you know, the first time I met him is when I was here as a young professor …

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:32:53.0]
… and my mail would go to him.

T.A. Rosolowski, PhD
[0:32:54.6]
Oh, really?

Mien-Chie Hung, PhD
[0:32:55.9]
Because Hong, everybody call him _____.

T.A. Rosolowski, PhD
[0:32:59.1]
Oh, my gosh.

Mien-Chie Hung, PhD
[0:33:00.0]
But he knew I was coming. Because he knew I was working on oncogenes. He know.

T.A. Rosolowski, PhD
Uh-huh.

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Mien-Chie Hung, PhD
[0:33:03.3]
And then, because as I told you, when I come, the oncogene was hot. So he took that letter to my office and I was waiting for it. And that's was the first time we met.

T.A. Rosolowski, PhD
That's ____.

Mien-Chie Hung, PhD
[0:33:13.0]
And so he become my senior brother. Anyway, so --- the question is what?

T.A. Rosolowski, PhD
[0:33:19.1]
Well, I know it's kind of --- kind of abstract and ill-formed, but one of the things as I've been talking to researchers who are doing translational research. I've been trying --- because this was a way of doing research that was in development. I mean, as you were --- were embarking on this intense career. And so --- and now, it's coming of age. So, I'm trying to get a sense of how did you learn to approach problems in this way? Is there --- is there a systematicity to it? Do you have kind of a style? You know, when you take a new grad student under your --- under your wing and show them the ropes, is there a way that you tell them they can begin thinking about this problem in a translational way?

Mien-Chie Hung, PhD
[0:34:07.1]
Okay, okay. There are two ways we can think about it.

[0:34:10.5]
As a scientist, everybody --some basic scientists like to do their own work. And so they --- they do their own interest, whatever interest they're into. And then when they discover something that may be related translation …

[0:34.25.2]
… and that's --- that was not on purpose, by design. But that's extent, just like a double helix. Double helix, they discover the strain, they discover it. So that's one type**.** Another type is more on purpose to --- to answer the clinical question, and that is the strength at MD Anderson.

T.A. Rosolowski, PhD
[0:34:41.7]
Right. That's --- and that's the question I'm asking.

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Mien-Chie Hung, PhD
[0:34:42.2]
Yeah, and that's the --- for example, we come to this E1A because of HER2 overexpression. And HER2 overexpression cause cancer patient death, right? So then we say, okay, in that situation, can I block it? If I block it, is this a drug? So, we develop new oncogene therapy, right? And then we, in order to get therapy in the lab, we can do it in the lab, we can do it in animals, but eventually we go to FDA and go to --- and so go to clinical trial. That's what we do. And then you can do that eas --- not easily. We can do that relatively easily at MD Anderson than at many other regular campus.

T.A. Rosolowski, PhD
Oh, okay.

Mien-Chie Hung, PhD
[0:35:19.5]
If we are doing that at Rice [University], it's going to be very difficult. In U of H, it's going to be very difficult. I could work in Rice, I could work in U of H, but it's two different --- it's different ball game. MD Anderson has all these structures. Okay. And so, to be working at MD Anderson, one of the nice things, there are a lot of important clinical questions here. Where your clinical colleagues --you know, in the ___ 0:35:46, we don't have faculty club now. Used to be faculty club everything ___ 35:47. You go to lunch, every --- all those clinicians are the number one in their field, right? So, and you know that's your colleagues, you talk to them in their lunchtime. Those questions (clicking fingers), sometimes we can just look at a question, I cannot do anything on it. But if those question come into mind, hey, wait a minute, can we do this? And then try to give --- give a shot.

T.A. Rosolowski, PhD
[0:36:10.3]
Right. Or someone talks about a clinical question and suddenly, oh, wait a minute, I know something about a molecular mechanism.

Mien-Chie Hung, PhD
[0:36:14.4]
And I'm going to give you a lot of examples.

T.A. Rosolowski, PhD
Yeah.

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Mien-Chie Hung, PhD
[0:36:15.7]
This is one of them. And that's --- that's how I come into HER2/neu, right?

T.A. Rosolowski, PhD
[0:36:18.2]
Okay.

Mien-Chie Hung, PhD
[0:36:19.1]
That's one of them. And then --- and so, therefore, by people in --- an environment like MD Anderson, that has all the clinical complement, surgeon, oncologist, pathologist, and radiation oncology --all those people who are dealing with --- on the clinical side, dealing with patient in first --- first line. And with the researcher here, in my personal view, is to my benefit. Because I'm involved in an environment of people who know all the central questions of cancer. I don't have to go to, if I want to review, I won't go to library, to do something. I just talk to my colleagues here. I can pick out most important clinical question in cancer area and then, by training, we are --- in molecular cell biology working with cancer. Then when we know those questions, there are a lot of other questions. Doesn't mean every question I can answer. But I can pick up those questions where we may have expertise and to do a project, and then come back to the ___ 0:37:21 so called model. Because in the lab, we build a model. We build up cell line model. We build up animal model to test the clinical question. HER2 overexpression is a good example, right? And then HER2 overexpression, it's causing cancer patient death --- death in a cell. In the animal experiment and in the lab, we can test that to see HER2 overexpression cause metastasis, cause tumor, and then if you suppress it, you can suppress tumor ___ 0:37:52 express itself. Okay. So that's --- that's why I enjoy so much working at MD Anderson. And also, I personally feel I have been benefited by MD Anderson's environment much, more than I actually contributed to MD Anderson. Because this is incredible place and the people here, working here, are incredible people. And all those clinicians all have passion. They can make much more money in reality, right?

[0:38:21.9]
Go somewhere else. But they stay here because they have their patients. They are treating cancer patient and they want to do cancer rese --- their clinical research so that they can develop --- make --- develop something which doesn't exist and make it exist. Making impossible possible.

T.A. Rosolowski, PhD
[0:38:35.4]
Right. Make it ….

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Mien-Chie Hung, PhD
[0:38:38.2]
I like that. I like that song, *The Impossible Dream*.

T.A. Rosolowski, PhD
[0:38:43.1]
The impossible dream, yes.

Mien-Chie Hung, PhD
[0:38:45.3]
To dream the impossible dream.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:38:45.9]
And then we --- in MD Anderson, we can dream that.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
[0:38:47.5]
And, indeed, that has been happening. HER2 overexpression at a time when it was cloning in the early 19 --- in the mid-1980s, overexpression in cancer patients, the HER2 is very poor. No --- no drug … the survival rate is poor and now, all you wanted was not being approved by FDA. But I'm happy because of the cloning of gene. Now, genetics has developed a acceptance. The FDA approved 1998. And up to that, they are _____ approved. They were given drug, part of this molecule. And they cure a lot of cancer patients and that's our contribution. If we can develop drug, perfect. If we cannot develop drug, we contribute. No one person really cures cancer patient but we are in the scientific community. We contribute what we can contribute.

[39:33.2]
And then, benefits the cancer patient. And now, HER2 overexpression patients, I still have some specific example that in --- in the mid --- in the mid 1990, some of my friend --- my friend's sister, actually, had HER2 overexpression breast cancer but she died. At that time, she actually came to see me, but there was no drug yet. But if she was a patient today, she has a 60% of chance to survive for more than five years. So, it's different.

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T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:40:02.8]
So we see --- we witness, we witness, say the patient was supposed to die but now, because there is an effective drug, another new clinical target therapy. And then as a basic scientist, we can contribute. We are not the only people who can cure the patient but we can contribute to it. Why not? Why not? And that's why --- part of reason I just cannot leave MD Anderson. This place and the people here.

T.A. Rosolowski, PhD
[0:40:30.8]
Is there a special mindset, do you think, that this kind of research takes, you know, I mean if ev --- if --- if --- probably not everyone is suited to doing this kind of research.

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
[0:40:46.0]
So talk to me. What --- what is it --- what does it take?

Mien-Chie Hung, PhD
[0:40:49.0]
I would assume that, you know, as a scientist, there are basic scientists who don't want to work on disease, because I'm basic scientist. That's fine, I respect that. Okay? And then, but there --- this talk of translational scientists, we --- we also do basic science too, but we have a mind that if our basic science outcome can benefit patients, then the question is, why not? And I can share one example with you. My mother who spend the first --- the first 10 years when I was here, she was one time --- she spend 50% of her time in Taiwan and 50% here. When I talked to her about what I'm doing, she had no idea. But if I tell her I'm developing gene therapy and I develop animal model, and animal with this tumor and I inject, the tumor disappear, and I am going to move to clinical trial, then she understand.

[0:41:39.3]
She und --- and then when she come next time, she come _____.

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T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:41:44.3]
But if I tell her, oh, I'm cloning gene and doing this signal translation, she has no idea what I'm talking about. Okay, so that's the difference. And I do feel as a scientist, we are --- we are part of all human beings. We're part of the community, right? So if we can contribute --- contribute a lot of way. I mean, it's a cancer center, it develop something to benefit cancer patients, a certain contribution. And of course, research contribution can be very broad. We train the next generation of scientists, our trainees. They may be a cancer biologist. They may not ___ 0:42:12. They learn all this skills, our PhD students or post-doc fellows. They may in the future to do the Alzheimer's disease or aging or something, or a disease not yet been discovered.

T.A. Rosolowski, PhD
Right. Exactly.

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Chapter 09
Training Basic Scientists: Grasping the Field and Preparing for the Future
A: The Educator;

Story Codes
A: The Researcher;
C: The Mentor;
C: Mentoring;
C: Research, Care, and Education;
C: Education at MD Anderson;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Discovery, Creativity and Innovation;

Mien-Chie Hung, PhD
[0:42:25.9]
Right? And that's what we can contribute. So here with the MD Anderson, working with the clinician, at the same time we associate with our graduate school. We train PhD students. I enjoy that a lot. I train probably in MD Anderson faculty --I think I'm probably right, the number of PhD students graduating from my lab is number one.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[0:42:46.7]
I don't think anybody can beat my record. In the last 27 – 30 years in the history of GSBS I believe the number of PhD students graduate from my lab total.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[0:43:00.1]
And I enjoy it because I --- I teach them and I learn from them. The first-year student come in August very naïve. It take them a while, they don't know anything. But usually by the time they graduate, I told them, if you start to feel Dr. Hung is pretty stupid, that's probably the time you graduate.

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T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:43:20.5]
Because you approach it, you know better than me.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:43:22.2]
… you know, that's about time. But at the very beginning, certainly I know better.

T.A. Rosolowski, PhD
Yeah, yeah.

Mien-Chie Hung, PhD
[0:43:25.0]
But that's --- we --- and then we learn from them. We teach them and we learn from them. And then --- and that's really benefit the scientific community. I enjoy to training PhD students. And I have a lot of outstanding PhD students here. My PhD students, they are --- currently there are five faculty members here.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[0:43:45.3]
Dr. Dihua Yu is one of them. The other person I could mention, he's still very active in MD Anderson. The other two person also kind of involved, not as much as Dihua Yu. Is Naoto Tada Ueno.___

T.A. Rosolowski, PhD
[0:43:47.9]
No … no. I don't know that name.

Mien-Chie Hung, PhD
[0:43:58.8]

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He's is in Breast Medical Oncology. He's my PhD student. And at the time he was my PhD student, he was a M.D. fellow.

T.A. Rosolowski, PhD
Oh, okay.

Mien-Chie Hung, PhD
[0:44:10.0]
So he joined the PhD. And the other one is Joe Chen. I don't --- He changed his name now. He was my PhD student. Both of them also kind of involved in E1A project.

T.A. Rosolowski, PhD
Uhuh.

Mien-Chie Hung, PhD
[0:44:19.1
But the major discovery was made by Dihua Yu. But, you know, it --- a major discovery is not by one person. The maj --- one person major but this two person, and both of them are physician at MD Anderson. Naoto Tada Ueno now is in breast medical oncology. Joe Chen is in radiation oncology. And he --- both of them actually participate that, too.

[0:44:37.7]
And Joe Chen, after Ph.D., train with me then he went somewhere else to complete his --- he came from China here as M.D., PhD. So he went to resident training. So become a clinician then come back to MD Anderson in radiation oncology. In radiation oncology. And I have two Ph.D. student who are currently still faculty members in MD Anderson.

T.A. Rosolowski, PhD
[0:44:55.3]
I'm not sure about this second name you have, Joe Chen, and then Naoto, and the second …

Mien-Chie Hung, PhD
[0:45:01.7]
Ueno.

T.A. Rosolowski, PhD
[0:45:02.1]
Ueno.

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Mien-Chie Hung, PhD
[0:45:03.4]
That's a Japanese name.

T.A. Rosolowski, PhD
[0:45:04.5]
Oh, U-E-N-O.

Mien-Chie Hung, PhD
[0:45:06.2]
Japanese name.

T.A. Rosolowski, PhD
[0:45:07.6]
I got you. Alright.

Mien-Chie Hung, PhD
[0:45:08.7]
Japanese the name.

T.A. Rosolowski, PhD
[0:45:09.4]
I've never seen it.

Mien-Chie Hung, PhD
[0:45:11.3]
And both of them are still very active here.

T.A. Rosolowski, PhD
[0:45:12.4]
Yeah.

Mien-Chie Hung, PhD
[0:45:13.3]
I think one is associate professor, the other one is a full professor here.

T.A. Rosolowski, PhD
[0:45:15.7]
Uhuh. That's very exciting.

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Mien-Chie Hung, PhD
[0:45:19.1]
Yeah.

T.A. Rosolowski, PhD
[0:45:20.1]
Yeah, very exciting.

Mien-Chie Hung, PhD
[0:45:21.0]
Yeah.

T.A. Rosolowski, PhD
[0:45:22.0]
Well, thank you for answering that question about translational research. You know, because that's ….

Mien-Chie Hung, PhD
[0:45:28.6]
So ___ model.

T.A. Rosolowski, PhD
[0:45:28.3]
Yeah, and the idea of model, you know, kind of how you go about doing it, …

Mien-Chie Hung, PhD
[0:45:34.1]
Actually, you know what? After being in the field for a while, I start at the very beginning, it's very difficult. How to do translational research. When was it like pretty easy? It's just, make a friend with it.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:45:49.2]
For example, this one, HER2/neu, I start with it, you know. I took a long time in learning, right? Now, I have multiple projects in my laboratory. So it depend on which disease I am going to deal with.

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T.A. Rosolowski, PhD
[0:45:58.5]
Yes.

Mien-Chie Hung, PhD
[0:46:00.7]
Okay. And HER2 cancer is difficult and cancer stem cell is difficult. Or, like, have you heard of triple-negative breast cancer difficult, okay?

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:46:09.1]
Okay. It's difficult. You go in, you read the literature, and I have a journal club. Okay. I run a very --- a --- a --- very unusual journal club every Saturday morning from 10:00 to 12:00. Then we buy --- we take turn to buy food for people in the lab. It's not mandatory because of the weekend but many people who --- student ____ 46:27, they come. Then we take turn to present, you know what? We --- we don't --- usually for scientist when you present a paper in detail, it's one paper or two paper discussed, that --- that's enough. We --- and every Saturday, we take turn to overview 15 to 20 publication in recent journal, and important ones.

T.A. Rosolowski, PhD
[0:46:44.2]
Oh, my gosh.

Mien-Chie Hung, PhD
[0:46:45.3]
But we don't talk about details. We look at it, what's the title, what's in the abstract? What did they talk about it in reviews. And look at the model. And then if it's new knowledge, we learn it, right? And --- and for trainees for student post docs, they learn how to present. How to, in a very short period of time, pick up 20 paper or 15 papers to present them, right? And then, I can show you … that's one of the recent ones. Yeah. ____ (0:47:18.5) present this one. This paper. I usually do collective. I don't ___

T.A. Rosolowski, PhD
Oh, wow.

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Mien-Chie Hung, PhD
[0:47:23.7]
Saturday journal club. And that's all the papers we presented.

T.A. Rosolowski, PhD
[0:47:25.1]
All the papers. Wow.

Mien-Chie Hung, PhD
[0:47:26.7]
And then all the presentations.

T.A. Rosolowski, PhD
[0:47:27.7]
Oh, my gosh! Two pages.

Mien-Chie Hung, PhD
[0:47:29.1]
But it's --- it's ….

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:47:30.1]
… it's only what. Nineteen minutes for presentation.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:47:32.6]
But we don't talk about details. We talk about concepts, we brainstorm. Then we say, if this is important, why is this important, and what is the lesson we should learn, right? And then after that, if it is something related to our study….

T.A. Rosolowski, PhD
Right.

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Mien-Chie Hung, PhD
[0:47:43.2]
… this is published recently, is it important, right?

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:47:48.2]
So, what's the next question we should do?

T.A. Rosolowski, PhD
[0:47:49.3]
But that's --- that is so important, I think, for graduate students because I think particularly beginning graduate students can get so bogged down in the details. Because that's what they get --- that's what they can handle. And --- but here, you're really looking at the lay of the land …

Mien-Chie Hung, PhD
[0:48:02.8]
Thank you.

T.A. Rosolowski, PhD
[0:48:03.0]
… conceptually.

Mien-Chie Hung, PhD
[0:48:03.9]
Thank you. I'm very proud of this one.

T.A. Rosolowski, PhD
[0:48:04.3]
Yes.

Mien-Chie Hung, PhD
[0:48:06.6]
In my trainees, student post doc fellows after their --- after their training here, they go outside ____ [0:48:10.1]

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T.A. Rosolowski, PhD
[0:48:10.8]
Yes. yes.

Mien-Chie Hung, PhD
[0:48:11.9]
… because they are very broad …

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
[0:48:14.8]
… when they think about it.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
[0:48:15.2]
One week, you pick up 10, 20 papers …

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:48:17.7]
… one year.

T.A. Rosolowski, PhD
[0:48:18.9]
That's excellent training.

Mien-Chie Hung, PhD
[0:48:20.1]
After five year training.

T.A. Rosolowski, PhD
[0:48:21.6]
That's amazing.

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Mien-Chie Hung, PhD
[0:48:21.8]
So compared to their colleagues …… at the very beginning they have knowledge.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:48:29.3]
And also we discuss concepts, we do brainstorming. We don't necessarily talk about detail, we say, okay, why is this important, right? And what's the next important question? And then I will say, okay. I frequently say that this so important but don't do it. We don't have the expertise to do it, that we --- we cannot compete with them.

T.A. Rosolowski, PhD
Right. Right.

Mien-Chie Hung, PhD
[0:48:48.6]
But there are something --- I say if we pick up some idea, we will go in, we have to use our expertise, _____ or somebody discuss something very, very interesting _____, are we going to move, we don't have a lot of knowledge on it, right? But cancer, we do. Special cancer models and all particular molecules, we have expertise on it. They discover this and we know this, how about combining these, can we do something? So, now for me to find a project, important project, to me, it's not an issue. I just need more money and more space, period.

T.A. Rosolowski, PhD
Right. Right.

Mien-Chie Hung, PhD
[0:49:18.6]
And course will be better ___ 49:20. __ funding situation.

T.A. Rosolowski, PhD
[0:49:21.3]
But I'm …

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Mien-Chie Hung, PhD
[0:49:22.0]
_____

T.A. Rosolowski, PhD
[0:49:22.6]
…I'm thinking, too, I mean, what an amazing skill and gift to give those graduate students. Because that's not --- that doesn't merely affect the decisions about individual projects. That's like, how do you manage your career?

Mien-Chie Hung, PhD
[0:49:38.1]
Yeah.

T.A. Rosolowski, PhD
[0:49:40.4]
I mean, how do you think intelligently about ….

Mien-Chie Hung, PhD
[0:49:43.0]
And also for them, it's the training, say, when they become independent. But they have to think about what they want to do. They can easily find out because they have to go through this training. And so I'm very proud that I created this one …

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:49:53.9]
… and so I buy and lucky. MD Anderson allow me to, every Saturday, to buy food for them to eat. Even in the times when we were hiring freeze, we still can do it.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:50:03.1]
At that time, we --- we control budget, we still.

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T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:50:06.0]
So I use --- I use a lot of nonrestrictive funding from my ___ And that's nonrestrictive. So --- so I ___ out.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[0:50:14.8]
And then --- then we join and --- and --- and the weekend coming, and you don't have to come. If you happen to have, you know, family event or something. You know, it's --- it's the weekend. But most of the people come.

T.A. Rosolowski, PhD
[0:50:23.5]
Sure.

Mien-Chie Hung, PhD
[0:50:24.2]
Most of the people come.

T.A. Rosolowski, PhD
[0:50:24.6]
Hey, free food and ideas.

Mien-Chie Hung, PhD
(Laughter)

T.A. Rosolowski, PhD
[0:50:30.5]
(Laughter). Magic combination.

Mien-Chie Hung, PhD
[0:50:31.0]
There are a lot of journal club people around, but this one, I created, and this one is very different from most other people's.

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T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:50:35.9]
And this, I personally give benefit.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
[0:50:37.8]
Because they --- they read and then we discuss it and I'm the one who…

T.A. Rosolowski, PhD
[0:50:42.6]
Yes. Excellent.

Mien-Chie Hung, PhD
[0:50:43.1]
Yeah, it's --- it's very nice.

T.A. Rosolowski, PhD
[0:50:43.2]
Yeah.

Mien-Chie Hung, PhD
[0:50:44.5]
So I am never short of ideas to do. We just need so many idea so we have to prioritize which is most important. And that's why I can mentor many students and sometimes student comes out, "Oh, you have so many students, so do you have still have project? It's not a matter of, do I have project now. I don't lack --- I don't lack ideas. I only lack of money. And space. (Laughing)

T.A. Rosolowski, PhD
Right.

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Mien-Chie Hung, PhD
[0:51:06.9]
Once I have that, I can --- and we have good idea. Then we have good training and that students to do well and then they graduate, they are successful.

T.A. Rosolowski, PhD
[0:51:13.9]
And, they're successful, yeah.

Mien-Chie Hung, PhD
[0:51:14.4]
Yeah.

T.A. Rosolowski, PhD
[0:51:15.4]
Well, thank you for telling me about that. That's great.

Mien-Chie Hung, PhD
[0:51:17.3]
I --- I --- I'm very passionate on training …

T.A. Rosolowski, PhD
Yeah, yeah.

Mien-Chie Hung, PhD
[0:51:21.5]
… I'm very passionate on training …

T.A. Rosolowski, PhD
Yeah, yeah.

Mien-Chie Hung, PhD
[0:51:22.6]
… or education

T.A. Rosolowski, PhD
Yeah, yeah.

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Mien-Chie Hung, PhD
[0:51:23.8]
Because it's important we cure cancer, of course. But the next generation --- next generation, as I mentioned earlier, there are some diseases we don't even know their name yet …

T.A. Rosolowski, PhD
[0:51:31.4]
Right.

Mien-Chie Hung, PhD
[0:51:32.2]
…right? For example, SARS. Twenty years ago, there's no SARS. You remember SARS, the infectious disease, SARS.

T.A. Rosolowski, PhD
[0:51:38.2]
Oh, yes. SARS, yeah.

Mien-Chie Hung, PhD
[0:51:39.6]
Right?

T.A. Rosolowski, PhD
[0:51:40.0]
Absolutely.

Mien-Chie Hung, PhD
[0:51:40.3]
AIDS. Because AIDS hang around for 30 years now. Fifty years ago, there's no AIDS, right? So, in science, you have to continue and then we have to pass our knowledge to our next generation and they are --- they are always better than us. They are always better than --- they are always better than us …

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
[0:51:55.7]
… because we provide a background for them to follow, more and more in the ___and then that can make human life better, you know, … and that's our contribution. So here at the cancer

center, I have a passion for cancer and I'm very lucky to work in MD Anderson. But at the same time, we are affiliated with our grad school. We have a chance to train students and we have a chance to train that young post-doc fellow, and let them develop their ___ 0:52:15.1 career. And then, they're --- our future … you know – I don't how to say that – our future whatever we have. Future --- our future relies on them. Yeah. I train a lot of students and they are always successful. And I'm --- and I'm very happy to see when a student comes in very naïve, but at the time when they when then are senior, they stop it. Nobody's perfect but they are much better than before.

[0:52:41.8]
And I feel very proud. And I feel very --- self, how do you say that? Self satisfaction. Self …

T.A. Rosolowski, PhD
[0:52:45.2]
Self …

Mien-Chie Hung, PhD
[0:52:46.0]
… satisfaction.

T.A. Rosolowski, PhD
[0:52:47.1]
… satisfaction. You're gratified.

Mien-Chie Hung, PhD
[0:52:49.2]
Yeah, you --- you put effort, you know.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
[0:52:50.4]
I could find funds to support them

T.A. Rosolowski, PhD
Yeah. Yeah.

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Mien-Chie Hung, PhD
[0:52:51.3]
… and --- and I can educate them. And they --- they improving. And then, some of them is so smart. They are better than me. And I can foresee this guy in the future is going to fly.

T.A. Rosolowski, PhD
[0:53:01.4]
Yeah, yeah. Yeah. I know my dad always use to say, you know, education is the one thing no one can ever take away from you.

Mien-Chie Hung, PhD
[0:53:07.1]
Yeah.

T.A. Rosolowski, PhD
[0:53:38.3]
And that's it.

Mien-Chie Hung, PhD
[0:53:09.6]
Yeah.

T.A. Rosolowski, PhD
[0:53:10.4]
You know.

Mien-Chie Hung, PhD
[0:53:11.0]
Education makes you better.

T.A. Rosolowski, PhD
[0:53:11.8]
Yeah.

Mien-Chie Hung, PhD
[0:53:12.1]
Education makes you better.

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T.A. Rosolowski, PhD
[0:53:12.7]
Yeah, yeah. It's just training that person …

Mien-Chie Hung, PhD
[0:53:14.4]
Yeah.

T.A. Rosolowski, PhD
[0:53:15.4]
… for the future.

Mien-Chie Hung, PhD
[0:53:16.6]
Yeah.

T.A. Rosolowski, PhD
Yeah, yeah.

Mien-Chie Hung, PhD
[0:53:18.0]
And then we always have to continue to pay attention to them.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[0:53:21.6]
We ____ while we are going it.

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Chapter 10
Research into Receptors, Pathways, Cross-Talk and the Utility of Existing Drugs
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;
C: Healing, Hope, and the Promise of Research;

T.A. Rosolowski, PhD
[0:53:25.2]
Yeah. Well, would you like to go back to your research story at this point?

Mien-Chie Hung, PhD
[0:53:26.3]
Okay.

T.A. Rosolowski, PhD
[0:53:27.4]
So we --- you were kind of going through a lot of stuff. You were talking --- you were talking about …

Mien-Chie Hung, PhD
[0:53:30.3]
We talked about translation, right?

T.A. Rosolowski, PhD
We did. We talked about translation.

Mien-Chie Hung, PhD
[0:53:35.3]
Okay. So why not let me share with you some --- we talked about HER2/neu, talked about doing

gene therapy, and then I moved to clinical trial. And now I'm developing a VISA vector and targeting other cancer types ….

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:53:45.0]
…right? So that's one arm that … because gene therapy and that --- you know how I come with gene therapy, but through this kind of journal club, through the environment of MD Anderson. Now, as I told you, for me to discover a project, it's not a difficult time ….

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:54:01.4]
… it's easy now. And then we can pick up … at this moment, this is the most important project. This most important project may not be most important 10 years from now, but 10 years from now …

T.A. Rosolowski, PhD
Right ___ yeah.

Mien-Chie Hung, PhD
[0:54:12.1]
… already ___ . Why not, for example.

T.A. Rosolowski, PhD
[0:54:13.2]
But also --- excuse me just a minute. But --- I mean, there --- there's something exciting about this sense of immediacy. You know, like, bang! Here it is, right now. This is what we need to do and you're ready to move on it.

Mien-Chie Hung, PhD
[0:54:22.7]
Yes.

T.A. Rosolowski, PhD
You know, you know.

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Mien-Chie Hung, PhD
[0:54:24.5]
And --- the --- my expertise --- HER2/neu is a receptor. You know receptor, right? Okay. So there's a circle signal transaction.

T.A. Rosolowski, PhD
[0:54:33.9]
But, why don't you explain for the --- what --- talk to me about a receptor. What does that mean?

Mien-Chie Hung, PhD
[0:54:38.1]
Receptors include HER2/neu, include the EGF receptor. There were a molecule originally been discovered. So they are in the cell surface. They --- they --- they are integral membrane for the --- this is the cell surface and there's a membrane here. But the receptor crosses that line. So one half is outside of the cell, the other inside the cell. And their function has traditionally been thought to be --- to be able to communicate outside of the cell, inside the cell. For example, you have something coming. You want to tran --- transduce some stress, some signal to the cell. You let it go to these receptors and then the ____, there's a portion outside called extracellular, right? But then after you have something stimulate this extracellular site, you make it pass the message to the intracellular site. And this intracellular portion induce whatever signal. And that's what we call signal pathway.

[0:55:26.5]
And then you can employ the cell to say, this signal comes in, it makes the cell say, hey, my friend, now you had to grow now from 1 to become 2; 2 become 4, right? So for example, why do you develop a tumor? You develop tumor in --- in a very simple term, say, you're not supposed to grow, stop now. But it keeps on growing into a tumor, right? So it keeps on growing --- an abnormal growing. And because that's not the only --- the only type of cancer is a tumor, to say. And --- but those signal from 1 to 2 , 2 to 4, you have to pass signal from cell surface. Something's stimulated from outside, then transfers the signal to the nucleus, right? So cell in the nuc --- and the nucleus ___ the DNA double helix, it starts to replicate… and it starts: 1 becomes 2, 2 to 4. All this signaling from outside to the inside, it's called signal transduction.

[0:56:18.6]
It's more --- it's like you run the 400 meter with a four-person race. Right? So I pass and run the first one. You're the second one, so I pass it to you, right? Then you pass to the third one, then you pass four. Then you compete ____. That's whole cycle. You --- you know what I'm saying?

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T.A. Rosolowski, PhD
I do, yes.

Mien-Chie Hung, PhD
[0:56:38.1]
A race, and they have to call a ….

T.A. Rosolowski, PhD
[0:56.38.7]
Relay race.

Mien-Chie Hung, PhD
[0:56:39.2]
Relay … relay … yeah, relay. Okay.

T.A. Rosolowski, PhD
[0:56.39.9]
Yeah.

Mien-Chie Hung, PhD
[0:56:40.4]
So signal transduction is like that. And signal transduction in molecular cell biology, it started maybe --- started from mid '80. Started from mid '80. And then, people don't know much about it. Or could have been even earlier --- early in '80. But now, we should know so much about a cell, how the signal transduces. And then many, many --and this signal pathway, because these signal pathways are very critical to control cell growth --- cancer cell growth. Well, why does cancer cell become an abnormal growing cell? Why does a cancer cell metastasize from primary tumor, and go on to –their, their properties change. Of course, not only their properties change, their environment may be changing rapidly. But first, their property --- this guy has to be changed, right?

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:57:33.1]
And the change --- they all change their signal. So now, in the last 20, 30 years, we know so much about signaling now. And all the signaling now has provide for targeted therapy. HER2/neu, EGF receptor. These are early stages for developing target therapy, but now there

are tons of examples, like ___ 0:57:55 now is a target for melanoma. They --- there are other examples out there. There are a lot of examples. But then when people understood this is a signal pathway, originally, it was HER2 overexpression, right? And so if there is HER2 overexpression, now we block it. But HER2 always actually produces a signal, right? You can block the signal, too. And all of them are potential _____

T.A. Rosolowski, PhD
At various stages.

Mien-Chie Hung, PhD
[0:58:14.0]
And that's where the tyrosine kinase inhibitor comes in. Tyrosine kinase is an enzyme. These receptors --HER2/neu is not only a cell surface receptor, they are also kinases, and this kinase is a enzyme. But if you develop inhibitor, then this ____ 0:58:32. So with this kind of a circular signal transduction being known --and this particular department call Molecular Cellular Oncology, right? We focus on cancer molecular cell biology ___, we do a lot of signaling. And the nice thing is, when you know the signal, this signal allows you to --- to understand why this cell metastasizes. Why this cell is a cancer cell and not a normal cell. So in that situation, we can understand what signal pathway was screwed up to make it become cancer. And then, if you can fix that, then that potential will drop. Similar to HER2 overexpression. But HER2 overexpression, is just one of the early examples. And --- and when a lot of people develop this kind of inhibitor, you block the signal pathways. There are many, many, many drafts, you know, approved by FDA and they are all ongoing right now. However, cancer is very smart. A cancer cell, when you block it, it cannot grow. They die, right?

[0:59:32.3]
But out of one million cancer cell, they want to survive too, right? They start mutating. They also make it so that they become resistant. That's why --- other reasons why --- remember cancer patient after treatment, five years later, they recur. Right? In some of them it is because of the cell which was originally there, and they just start to develop. But in many --- in some occasions, it's because especially in human ___ 0:59:58 cancer. And several cancer type is already --- we you do target therapy. Okay, this particular cancer, HER2/neu overexpression, you can use a receptor [1:00:07.3] or use a drug, too. But after treatment, some of the patients respond, they are cured, but some of the patients, before they complete cure, their cancer recurs.

[1:00:17.7]
You know why? They become a mutation, and that drug os no longer useful. So then we …

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T.A. Rosolowski, PhD
[1:00:22.1]
How quickly does that happen?

Mien-Chie Hung, PhD
[1:00:22.7]
From case to case, it's different, okay? But in a case of recent --- I may know more in a few months.

T.A. Rosolowski, PhD
[1:00:30.7]
So very fast.

Mien-Chie Hung, PhD
[1:00:33.0]
Yeah. Then --- then they already are strengthen. Those who can be cured, they cure. But if we don't completely cure, then before the cure, some of them mutate in such a way that they become --- the drug no longer useful, right? They --- they don't care what drug. They start to develop, right. And so now, we --- the knowledge that we have with this signal transduction, we can --- I should not say easily, but it's not difficult at all to identify the so-called signal cross talk.

T.A. Rosolowski, PhD
[1:01:00.1]
Cross talk.

Mien-Chie Hung, PhD
[1:01:01.9]
Yeah.

T.A. Rosolowski, PhD
[1:01:02.2]
Okay.

Mien-Chie Hung, PhD
[1:01:03.1]
For example, you take this drug to treat it, and if this cancer cell, it's been blocked, then the center of the particular pathway is actively blocking it. But then, you identify there's a signal pathway cross talking with this one [1:01.19.9]. And then when you block this one, we cannot really block it. Let me draw that for you. One specific example. So, this is the pathway and this cause cancer. Okay? So people develop an inhibitor here.

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T.A. Rosolowski, PhD
[1:01.35.5]
Okay. So you're intervening in one place.

Mien-Chie Hung, PhD
[1:01:39.1]
Yeah. But now, we found this --- this guy which causes cancer is …

T.A. Rosolowski, PhD
[1:01:48.2]
Is coming from another signaling pathway.

Mien-Chie Hung, PhD
[1:01:50.4]
Yeah.

T.A. Rosolowski, PhD
[1:01:51.2]
Yeah. So you have to …

Mien-Chie Hung, PhD
[1:01:52.2]
And so …

T.A. Rosolowski, PhD
[1:01:52.6]
… attempt to intervene in another place.

Mien-Chie Hung, PhD
[1:01:53.9]
… this … yeah. Yeah, you're right. Okay, so…

T.A. Rosolowski, PhD
[1:01:54.9]
Yeah. Got ya.

Mien-Chie Hung, PhD
[1:01:55.1]
… then we disco ---- so for us to start here, we can study this cross talk …

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T.A. Rosolowski, PhD
[1:01:58.0]
Right.

Mien-Chie Hung, PhD
[1:01:59.1]
We --- we can predict it before they become resistant.

T.A. Rosolowski, PhD
[01:02:02.0]
Gotcha.

Mien-Chie Hung, PhD
[01:02:03.3]
Or --- or after they are resistant. So now, if I have resistant cell, it's been treated, right? And then --- they are resistant. We check these cancer cells, right? We can --- can looking for what happened.

[1:02:14.6]
And we do a lot of this kind of stuff. And the nice thing is, if it's an anti-cancer drug to treat the patient and they are already very resistant, then we should try to find out this one so we can then identify another pathway where we can block it, right? So that's important. But we can even, before they do that, now every time --- if I develop new drug, before it goes to the patient, we can, in the lab, we can treat the cell to cure them. But some of them eventually develop resistance, right? So that's going to mimic human. And so we can understand this one and identify …

T.A. Rosolowski, PhD
[1:02:47.1]
And begin to ___ where those points in cross talk are.

Mien-Chie Hung, PhD
[1:02:47.9]
Yeah. And then ideally say, now, they are so many drugs available.

T.A. Rosolowski, PhD
[1:02:52.3]
Right.

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Mien-Chie Hung, PhD
[1:02:53.7]
Many of these so-called signal pathways are important. You may not even have to develop drug, because to develop a drug takes 10, 20 years. This drug A is the one you study. Then after you cross identified, the drug B --- may already --- is another drug already available. So, it is low hanging fruit. You could not do that 20 years ago, but now you can because there are a lot of drugs there already. You don't need to really develop a drug. There were drugs 20 years. But you can take the existing drug, if they cross talk …

T.A. Rosolowski, PhD
[1:03:24.6]
Right.

Mien-Chie Hung, PhD
[1:03:27.5]
… then we can benefit patients right away.

T.A. Rosolowski, PhD
[1:03:28.9]
So it's getting a deeper understanding …

Mien-Chie Hung, PhD
[1:03:30.5]
Yeah.

T.A. Rosolowski, PhD
[1:03:31.4]
… of all of the little pathways and figuring out how the existing drugs …

Mien-Chie Hung, PhD
[1:03:34.3]
And that's why this ….

T.A. Rosolowski, PhD
[1:03:35.3]
….can be used to intervene.

Mien-Chie Hung, PhD
[1:03:37.2]
… that's what this department is doing.

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T.A. Rosolowski, PhD
[1:03:38.2]
Right, uhuh. Got you.

Mien-Chie Hung, PhD
[1:03:39.2]
That's why we are called Molecular Cell Oncology.

T.A. Rosolowski, PhD
[1:03:40.1]
Yeah, yeah.

Mien-Chie Hung, PhD
[1:03:41.7]
And we do a lot of this concept. And for us to identify this, it's not piece of cake, but it's not that difficult. Because the technology has improved. So at the very beginning for HER2, it was one big event and only HER2/neu. But why now? If this signal pathway, if this is a single cell, from outside stimulant going to single cell. Now, in the literature, there probably 200, 300 ---- 300 pathways. And several major pathways are known to be involved in specific cancer. And so we are doing a lot of this cancer. I can share with you one of the --- one of the recent examples.

T.A. Rosolowski, PhD
[1:04:14.9]
Please do that.

Mien-Chie Hung, PhD
[1:04:16.2]
It's called --- it's a skin cancer called basal cell carcinoma. It's type of cancer cell --- a skin cancer. And then Genetics **1:04:36.3** developed a drug and they path --- by the way, a lot of these pathways are very interesting, okay, --- fundamental science. Their name come from drosophila.

T.A. Rosolowski, PhD
[1:04:46.1]
Yeah?

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Mien-Chie Hung, PhD
[1:04:46.9]
There was two crazy scientist group who received the Nobel Prize. They took drosophila, you know, fruit fly ….

T.A. Rosolowski, PhD
[1:04:50.4]
The fruit fly, yeah.

Mien-Chie Hung, PhD
[1:04:51.3]
… and mutated it. ___. And after mutation, they spent their lifetime to characterize it. And then when the mutation takes place, you know, it become two --- bithorax or antennapedia because of their heg --- their legs come off easily. So there are lot of mutants and it's called the hedgehog, called hippo …

T.A. Rosolowski, PhD
[1:05:08.6]
I was wondering where that came from.

Mien-Chie Hung, PhD
[1:05:09.9]
Okay, okay.

T.A. Rosolowski, PhD
[1:05:10.7]
Yeah.

Mien-Chie Hung, PhD
[1:05:11.8]
All those name …

T.A. Rosolowski, PhD
[1:05:12.6]
Yeah.

Mien-Chie Hung, PhD
[1:05:13.4]
All those names come from drosophila studies. So, then everyone has --- has a history, hedge --- and a hedgehog is one of them. You know who --- hedgehog --- hedgehog is a mutant because

when that mutant --- the --- the fly, remember the fly development? After the egg, they become larva, right? And they start moving around, right? Then they don't mature and become a fly, right? And doing the larva --- origin in --- in --- have you seen those larvae?

T.A. Rosolowski, PhD
[1:05:37.8]
Yeah, they're creepy.

Mien-Chie Hung, PhD
[1:05:38.9]
Okay, so --- so the larva

T.A. Rosolowski, PhD
[1:05:39.3]
Yeah.

Mien-Chie Hung, PhD
[1:05:40.5]
During the development, they have a specific pattern**,** okay? But the hedgehog pattern is a mutant. When you have that hedgehog mutant, they don't have this one. They look like a spiny ball.

T.A. Rosolowski, PhD
[1:05:52.5]
Oh, yeah.

Mien-Chie Hung, PhD
[1:05:53.9]
This look like hedgehog.

T.A. Rosolowski, PhD
[1:05:55.3]
Yes. So it's like a ball instead of a long thing.

Mien-Chie Hung, PhD
[1:05:56.6]
Yeah, yeah, so that's why it called hedgehog.

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T.A. Rosolowski, PhD
[1:05:57.2]
Creepy.

Mien-Chie Hung, PhD
[1:06:00.7]
Okay? So --- so, otherwise …

T.A. Rosolowski, PhD
[1:06:02.5]
That's a horror --- horror movie stuff.

Mien-Chie Hung, PhD
[1:06:03.8]
So --- so, otherwise hedgehog has no meaning.

T.A. Rosolowski, PhD
[1:06:04.7]
Okay, I was ….

Mien-Chie Hung, PhD
[1:06:05.4]
But it's because …

T.A. Rosolowski, PhD
[1:06:05.9]
… wondering about that.

Mien-Chie Hung, PhD
[1:06:06.1]
… because of historical reason.

T.A. Rosolowski, PhD
[1:06:07.9]
Yeah, yeah.

Mien-Chie Hung, PhD
[1:06:09.1]
Okay? Okay. So hedgehog pathway is well known --that there is this mutation in the hedgehog pathway, and that mutation causes this particular type of basal cell carcinoma. It's a skin cancer.

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T.A. Rosolowski, PhD
[1:06:20.7]
Okay.

Mien-Chie Hung, PhD
[1:06:21.6]
And so nowadays when people developed that – you know the mechanism, right? So right now, we know the mechanism.

T.A. Rosolowski, PhD
[1:06:27.5]
Okay.

Mien-Chie Hung, PhD
[1:06:28.1]
Used to be to develop a drug take a long time. You had to do Phase 1, Phase 2, Phase 3, a lot of --- but nowadays, it's so-called target therapy, like HER2 is one of the good example at that time. You talk to HER2, right? So you only treat the patient with the HER2 overexpression. If the patient is not HER2, you don't use this drug. So you use this drug for this patient. This one is like that. You have a mutation. And then, so they deal with --- they --- they make a inhibitor to block this particular pathway and they go to Phase 1, Phase 2. Only Phase 2 FDA approve it. The good response rate was very high. Nowadays when you do a clinical trial, you select the right patient. You know this patient is going to respond. You select the population of patients to treat. So then, your response rate is very high. So when you go to Phase 1, Phase 2 FDA approve it all, you don't have to go to Phase 3.

T.A. Rosolowski, PhD
Oh, wow.

Mien-Chie Hung, PhD
[1:07:14.5]
Used to be, you go to Phase 3. So this one --- and then, just two, three years ago, we discovered this hedgehog pathway cross talking to another pathway. And this --- another pathway is another very well known cancer pathway called mTor.

T.A. Rosolowski, PhD
[1:07:31.9]
Called?

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Mien-Chie Hung, PhD
[1:07:32.3]
mTor. And the nice thing is, this mTor pathway …

T.A. Rosolowski, PhD
[1:07:42.3]
mTor. Oh, okay.

Mien-Chie Hung, PhD
[1:07:43.7]
mTor is another pathway. And remember when I talk about a pathway, I'm not talking about only one molecule. It's a series.

T.A. Rosolowski, PhD
[1:07:48.1]
It cascades kind of

Mien-Chie Hung, PhD
[1:07:48.5]
Is --- yeah, cascades.

T.A. Rosolowski, PhD
[1:07:49.6]
Yeah, got you.

Mien-Chie Hung, PhD
[1:07:50.5]
And this is a very well known cancer pathway. There are a lot of drugs available.

T.A. Rosolowski, PhD
[1:07:55.3]
Oh, really?

Mien-Chie Hung, PhD
[1:07:55.7]
Many, many, many drugs already in the clinical trial FDA approved in that particular pathway.

T.A. Rosolowski, PhD
[1:08:01.2]
So what does this do? What does mTor do?

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Mien-Chie Hung, PhD
[1:08:02.4]
mTor is an enzyme, it's a kinase --- all these are kinase. And this kinase, they induce signal 2. In many cancer cell, they were abnormally activated …

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[1:08:13.2]
… so they enhance those gene expression which cause abnormal tumor growth or even enhance --- enhance, you know, migration, metas --- enhance metastasis. So anyway, they are linked to the genes which are known to trigger a cancer. And they are --- they serve as these target. So the drug is already there. That's what I'm trying to say. Low hanging fruit.

T.A. Rosolowski, PhD
[1:08:38.1]
Right.

Mien-Chie Hung, PhD
[1:08:38.5]
So now --- and then for this kind of drug, when you treat with it, perfect. That particular patient population will be responding very nicely. But once the cancer cell has another pathway to cross talk, some of the patient may not respond then. And so even before they develop resistance, we already predict which one.

T.A. Rosolowski, PhD
[1:08:58.7]
Interesting.

Mien-Chie Hung, PhD
[1:08:59.3]
Right? And in principle, you can do mutation therapy. And the very funny thing is, this particular drug with Phase 2 being approved by FDA, right, for --- for skin cancer, for the basal cell carcinoma skin cancer. But at the same time, clinical trial in ovarian cancer, in brain tumor and pancreatic cancer, this drug doesn't work. Now we know why.

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T.A. Rosolowski, PhD
[1:09:23.8]
And you were able to --- now you're able to understand which --- and which means you will be able to predict …

Mien-Chie Hung, PhD
[1:09:28.1]
Yeah.

T.A. Rosolowski, PhD
[1:09:28.6]
Got you.

Mien-Chie Hung, PhD
[1:09:29.0]
And then, one can design clinical trial, too. One can design clinical trial, too. You --- you go to this mTor, you have a serious marker you can follow. One new principle can use combination therapy. So that's why we ___ … that. You know, in the lab, you are not --- I'm not doing work with patients but from the clinical observation and then from our study we can even pro --- and they --- they may not even happen yet but we are already prov --- end up, yeah. But the time when we discover this one, then I called _____ 1:09:59 hold --- hold a minute, wait a minute, pancreatic cancer doesn't work.

[1:10:03.6]
Ovarian cancer doesn't work. And brain tumor doesn't work, right? But only basal cell carcinoma works. And they approve it, right? But, you know why? Basal cell car --- carcinoma was activated only by this pathway.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[1:10:16.2]
But pancreatic cancer, ovarian cancer, and now we know, breast cancer, the same, too. Now mTor pathway was activated. And that's why clinical trial doesn't work. Because they targeted the same molecule. You can go this way, you can go this way. You block this one, but this cancer cell, this pathway so --- and now we provide an option. Now I'm talking to several clinicians here, tryomg to see where we can design clinical trial to test that. And in a way, I'm not developing a drug. But I'm identifying a marker to guide it. Say what patient population will respond to what. And then, let them be treated this way. And that's what we can contribute

in, my friend. 20 years ago, we could not do that. For HER2 overexpression at that time, the HER2 ___ HER2, HER2, HER2, HER2, HER2. At that time, there is no signal pathway, but now, there are 300 signal pathways. And so we're doing a lot of this kind of stuff.

[1:11:09.9]
And again --- and this is the most recent data, right? And you ___ 1:11:13 because by the time when your book came out, some of the stuff we predict magic going to happen.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[1:11:20.5]
And then in the future, when people read it, hey, at the time when we talk about it and five years later, …

T.A. Rosolowski, PhD
[1:11:25.1]
It was there.

Mien-Chie Hung, PhD
[1:11:26.4]
Another one, for example, recently we have --- this a triple negative. Let --- let's take another one. The --- the HER2 --- EGF receptor, you know the …

T.A. Rosolowski, PhD
[1:11:42.1]
The HER2 …which receptor?

Mien-Chie Hung, PhD
[1:11:44.3]
Okay. HER2 is one receptor. There's his brother, EGF receptor. You know Cetuximab right? You know John Mendelsohn's drug? Right? John Mendelsohn's drug, right, is a monoclonal antibody EGF receptor. And HER2 and EGF receptor are brothers, okay? Okay. But that drug has been approved. But you know that story, right?

T.A. Rosolowski, PhD
Tell it.

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Mien-Chie Hung, PhD
[1:12.04.6]
No, no, no. When Mendelsohn____ we said with Inclone and then _____ that famous one, they are now in jail because their staff, they released the clinical trial --staff because 10 years ago, there was one big news. _____ Anyway, that's not important. This stuff is important. The drug developed by John Mendelsohn called Cetuximab. You know that, right? That drug has been approved by FDA for colon cancer, and head and neck cancer. But that drug treated pancreatic cancer and breast cancer because … sounds familiar now? We talk about carcinoma --- carcinoma. This drug treated --- treated with the skin cancer work. Treats pancreatic cancer. Other cancers, it doesn't work. Right? It's because of signal cross talk.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[1:12:56.6]
Now, the EGF receptor overexpression in colon cancer --FDA approved, in head and neck cancer. ____ in the neck. It's approved.

T.A. Rosolowski, PhD
[1:13:08.6]
Approved, right.

Mien-Chie Hung, PhD
[1:13:09.0]
But they did a clinical trial. They wanted it. This is targeted therapy --this EGF receptor. So if a cancer cell has EGF receptor overexpression, it should work. So pancreatic cancer, breast cancer, they all have EGF receptor overexpression, but the clinical trial failed. So what does that tell us? It's just like the --- the skin cancer. The skin cancer example is --- that means there's something else…

T.A. Rosolowski, PhD
[1:13:33.7]
There's something else going on.

Mien-Chie Hung, PhD
[1:13:34.1]
… making it --- it --- they should work, but it's something else you have to take care of. And there are many, many people studying this one, and right now, there's no clear cut conclusion

there. I have something which are under review right now. We --- it probably doesn't matter anyway. So this --- we actually --- because by the time your stuff come out, it's probably ….

T.A. Rosolowski, PhD
[1:13:56.8]
Been discovered.

Mien-Chie Hung, PhD
[1:13:57.7]
… probably half year later, right? Okay. So we now discover the mechanism by which this receptor can be modified. And after modification, our data now show it's become resistant to Cetuximab. So when I say modification, I mean, --remember I told you receptor has one --- one half outside, one half inside, right? And then when you use the Cetuximab, the monoclonal body to do therapy. This monoclonal body comes on the block --- you inject into block. And the cancer cell is here. Then this --- this cancer cell can

T.A. Rosolowski, PhD
[1:14:37.7]
___ inside, outside receptor? Yeah.

Mien-Chie Hung, PhD
[1:14:38.1]
Yeah. And then monoclonal body cancels this one, okay? And then you cancel it, then you degrade this one, so, you can kill cancer cells. Now what we found was this guy can be modified. And there are some specific amino acids that can modify it. After modification, this becomes --- cannot find. And therefore, this cancer cell, if it had this modification, this drug doesn't work. And for cancer cell to work, this --- this drug had to come to find and kill it. But now, we found --- there's some modification here. And that modification make it difficult for this guy to find. So they'll --- that cancer cell resistant. And we are testing right now that is it. If that the case, we can identify this one.

T.A. Rosolowski, PhD
[1:15:25.3]
And you want to do that.

Mien-Chie Hung, PhD
[1:15:26.3]
Yeah, we know it, right? So we say, hey, if this patient --- this modified, don't do this drug, it's not going to work. And then, we know --- we now know triple-negative breast cancer, one type of breast cancer, 50% have this. So my prediction is my prediction ___. If we remove this 50%

and take those clinical trial data, if the clinical trial fails, failure doesn't mean all patients have no response. Some patients, a very small number of patients respond. So if the response rate is too late --- too low, the FDA is not going to approve it, right? But if we know who are not responding, that's a ____ way. So if you look at that data, it maybe approvable. And then if that is the case, then we can initiate another trial.

T.A. Rosolowski, PhD
[1:16:18.8]
Right.

Mien-Chie Hung, PhD
[1:16:19.6]
And just on purpose, you exclude those patient because it not going to work. It not going benefit you. But for those patients who are EFG receptor positive but there's no mo --- modification, so we know it's going to respond, then we may be able to make this --- again, I don't want to develop a drug. Maybe it will help a patient in such a way that this --- let's say breast cancer --- certainly portion of population with breast cancer is supposed to respond to this drug, but the FDA didn't approve it. But we don't have a way to identify who's going to respond. So, the drug is not available for ____. We're stuck.

[1:16:56.3]
But if now we can tell them, say, hey, this population, with this --- we know how detect it, right? You are going to respond. And you're not going to respond --- if you're not going to respond, don't do it. And then, take this responding one to the clinical trial. And then improve the --- the responding rate. We may be able to help the company to get FDA to approve this drug for breast cancer. And the long-term goal is, then, this population of patient can be identified throughout this trial. And they can benefit by this drug. And otherwise, right now, FDA not approved. We don't know --- because there's a big population and you are small portion inside here. This drug, it's good for you but nobody knows it. But now we can tell them. Then in addition, then you can think how --- how about the other population?

[1:17:45.9]
Who --- who --- who ____? What will help them? Then can do it. But this --- this take a longer time. That is because you set this modification, right. What causes this modification?

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[1:17:59.5]

Then we identify it. Very nice thing. That's why doing this job, it's just unbelievable enjoyable. We discover one by one, they never stop, and this are important. Because we discover what enzymes do that job.

T.A. Rosolowski, PhD
[1:18:13.0]
So you've identified the enzymes.

Mien-Chie Hung, PhD
[1:18:14.4]
We already know it.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[1:18:15.5]
And then, this enzyme unfortunately is not anticancer drug. It's --- it's not therapeutic. Now we know it's therapeutically target. So we identify a new therapeutic target and luckily, now I look at the literature, there are many companies developing drugs to target this one. We can go into development, too. We may not be the best people, but since we know it --- but there are people developing that. So once that drug is available, my friend, that drug can be used to target this population who at this moment have no cure.

T.A. Rosolowski, PhD
[1:18:46.6]
Has no cure.

Mien-Chie Hung, PhD
[1:18:48.4]
And that's our contribution. And we have many of these examples. I mentioned --- shared with you, that at this moment, we know for breast cancer --- breast cancer is estrogen receptor positive. That's 60%. HER2 positive. We just had major HER2/neu at 20%. There's another 20% of breast cancer patients are HER2 negative, ER positive --- negative PR, not negative, we call triple negative. The reason we call triple negative is we don't --- don't know how to deal with it.

[1:19:18.3]
And triple negative is not real term. Triple negative is a passive term because this breast cancer right now is HER2 positive, ER positive, PR positive. For HER2 positive, we have a drug. ER,

PR positive, we have hormone therapy. But this, all three, are all negative, based on target cell, so why do we call them triple negative. But triple negative is not a scientific term. Triple negative, this term is a historical term. Ten years from now, it will disappear. Ten years from now, if it's still call --- called triple negative, shame on us. Because we go make triple negative – triple negative become this positive, that positive, A positive, B positive, C positive. So, A positive, we have A drug; B positive, B drug; C positive, C drug.

[1:20:02.7]
Okay, now, EGF receptor is overexpressed in 50% of triple negative. But ER receptor has FDA approved --- approved drug ___ to them. But in this population of patients it doesn't work. But I just mentioned to you, now we identify. So this 50% of the EGF receptor positive triple negative breast cancer patients, at this moment has no drug, right? But actually a drug is there, FDA approved. It just says, in this 50% only some will respond. And we have to identify this group who respond. And then the other part that do not respond, we have to identify another drug, ____ waiting for the new drug ____. And that take care of 50% of triple negative.

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[1:20:50.4]
So in the future, this 50% of triple negative is not going to be triple negative anymore. It will be called EGF receptor positive, right? And then at the same time, then this circle triple negative. So now, we doing this triple negative. You know triple negative, right? You try to identify --- right now, there are so many kinase inhibitors hanging around approved by FDA, or already in clinical trials, meaning they already passed --- passed the regulatory issue. It's different from developing a drug. Developing a drug, you just start from beginning, tatatatata, it takes 20 million dollars. They're already there. Now, in our lab, we can do this, for example. We take triple negative cancer cell. We say, this is the population I'm going to deal with it, right?

[1:21:42.8]
So the EGF receptor, already dealt with it. How about those two molecules which have no EGF receptor? They are another 50% of that. What we looking for? Is there any kinase? The reason I say kinase, you know kinase, right? Kinase is the …

T.A. Rosolowski, PhD
[1:21:57.8]
That's the protein that …

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Mien-Chie Hung, PhD
[1:21:58.6]
Yeah, enzyme.

T.A. Rosolowski, PhD
[1:21:59.1]
Yeah.

Mien-Chie Hung, PhD
[1:21:59.3]
And there are a lot of kinases that already have inhibitors in clinical trials. So I'm looking for --- and because taking advantage of the current knowledge, the whole ____. How many kinases are there that we can use already. Which have all the kinases. We could not do that 20 years ago, okay? 30 years ago, we cannot. But it's available. I'm looking for systemically what kinase in the triple negative was activated? I --- they contribute to their triple negative cancer. And then, we can use them already and we can use a lot of databases to analyze them. And now we have identified several of them.

[1:22:36.8]
And the nice thing is, some of these kinase --- we only interested in those kinase because when you identify, there are many candidates. But we only select those which already have clinical trials for drugs. Because we show it works, the drugs are there. I can benefit the patient right away. I'm not trying to make money. I don't have to make any money. Right? Because there is already a drug, but I'm just helping to identify the right patient population for the right drug.

T.A. Rosolowski, PhD
Right, right, right.

Mien-Chie Hung, PhD
[1:23:02.5]
Just like a matchmaker. Right? That's our job. And then we can benefit cancer patients. And so now, we on purpose select those kinase which already have a drug. And then we identify several of them and test them. Then, since we already know any drug treatment eventually develops resistance, so now, essentially we have multiple candidates? So we start to do what? Pick out two of them, two combination. So to prevent it from resisting in the future.

T.A. Rosolowski, PhD
Yes, resist, yeah.

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Mien-Chie Hung, PhD
[1:23:33.6]
And then we identify a pair of the inhibitors who give us the best therapy and then we can move to a clinical trial. And the beauty with this, the drugs are all there. We don't have to develop drugs. Except these drugs, some of them are not anticancer drug. Some of them are anticancer drugs, some of them are not. But we just don't care. If they don't know it's an anticancer drug and it was treated to some other disease, then this is so-called repurposing. Right? So we just look at what works. So now, with this knowledge explosion, it's a translation, you say that looking for translation model, is known.

[1:24:15.1]
I --- so any disease, just tell me ___ . Right now, what we need is money, space and time. Almost for cancer, we can help wage some of the study and before study, I cannot know how --- how it's going to come out. I can predict and we can identify something. 20 years ago, 30 years ago, we cannot do that. So right now, it's really starting. This --- you know triple negative, right? Pancreatic cancer can do the same thing, too. Pancreatic cancer, there's no cure right now. Brain tumors. So --- and we are gradually moving up with other cancers, too. So --- so I'm telling you, this one and this one, and --- Yeah, so ty --- this type of approach, the one I just mentioned can be applied to any other cancer type. Can be applied to any --- and I'm taking advantage of those existing drugs.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[1:25:13.8]
So we can identify new therapy to target, then can develop drug, okay? But, at the same time, the other approach I'm using, this all, you know, most thing, new data which ____ but --- but I think in the future this is going to be true. Okay. If somebody identifies a new therapy to target, but there's no drug. There's no drug, right? Then, now, we can use this one to --- to develop drug. But developing a drug takes 10 years, 20 years. And remember, the human genome is already known. So now, we all have ____ databases, all that. A patient comes in, we determine the sequence, uh-oh, you know, this is a mutation, but there's no drug. We wouldn't develop drug 20 year, 10 year ___. Okay, so no. Any new therapeutic target, if there's no drug now, there are lot of additional drugs, right? We can take advantage of signal transductions, signal pathways, that's our expertise in this department, right here. Try to looking for --- remember what a signal pathway means, one relay, right? One by one, right? So if this is a therapeutic target, there's no one single molecule inside a cancer cell, just alone doing nothing. They all have a relation to be someone else. And…

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T.A. Rosolowski, PhD
[1:26:37.2]
Right. So someplace you're going to be able to …

Mien-Chie Hung, PhD
[1:26:38.9]
Got it.

T.A. Rosolowski, PhD
[1:26:39.7]
Yep.

Mien-Chie Hung, PhD
[1:26:40.7]
This is already there. Nobody had a drug.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[1:26:43.9]
How about let me identify its signal pathway upstream from it?

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[1:26:48.0]
And this upstream is a kinase. The drug is already there. So let's say this one operates through this one. And this one, I don't have a drug, but for this one, I have drug. I'm done.

T.A. Rosolowski, PhD
[1:27:01.7]
So it's finding the back doors …

Mien-Chie Hung, PhD
[1:27:03.3]
Yes.

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T.A. Rosolowski, PhD
[1:27:03.6]
… when there's no front door approach basically.

Mien-Chie Hung, PhD
[1:27:4.6]
Yeah, yeah. I'm done.

T.A. Rosolowski, PhD
Yeah, got you. Yeah.

Mien-Chie Hung, PhD
[1:27:07.6]
Then I don't have to spend 10 years. And I only help the drug company to identify, hey, this drug is used for this one. I don't have to make money, but this is still a contribution.

T.A. Rosolowski, PhD
[1:27:21.0]
Right. And I suppose,, too, in --- in the process, you're also learning more and more about those pathways. So you're finding more and more opportunities to intervene …

Mien-Chie Hung, PhD
[1:27:32.3]
Yes.

T.A. Rosolowski, PhD
[1:27:32.5]
… when other situations arise.

Mien-Chie Hung, PhD
[1:27:34.1]
And my prediction. In the near future once all these come up --- remember all these pathways? We call this --all the important pathways, go to a particular spot then record signal note. For example, like a --- like a – how do you say --- a highway. A U.S. highway. You go to Houston, Houston is a north. But you go through the small city, right? All the highway go to New York City – but New York is north, right? So in the future, we can identify this north. We can have Houston, we can have Chicago, we can have New York. And, we have a way to detect these. We have an antibody to detect all these specific molecules. So my dream in the future is for people doing sequences is important. So you take a human tumor sequence to see what mutation. My dream is in the future, there will be a tiny array like this (indicates a small square)

commercially available in CVS. And then, you have to stop there, array. And, each one of them or two of them should recognize a specific note. Recognize Houston or New York or --- or Chicago. And recognize those signal pathway which are potential for ____.

T.A. Rosolowski, PhD
[1:28:47.7]
Now, I'm not sure I understand what you're --- what you're visualizing there.

Mien-Chie Hung, PhD
[1:28:50.6]
Okay.

T.A. Rosolowski, PhD
[1:28:51.2]
So you said at CVS, what --- what --- what would I get at CVS?

Mien-Chie Hung, PhD
[1:28:54.2]
Okay. Okay. I'm going to identify all those signal crosstalk. Their protein order and specific modification so we can detect it by a specific antibody.

T.A. Rosolowski, PhD
Oh, okay.

Mien-Chie Hung, PhD
So with this antibody, they say, let me just ____. Does the antibody work against HER2? Is the antibody against the EGF receptor? Any antibody against hedgehog? Any antibody against whatever? And those for which you know all their signal crosstalk. And so we can have those antibody in a spot in here. Each spot is one kind of antibody. Then you have --- you --- you …

T.A. Rosolowski, PhD
So this would be like a test …

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
… so that we will know which nodes are active, which are not active?

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Mien-Chie Hung, PhD
Yeah. And so then, well, maybe CVS is too far but we never know.

T.A. Rosolowski, PhD
(laughter). Yeah.

Mien-Chie Hung, PhD
You never know. Or in a clinic, they have this one. So when a patient come in, and the patient's tumor. The tumor has a lot of molecules like this, right? Then the ___ **1:29:54.2** can isolate it. Then it is just to see --- take the tumor to ___ it.

T.A. Rosolowski, PhD
[1:30:02.1]
So this would be kind of like what they do for allergies. You know, you're --- you're allergic to trees, you're allergic to dog hair, yet …..

Mien-Chie Hung, PhD
And se --- once this one came out…

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
… that tells us all. Your pathway A is activated. Pathway B not activated. Pathway C activated. And based on our database, the individual program would say, okay, then you treat me with drug A plus drug C.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
I'm not --- I am very confident this is going happen.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
It's a matter of time. It's a matter of time. It will happen. Remember 30 years ago when we were young, cancer was impossible.

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T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
Cancer is something nobody wanted to talk about it. It's shame on you. I did something wrong my last life. But now, in U.S. we have 15 million cancer survivors, and now with recent data, they say it's 80 million now, right? There are more and more of them. And then in the future, cancer may not be that serious. But is still disease.

T.A. Rosolowski, PhD
[1:30:55.8]
Right. But addressing it is not going to be as much of a problem.

Mien-Chie Hung, PhD
It's just a concept and I'm sure similar con --- concept as people has been thinking about similar concept. So because with knowledge, did I mention --- did I mention to you that all these signal crosstalk. I can do it now, for right now when we do --- I think that's --- whatever particular disease you want to deal with it, my personal feeling is as long as I have enough money, we can do it. When mon --- Enough money, we can do it. It's just a matter of time because the technology is there. It's different from 30 years ago. You don't even know what cause cancer, right? You don't know cancer and what it can do. But now we know what causes cancer and we know all those inhibitors are there. And even I saw --- you identify a new therapy, you don't have to develop a drug for 10 years. Take an existing drug. Except I don't make money, that's all.

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
Develop a new therapeutic drug, then you patent it and you make a lot of money. But you know, either way is fine, you know. That's all --- that's all do. And it's funny. Something that this doesn't have to be this way. Something like that.

T.A. Rosolowski, PhD
But something, yes.

Mien-Chie Hung, PhD
Something like it. When we say personal medicine, right? ___ **1:32:00.5** personalized medicine.

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Breast cancer patient. One hundred breast cancer patients, they may have to treat each a different way. Right now, they are all treated the same way, but in the future, the clinical [approach], it's going to be different because there are different --- there are different diseases.

T.A. Rosolowski, PhD
[1:32.17.2]
What's really interesting. I just --- I've had an interesting experience, you know, listening to you over the past half-hour, because hearing you talking about the signaling pathways, it suddenly demystified it for me. You know, I mean, before I was --- just like, wow, you know, all of this --- it's so mysterious, you know, how cancer works. But suddenly it's, okay. We have this communicating with this, and it's all in a sense very mechanical. So all we need to do is figure out where the mechanisms work and then put something in to jam that mechanism.

Mien-Chie Hung, PhD
And --- and remember we cannot do it 20 years ago.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
It's not available.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
At the time when I clone HER2, right? There's no signaling pathway.

T.A. Rosolowski, PhD
Right. Exactly.

Mien-Chie Hung, PhD
And so there's nothing. And really at that time, we said, this tumor has cell growth. Agree that one cell become two, right? Oh, light can come on, stimulate. But then in HER2 receptor, then after that, question mark, we don't know anything. Question --- question mark. Then cell, then DNA replicate from ___ **1:33:19.2**. The double string start to replicate, and 1 becomes 2, 2 becomes 4. But we didn't know anything. Question mark. Twenty, twenty plus years ago when we write signal, that's why signal, we write it this way. This is cell… and this is receptor. This is the cell …. this is the receptor. Then light can come in to fight it, then we say this and here is the nucleus, double strand. Then this –we don't know what it is. Then it just replicated …

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T.A. Rosolowski, PhD
Right, right.

Mien-Chie Hung, PhD
… 1 become 2, 2 become 4.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
Right now, it's not the case. Right now, we talk about how these are --- this A, this A1, this A2, this A3, A4. Then here is B series, and here is the C series. Then D series. And now we're talking about A and B crosstalk here. And --- and C --- C and A crosstalk here. And then all this crosstalk. Each crosstalks to this one. The --- there are a lot of cros --- the one who has more crosstalk will be the north. Will be the Houston. Will be the Chicago. Will be the New York City. And those, we have 22,000 proteins inside a cell. We are not going to make this 22,000. We don't need to. We may only need 50.

T.A. Rosolowski, PhD
[1:34:29.3]
This --- just having that specificity of knowledge …

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
… which ones.

Mien-Chie Hung, PhD
Yeah. We may need only 50. Or, hopefully, twenty. Right? And then we're done. Then your patient comes in, you know, take a biopsy, a little bit of tumor. And this --- you patient-- maybe takes a few hours. Then this morning you come in, and afternoon, say, hey, here you are, go to this cancer drug. That's your treatment.

T.A. Rosolowski, PhD
[1:34:53.9]
So I'm understanding now why it said that there was a huge conceptual shift with molecular biology …

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Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
… taking over.

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
Because we know down to the molecular level. We know what's going on. It's different from 30 years ago, cancer is very --- we don't even know what's cancer. But now, we know what causes cancer. And we know what is critical for cancer. And we know how to block those things. We block cancer cell growth. Of course, with more _____ a lot of critical questions, say, clinically, the physician --when you treat a drug, what kind of dose and what kind of timing, and what kind of sequence and --- and --- and --- and then patient. But that's a different issue. But I'm just talk --- making say, this originally is impossible to cure. I'm sorry. There's strategy here. And get this thing. Right? And --- and this is just happening in 20 --- the last two decades. And I feel very lucky that --- to be working at MD Anderson and to be a molecular cell biologist and to be able to involve this one and that one. Very rewarding. Every --- almost everyday we're doing, something now. I'm not doing --- there's nothing more to --- to sell McDonald, okay?

But what I'm saying is, the job we're doing is very challenging. Every day is different. And it's very significant. We deal with HER2/neu. HER2/neu can be resolved now. And we're dealing with triple negative. Triple negative, there's no drug. And I've been telling people and my trainees, my students, post-doc, get excited. I said, you're working with pancreatic cancer. I say breast cancer, 60% yeah, 20% HER2. The other 20% triple negative. We're working with many, many people ____. Ten years from now, the major discovery in breast cancer probably ____. I'm not saying 20 years --- 10 years. I'm not saying 10 years, there will be no breast cancer, don't misunderstand. Breast cancer will still be there. But breast cancer, the fundamental science for discovering breast cancer and to give up, it's not going to be the major step now. 10 years from now. So we start to work on pancreatic cancer, but pancreatic cancer -- right now there is no cure. Of course, pancreatic cancer also involves HER2 and EGF receptors in which I have expertise. So I --- we have to move in some in --- where we have expertise. Right? Because I'm not going to --- If I'm going to teach you, I'm going to teach you Chinese.

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I'm not going to volunteer to teach Germany. I don't speak German, you --- you know what I'm saying.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
So you have expertise. And then ---- and --- and it's exciting. It's absolutely exciting. And things like this, I could not imagine 20 years ago. And this one, I imagine, it doesn't mean --- in my head, I can see it. But the concept --if we can contribute part of it because for example, each of one this --- each --- who identify Houston, who identify Chicago and New York, you have to put here, right? This may have to identify 15 major cities but we may identify 10 of them and contribute.

T.A. Rosolowski, PhD
Right. Right.

Mien-Chie Hung, PhD
I'm --- I'm not saying one person should ….

T.A. Rosolowski, PhD
[1:38:01.9]
Sure. It's just pushing --- everybody's participating and pushing it back. Yeah.

Mien-Chie Hung, PhD
And that's exciting.

T.A. Rosolowski, PhD
Yeah.

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Chapter 11
Co-Director of the Women's Cancer Moon Shot Program: An Environment of Team Science and Translational Research
A: The Researcher;

Story Codes
A: The Researcher;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery and Success;
A: Professional Path;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;
C: Formative Experiences;
C: Discovery, Creativity and Innovation;
C: Healing, Hope, and the Promise of Research;
B: Building/Transforming the Institution;
B: Multi-disciplinary Approaches;
B: Growth and/or Change;

Mien-Chie Hung, PhD
[1:38:01.9]+
So, when Ron DePinho [oral history interview] says, Moon Shot – because he --- he like to use Moon Shot, ____ 1:38.13. That concept is there, that's correct. He said low hanging fruit. What I say, low hanging fruit ____ 1:38.24 work. _____ you don't want to develop drug, because that takes 20 years. Use an existing drug to look ____ 1:38.33 We are looking for the opportunity to ____. It's already there.

T.A. Rosolowski, PhD
[1:38:36.6]
Now, you're Co-Director, is that correct? Of the …

Mien-Chie Hung, PhD
Yeah. For --- for Moon Shot.

T.A. Rosolowski, PhD
…Women's Cancer Moon Shot?

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Mien-Chie Hung, PhD
Yeah, yeah, yeah.

T.A. Rosolowski, PhD
[1:38:42.3]
Okay. We have about 15 minutes left. Why don't you --- do you want to tell me about that?

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
Okay, great.

Mien-Chie Hung, PhD
The --- the Moon Shot, I think the concept is great. Because if somebody should do it, MD Anderson should be the place to do it. I'm not sure about saying this is the only place that can do it, but MD Anderson is certainly one of the very few places that can do it. And Ron --- Dr. DePinho came here to ____ 1:39:08 This concept is great because you focused it. And then you conceptually emphasize less --- for many people doing research. It's just doing research, just doing what I'm interested in. But this is Cancer Center, patients are there, and there are ways we can, in a much shorter term, help patients… to --- to identify them, treat them or taking them back ____ 1:39:36. But if we don't have a structure to push that --it will happen, but it may happen 50 years from now. But with the Moon Shots, this says, I'm going to be using whatever resources we have to focus on this major cancer type and to make them --originally not treatable-- but treatable. For example, for the Women's Moon Shot, what we focus on triple negative -- why we focus triple negative? There's no drug. We're done. But 10 years from now, I --- I would imagine 10 year --- years from now, if it's still called triple negative, it's shame on us.

T.A. Rosolowski, PhD
[1:40:13.0]
Right. That's a failure, right.

Mien-Chie Hung, PhD
It's shame on us. We're not going to make it a triple negative. We are going to make it A positive, B positive, C positive. And then, we will have th --- therapy to target A,B, and C, and D. And we're already ongoing. And this now. I --- I ….

T.A. Rosolowski, PhD
[1:40:26
So this is the work --- the work on triple negative, is part of the Moon Shot project.

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Mien-Chie Hung, PhD
Yeah. The Moon --- the Women's Moon Shot is triple neg --- okay. The Women's Moon Shot combine both breast cancer and ovarian cancer together. And the reason is not because both of the disease are a woman's disease. The reason is because of molecular profiling. So now, we know a lot of data, right? The molecular profiling, meaning the ovarian cancer --- this particular type of ovarian cancer is called high grade serial ovarian cancer.

T.A. Rosolowski, PhD
[1:41:00.7]
High grade ….

Mien-Chie Hung, PhD

Serial. S-E-R

T.A. Rosolowski, PhD
S …

Mien-Chie Hung, PhD
I-A-L

T.A. Rosolowski, PhD
Serial …

Mien-Chie Hung, PhD
Serial ovarian cancer, and breast cancer triple negative. These two types of cancer, they happen to be all in women, but they are special group of the breast cancer and ovarian cancer. And their molecular pro --- profiles are very similar. Therefore, they are two different disease in breast and ovarian….

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
… but for molecular terminology, they may be the same disease.

T.A. Rosolowski, PhD
Interesting.

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Mien-Chie Hung, PhD
And so, by putting them together, that you can cross-fertilize it. The knowledge we learn from breast triple negative may be applied to high grade serial ovarian cancer.

T.A. Rosolowski, PhD
[1:41:46.5]
Can you --- can you identify for me, you know, in simple terms, what are some of those similar --- what are the similarities?

Mien-Chie Hung, PhD
Okay. For example when people take note, you know, --- do you know TCGA?

T.A. Rosolowski, PhD
Uh-uh [negative].

Mien-Chie Hung, PhD
Okay. TCGA is like --- it's --- The Cancer Genomic Catalog.

T.A. Rosolowski, PhD
Oh, okay.

Mien-Chie Hung, PhD
Okay. So, there are this type of database from United States and from Europe. So what they did is put 500 breast tumors, 500 ovarian cancers, 500 something – to make complete sequences. And then analyzed all the data. Then all the data, made it available for people to analyze. And this is a totally non-biased approach to put all data there. But when the people are buying from many people who analyze it. They start to find, oh, wait a minute, this gene and this gene and this gene and this gene are highly mutated or activated in this cancer. In this cancer, they are very similar. They are very similar. For example, ____ 1:42:46 mutation, PI 3 kinase, and there are a whole bunch of --- that's why I call profile. Gene expression profile. Those profiles, between this particular breast cancer and that particular ovarian cancer, are very similar molecule-wise. Very similar. So we call their signature very similar. And so for molecular biologists or for many scientists, they should be the same disease, except they --- this disease was occurring in different organs. But they were the same disease because they --- the gene which involved is the same or highly similar.

And it's different from breast cancer, saying, out of 100 breast cancer patient come in, some are ER positive, some are HER2 positive, some are triple negative, right? So they are --- we thought with the breast cancer, they're the same disease. No, they are different disease. Molecular profile, they are different disease. But for Women Moon Shot is, we put breast and ovarian these

two subgroup because these two subgroup are very difficult disease to cure at this moment, both the breast and ovarian

… and of course, ovarian is worse than breast. Okay, you know that, I mean. And because of the diagnosis, it's more difficult. But the molecular profiles, they are very similar. So with the Women Moon Shot putting them it together, it makes a lot of sense to understand these two diseases, breast and ovarian grouped together. They --- we can cross fertilize. We can share and now we're going to actually, almost forced, every time we're going to do something with breast, we have to do with ovarian because they are same. They're the same.

T.A. Rosolowski, PhD
[1:44:10.5]
So how are the --- how is this project being structured? You know, like how are you approaching this?

Mien-Chie Hung, PhD
Okay. So at this moment, you know there are 3 leaders which I identify at upper level and **Cormeo, myself, and _____ 1:44:23.6 and ____** primarily in ovarian, and I'm in breast but I'm --- I'm not a clinician. Most of the Moon Shot leaders, as you notice, they're all clinicians. Because, you know, the Moon Shot questions have to be clinically relevant. And I was identified probably because I'm a good scientist and I've been very translational, I've been working on breast cancer. And, at this moment, the Moon Shot structure is, we have three leaders but we are waiting --- we would like to have recruit one more leader on the breast clinical side. Okay?

And then by working together, we ____ 1:45:01. And three of us in the institution, we don't have a real structure but we have leader, but we have mission. And then three of us are working very closely with the breast medical oncologist, breast surgeons, and gynecologist people, and then identifying the so-called Flash project.

T.A. Rosolowski, PhD
[1:45:18.5]
They're Flash ….

Mien-Chie Hung, PhD
Flash, yes. Two --- we have two major projects we have ongoing. These two projects, we call the Flash because we put effort in it and show that we can --- within a reasonable short time, come out with a significant impact on patient.

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T.A. Rosolowski, PhD
Oh, okay.

Mien-Chie Hung, PhD
And --- but we started this one but, we are doing fundraising now, trying to expand more, like the one concept I mentioned to you ____ 1:45:44. Any one of them in the lab discover something and really can in a short period of time benefit the cancer patient we will do it. And that we are ---the Moon Shot, we are not trying to develop a new --- new therapeutic target and then develop a drug 20 years later. I mean, it's okay but that's not our priority. Our priority is taking any advantage --- any knowledge we have now, and assembling it together, and they benefit the patient right away. And so --- so with this structure available, MD Anderson is going to leading among many cancer center. Because what --- many cancer centers, we're ____ at, you know, who's doing what. But we actually developed this culture that by aiming it to benefit cancer patients, sooner is better. You don't have to develop a drug to --- if --- if you needed to develop a drug, that's fine. But before that, before you do that, just take advantage similar to what I just mentioned.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
Those --- we could assemble those data which may take only a couple year and that can benefit patient right away.

T.A. Rosolowski, PhD
[1:46:47.8]
Why not take advantage of that?

Mien-Chie Hung, PhD
Why not? Yeah. And that --- do we have this concept? We do, but we don't have the vision like --- and of course, the capacity, you know, Ron [DePinho] coming here, and he's president, he has a lot of resources here. I said, let's do it. We were thinking about it in a very small scale, but when he said, let's do it, with his support and we work with development with if we do it right.

Any project could go wrong and not be done right, but the concept's there. If we do it right, we will be very efficiently using money to benefit cancer patients.

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T.A. Rosolowski, PhD
[1:47:25.8]
Now with the fundraising, how is that working? Do you --- is that working within the Moon Shots or is Development doing that? ….

Mien-Chie Hung, PhD
The Development office, they --- the Development office, you know, MD Anderson has a large Development office structure. And they --- the Development office, they --- they have their specific mission, here, there, here, there. And Moon Shot is one of them. And so we --- no, they talk about, say, okay, you know, what kind of project, what kind of scale we're looking for? So we work with the Development office, you know, closely, and whole develop and we certainly should spend time to do it and to develop it. In addition to the fundraising, we certainly ____ with some concepts which are a little more premature. It is more in the research that we write grant.

We use Moon Shot money to do something almost directly. When I say almost directly, meaning not directly for patients but almost directly that can benefit patient. So that's concept. And then if we have idea, then we still write the grant to support. Unless in the future we have fundraising resources more and more, then in certain case, support some of the more fundamental science to move into clinical trials. But otherwise, at this moment, we all those --- ___ 1:48:32 I mentioned to the concept, we will develop that writing grant. But, once it's come to that clinical trial stage, we go to clinical trial to test patients again, and that's the Moon Shot budget.

And so with the Moon Shots, there also a very important concept. That is, when I am talking about a project that I do, that's my project, that's all mine. I work with it, you know, my collaborator. But, Moon Shot, is no one's project. The Moon Shot is the Moon Shot. It's Ron DePinho's concept. We are all doing Moon Shot. We bring those people who ___ 1:49:05 who are the best people in science to --- to do this job, let them do it. You know, we manage that and then we identify the right direction to go, the direction which we --- we three are service leaders but we don't really grab that money that comes to everyone.

T.A. Rosolowski, PhD
[1:49:21.8]
Right. Has that --- has that been different, you know, as a team coming together, has that created a different mentality, you know, that lack of ownership?

Mien-Chie Hung, PhD
[1:49:40.2]
Culture. Culture. It does. And it's developing now. At the very beginning, everybody needed

to learn. Most of the time, you know, it's human being's nature and, you know, you have to develop something for which you have ownership. But Moon Shot doesn't look like that.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
And then we -- at the very beginning, it's difficult to concep --- the concept was difficult going to be accepted, but now, when we started working, it's moving now. And I think this is an unbelievable concept that MD Anderson has. And I can share with you another one. There's a type of grant which was developed 20 years ago by NCI called a SPORE grant. You know SPORE, right? MD Anderson has more SPOREs than anyone else. Because MD Anderson has more than 10 SPORE grant being funded by the NCI, the National Cancer Institute. SPORE, at the time when it started, the concept is to bring clinicians and basic scientists together. They on purpose make it a rule that when you write a grant, the SPORE grant, every project have to have at least two leaders, one scientist and one clinician. One scientist and one clinician. One scientist and one clinician. That's the rule. And they --ten years ago, the scientist and the clinician were not as open to one another as they are now. But SPORE had that culture. And MD Anderson was always in the forefront in this new concept in terms of team science, in terms of working together. And many other places are still far behind with that, because everybody has ownership.

SPORE already developed like a concept, say, working together, working together on a specific disease. And then, the Moon Shot come on, actually to certain degree. The spirit is similar but Moon Shot is on a much larger scale. The Moon Shot moves forward. In the past, at that time, we liked to see translation. We wanted the lab scientist to go to clinical, and the clinical back to lab science. But Moon Shot is --- we want to put it together so we are going to benefit the patient. And we only use the knowledge that we have right now. We have the Moon Shot. Twenty years ago we could not do the Moon Shots. We would have been wasting money because the knowledge was not enough. But now is the right time. So if we manage well, and I believe we will, the MD Anderson Moon Shot project is going bring MD Anderson to a different level.

MD Anderson is --- in the cancer area --- in --- in entire world, I don't mean the US, ____ 1:52:00, and people have been jealous. We can do a lot of things other people can't do. And that is not only because of our structure, our capacity, our leadership. It also includes the culture we have been developing at MD Anderson. We created this culture before other people. I'm a basic scientist. When I come here, I only think about my own laboratory, my own publication. From this time you've been talking to me, do you think I'm that kind of almighty person?

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T.A. Rosolowski, PhD
No way.

Mien-Chie Hung, PhD
Because I've been here 28 years. I have been benefited by institution, actually get me to think this way. Which is good. Which is good. I'm not kidding. When I come here, I only care about my own lab, and my career. But now, I look at very different because we're MD Anderson.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
And it's very difficult for me to leave MD Anderson. A lot of cancer centers have much better pay, much better leadership position. I'm not saying go to other place _____ concept. But I kind of enjoy so much including all my education. I --- I already told you I train more trainee than _____record number of students. Nobody could compete with me.

T.A. Rosolowski, PhD
[1:53:24.0]
Well, and I can tell just, you know, putting what you said earlier about education in the context of what you just said about the Moon Shots. I mean, you're clearly educating the next generation in the MD Anderson mentality.

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
And I mean, that's it, how to pass that on that --- that culture.

Mien-Chie Hung, PhD
And --- and I feel so honored that I have been selected for the Moon Shot leader. They selected --- they selected me based on something based on the track record. And then, I can contribute and can involve this --- and every time when I involve something, I learn. As I told you, I train PhD student, but they teach me. I joined the breast program, so I learn. And then serving as a Moon Shot leader, I learn, too. I am involved in the forefront of the new concept, say, no ownership.

___ 1:54:11 patient only, right? And then is it wrong? No, it's right. Right? I feel it's right, it's incorporated into my grain and that's now the way I think. So, the Moon Shot, we --- we still work very hard on grants, and to do all these things. Then new patient project, the one I just

mentioned, the signal _____ 1:54:30 expertise and then if I use my expertise to contribute and once it's ready to go to trial, then that's Moon Shot. And --- and that's perfect. And that's perfect. And MD Anderson --- this number one cancer center is going to be number one forever. I hope so.

T.A. Rosolowski, PhD
That seems like the perfect place to end today.

Mien-Chie Hung, PhD
Thank you. And I say I enjoy to talk to you and then because the last time, I think all those memory of old stuff and then here, talk about exciting stuff.

T.A. Rosolowski, PhD
Exciting stuff, yeah.

Mien-Chie Hung, PhD
And then the future.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
And even this.

T.A. Rosolowski, PhD
Yes.

Mien-Chie Hung, PhD
I think talk about in my committee for long time

T.A. Rosolowski, PhD
[1:55:07.9]
Yeah. No, it's very exciting. Very exciting. Well, I hope we can schedule another session because I would like to hear ….

Mien-Chie Hung, PhD
I would be more than happy to chat with you.

T.A. Rosolowski, PhD
Great.

Interview Session: 02
Interview Date: March 7, 2014

Mien-Chie Hung, PhD
Yeah. We kind of like friends now.

T.A. Rosolowski, PhD
Great.

Mien-Chie Hung, PhD
Just let me know, and I'll buy you a Starbuck coffee.

T.A. Rosolowski, PhD
(Laughter). Alright. Well, thank you. Well, I'm --- I'm turning off the recorder at, let's see, two minutes after four. And thank you again, Dr. Hung.

Mien-Chie Hung, PhD
Sure.

T.A. Rosolowski, PhD
… it's been really, really wonderful. Thank you.

Mien-Chie Hung, PhD
[1:55.31.5]
I --- I hope ____ at you. I know this is ____ concept, right? And so now, you interview --- how many people have you interviewed?

T.A. Rosolowski, PhD
Let's see. Well, it's 49, and then I have a few --- add more people so…

Mien-Chie Hung, PhD
Hold on, how many ____ 1:55:47?

T.A. Rosolowski, PhD
[1:55:48.6]
Well, I --- I --- hopefully the project will be funded another year and we'll just keep interviewing because, you know, there are lot of people to --- that have made contributions. I mean --- and what's really, really interesting is, you know, not only from the side of researchers, clinicians, but I've been interviewing, for example, Bill Daigneau, who is head of Operations …

Interview Session: 02
Interview Date: March 7, 2014

Mien-Chie Hung, PhD
[1:56:08]
Ah, ah, ah, ah.

T.A. Rosolowski, PhD
… during, you know, during that period _____

Mien-Chie Hung, PhD
Different --- oh, yeah, yeah, yeah, yeah.

T.A. Rosolowski, PhD
… when John Mendelsohn expanded the institution. And to hear about the creation of the emergency plan. There were no emergency plans. To hear about, you know, putting all of those 10 floors on the Alkek Hospital. I mean, fundamental stuff. I mean, how to take the computer system and put it into a safe place. I mean, that --- you never think about that but that's so essential to help this place ____

Mien-Chie Hung, PhD
MD Anderson has a --- a lot of good stuff because we are …

T.A. Rosolowski, PhD
Really, really ____

Mien-Chie Hung, MD
Session 3: April 21, 2014

Chapter 00C
Interview Identifier

T.A. Rosolowski, PhD
[00:01.2]
Alright. So, now we're officially recording. And the time is about 10 minutes after two --- or two minutes after ten, and it is the 21st of April, 2014, and I am in the Department of Molecular and Cellular Oncology for my third session this morning with Dr. Mien-Chie Hung who is Vice President of Basic Research. So thank you, Dr. Hung, for agreeing to do another session. I know how busy you are.

Mien-Chie Hung, PhD
[00:31:5
Okay, so welcome back to my office again. So, let's chat. As I told you, I mentioned it …. Come on in …. I was … So our coffee is here.

Speaker 2
00:39:5
Yeah.

Mien-Chie Hung, PhD
[00:39.9]
Okay, thank you so much.

T.A. Rosolowski, PhD
[00:41.6]
Gasoline.

Mien-Chie Hung, PhD
[00:43.0]
So, gasoline.

Speaker 2
00:45.5]
They are both the same.

Interview Session: 03
Interview Date: Aprul 21, 2014

T.A. Rosolowski, PhD
[00:46.9]
Alright. Great.

Mien-Chie Hung, PhD
[00:48.5]
So, which ones …. We are the same.

Speaker 2
00:49.7]
They are both the same.

T.A. Rosolowski, PhD
[00:50.7]
Thank you so much. Appreciate that.

Mien-Chie Hung, PhD
[00:51.5]
So …. Let me see. Here is one.

T.A. Rosolowski, PhD
[00:56.8]
Thank you.

Mien-Chie Hung, PhD
[00:58.9]
You want a ….

T.A. Rosolowski, PhD
[01:03.0]
Sure.

Mien-Chie Hung, PhD
[01:07.5]
Sugar, no.

T.A. Rosolowski, PhD
[01:09.2]
Oh yes, I always take a …. I'll doctor it all up.

Interview Session: 03
Interview Date: Aprul 21, 2014

Mien-Chie Hung, PhD
[01:09.9]
Oh, that's very cool.

T.A. Rosolowski, PhD
[01:17.8]
I get it.

Mien-Chie Hung, PhD
[01:25.0]
Too cool, too cool ... I usually don't make it so cool, I just kind of … 80%.

T.A. Rosolowski, PhD
[01:31.7]
The worse is when you try to drink one of these full ones in the car. I always end up with it all over the place.

Interview Session: 03
Interview Date: Aprul 21, 2014

Chapter 12
A Move into Administration and Building a Culture of Translational Research
B: Building the Institution;

Story Codes
A: The Administrator;
A: Contributions to MD Anderson;
B: MD Anderson History;
B: Growth and/or Change;
B: Institutional Mission and Values;
A: The Leader;
C: Professional Practice;
C: Leadership;
C: The Professional at Work;
D: Understanding Cancer, the History of Science, Cancer Research;
A: The Researcher;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;

T.A. Rosolowski, PhD
[01:31.7]
Alright, so … now, where would you like to start? You had mentioned some things about … you want to start with the administrative roles?

Mien-Chie Hung, PhD
[01.32.3]
Sure, sure. So …

T.A. Rosolowski, PhD
[01:34.3]
Okay.

Mien-Chie Hung, PhD
[01.34.8]
I assumed my first administrative role at MD Anderson, was in 1996. It was a breast cancer patient research program. I think that was my first time to get involved in a heavier organization and the institution in high echelon quality ___ 1:49. At that time, I worked very closely with Gabriel Hortobagyi who is the Chair of Breast Medical Oncology [oral history interview]. As you know, he just recently retired from that position. And so he served as a breast cancer research program director. He is a world renowned breast medical oncologist and I come from

the basic research appointment side that, you know, worked with him closely to help to build up the basic research program in breast cancer program. So --- so, at that time, he and I worked very closely. So from then, that we start to develop --- we actually started to learn from very beginning that I don't know much about clinical breast cancer, and he, you know, also had limited knowledge in basic science. But then he and I been working very, very, very closely and later on now, we all become very close friends, our family. And then we actually worked on many, many of those large type of center grants or support type of grants, ____ 2:54 PI grants because those require the clinicians and basic scientists to join together.

So historically, we actually have our DOT Center for Excellence Breast Cancer Program. It's --- it was created by MD Anderson, with Hortobagyi as PI. Then I helped him to call --- to invite Cormeo and two persons from San Antonio. It's a multiple institution program. And we also --- at one period of time, we had to --- almost 10 --- more than 10 years support from the NIH Breast Program, and he served as the PI; I served as the Co-PI, and on top of that, we worked together --- I served as a PI for the NIH P01 grant which currently show active funding. So that was a lot --- it started from 1996 when we started to work together. Actually, we worked together before that. We have kind of a track record but 1996, that was the first time we officially gave recognition of the leadership growth. So since then, I --- first I learned organizational skills and second, I enjoy so much by working with Gabriel Hortobagyi and many, many physicians in Breast Medical Oncology and breast surgeons.

T.A. Rosolowski, PhD
[04:03.8]
Why did you decide to start in 1996? You know, what was going on at the time that made you feel that now was the time to get into a more administrative role?

Mien-Chie Hung, PhD
[04:11.9]
Okay, so I believe I was promoted for professor in 1994. Yeah, 1994. By then, Gabriel and I had been working together very closely. We worked on that P01 project, moved --- moved into a clinical trial. We already had a track record of working together, moving from laboratory discovery to clinical trial. I still remember, that was the first human gene therapy trial in breast and ovarian cancer. I was working with Hortobaygi and Gabriel or Pat Winston, I think we mentioned earlier, and Hortobaygi was a PI. And, so --- and at that time, because the institution felt that it was probably really nice to have a … back to the early 1990, institution start --- this institution was very, very strong clinically but we also wanted to foster that interaction between scientists and clinicians. And, the culture is not specific time ___ 5:08, but in the early 1990s, because of NIH --- NCI come out with a first breast program. And with breast supported, the concept is forced in a way, kind of forced clinicians and scientists to work together. So at that time, the rule is still similar, that is, you needed a PI who is a clinician or a basic scientist. But

then, you need a --- of you have a PI clinician then you need a basic scientist as a co-director or the other way around. In each project or in overall. So, the culture started to develop so you want to really --- really have some sort of an impact --- a bigger impact in patient care. We needed to bring scientists in. The concept had been known for a long tim, but how to do it? And the support grant certainly is one type …. I'm not saying the only one, but one type, a kind of one: I give you money, but I force you to talk to each other. And --- and hope also, not only so. The institution already had that culture ongoing …

T.A. Rosolowski, PhD
[06.12.4]
Right.

Mien-Chie Hung, PhD
[06:12.8]
So --- so at that time, the institution and faculty, we all feel that there's a need for that. So we started to do that. So they appointed me --- and it was very natural because as a basic scientist who committed a lot to breast cancer research, I easily stand out because I already moved that --- worked with him and moved the project into the clinical trial. And so --- so that was my first administration role.

T.A. Rosolowski, PhD
[06:37.6]
So what did you learn about yourself as an administrator and a leader at that point.

Mien-Chie Hung, PhD
[06:41.5]
I enjoyed it because I --- before that, I was running my lab and I enjoyed running my lab, to training post-doc fellow, train the student. As I told you before, I consider myself not only a researcher but also educator because I did have a track record of educating, training a lot of student post-docs, and oncology fellows, too. But when you start to serve an administration role, then it's like you have a --- you move up to a slightly different kind of impact because you're not only looking at things from your lab, you're looking for --- you're looking at the entire institution, how can we promote the breast cancer program? So I just --- we have --- at time, I think ___ 7:22 fund, we had two million dollars supporting breast cancer research. So Gabriel and I both worked very closely and I went department by department to encourage the basic science department chairs. You know, it's a free country and back to the early nineties and the mid 1990s --it's different from now. Right now, the translation voice is huge. At that time, it was not. So we still had some basic scientists who wanted to stay in their own ivory tower, you know. And I --- I'm not saying it's wrong, I'm just saying the culture…

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T.A. Rosolowski, PhD
[07:53.4]
Yeah, exactly …

Mien-Chie Hung, PhD
[07:56.5]
So…

T.A. Rosolowski, PhD
[07:56.6]
It was --- it was a ….. (inaudible)

Mien-Chie Hung, PhD
[07:56.6]
… at that time. And then at that time, we tried to say, hey, we have some sort of breast cancer research fund here. You can still stay in whatever you're doing as a basic scientist, but --I used myself as example. I was a basic scientist but because I discovered HER-2/neu and because I studied the mechanism, I moved to a clinical trial. I feel it's, I enjoyed it. so I shared my experience with some basic science department chairs and scientists, encouraging them to say if you like, maybe the --- our breast cancer research program pool has some money, we can give you some seed money to expand your research. Do not change your research. You do what you were doing. But what you were doing, whatever molecule, whatever gene you're working on that happens to be related to breast cancer, then we --- we can extend your arm. Because it's difficult and there's no point to asking people to change their direction. We only encouraged people to think about breast cancer questions, so that if the gene you're working on happened to be --- for example, I worked on HER-2/neu, so I'm obviously working in breast cancer. People work on a lot of different genes which are important in development. Biology is important in, you know, in basic science. They may well be very important in cancer, in breast cancer. So we started to do that. Then I started to expand my interaction with other types of leader and then --- then I started to learn, you know. Some people might be very easy, they said sure, we would like to do it, let's talk about it, get some seed fund to do it. But some people may say, hey, no, no. We're not interested, you know, because we are better basic scientists. So things like that, then I start to learn about a different level of impact. And then, I thought it was timing wise, it was good because in the mid-1990s, there were a lot --- enough basic science results. It was already on the table. It was time people should start to think about translation. And you can do that anytime. You can do that even earlier now but better earlier than none. There was very limited knowledge about it. But now, too much information is the flush of the data in, so we need a bioinformatics because so much data. But at that time, it's about --- we had some data but is not much, again so basic scientists and clinicians started to talk about each other.

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T.A. Rosolowski, PhD
[10:17.1]
Very interesting.

Mien-Chie Hung, PhD
[10:18.2]
And so I --- I actually enjoy working in that capacity, starting to interact with more in --- in the institutional level instead of only my own lab, my own department. I started to interact with clinician and I started to learn a lot. Because I'm a basic scientist, so when you go to cross the field, everything is new to you. So you can talk to them for 10 minutes and learn a whole bunch of stuff. But if you talk to your own people, that's different because you already know maybe 70%, 80%. You talk to them one hour, you may learn another 5%. But you talk different field, you know what I'm saying.

T.A. Rosolowski, PhD
[10:53.8]
I do.

Mien-Chie Hung, PhD
[10:54.1]
And you --- you learn a lot.

T.A. Rosolowski, PhD
[10:56.7]
Exactly.

Mien-Chie Hung, PhD
[10:56.1]
And I started even more to enjoy, that is, when I talked to clinician, I start to learn how to grab the important clinical question and come back to the lab. I'm not saying that every problem clin --- clinically we can do it in lab, but some we can do. And it --- we would talk about that and then they would say, you know, clinically we have this issue then, you know, it's a problem, right? So then maybe in the lab we can do this type of experiment or that type of experiment, then we may able to help. I mean, there is no guarantee, but there's an expertise here. There's a, you know, knowledge here then we could test it, some ___ 11:33. So since then my research is much, much more translational. And then, also since then when I'm writing grant, I never need to write why it's important because the question I'm asking is already important. I don't have to --- as a basic scientist, I don't have to worry about spending a lot of time, just why it is important. Nobody questioned me on my grant on that. They may question me here or there but nobody says, what is important, because it is obviously important.

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T.A. Rosolowski, PhD
[12:03.4]
Right.

Mien-Chie Hung, PhD
[12:04.5]
So that's certainly, an individual myself and also for me to learn how to work with other people, and how to promote to ask those people who are originally not thinking about breast cancer come to think about breast cancer. And also encourage the breast cancer doctors, you know, either surgeons or oncologists, to communicate and develop common language to --- to talk to scientists. And now, today…

T.A. Rosolowski, PhD
[0.12:31.6]
Can we … I want to just --- ca --- how --- what's the issue there? You now, I mean, I --- since I'm not part of either field, how would you describe some of the communication gaps between basic scientists and clinicians, and then, what's needed to overcome that?

Mien-Chie Hung, PhD:
0.12:47.7]
Okay, at that time, for most of basic scientists, you know, basic science is always interesting. Detailed molecule mechanisms. Which is important, but if you only pay attention to detailed molecule --- molecular mechanism, then you do not pay attention to why this mechanism is important. As a basic scientist, you know, it's a free country. You can do whatever you want to do. But then, what is important? However, let's say there's a clinical question. Let's say I'm interested in transcription regulation, you know, gene expression. And this gene expression, without asking clinical importance by itself can be very interesting, you know, a detailed mechanism. You know, just like, you know, it's interesting. But if the gene you're working on happened to be overexpressed in breast cancer, let's say, then you study your mechanism, the mechanism may actually be the cause of the breast cancer, for example, maybe. And even if it was not the cause of the breast cancer, but not mechanism because it controls gene expression and you know that particular gene is always present in breast cancer, then the mechanism you study may be able to come out with some product to block that overexpression and not product mine by itself, then the cancer drop. So that can be totally independent from your original basic research, but it's a potential application. I use this example to HER2/neu and that's what happened to me.

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T.A. Rosolowski, PhD
[0.14:19.0]
Right.

Mien-Chie Hung, PhD
[0.14:20.6]
And then after I think the last two times we talked about a lot of interesting potential clinical marker guided trial. Those cancers, it's just because I've benefited by having so many friends inside the institution, they were clinicians and they have a clinical question. Then by talking to them, I find out a question then come back to the lab.

T.A. Rosolowski, PhD
[0.14:40.3]
But you had that impulse very early. I mean, you talked about how you did your studies with snake venom very, very early. You always wanted …

Mien-Chie Hung, PhD
[0.14:47.2]
I am interested ….

T.A. Rosolowski, PhD
[0.14:48.2]
Yeah, you wanted to. Whereas I can see that a basic scientist that --- you --- you can get caught up kind of in the intellectual intrigue of these mechanisms or even the aesthetics of them. I mean, they're beautiful. I mean, I remember seeing biochemical pathways, you know, the maps, and thinking, wow, that's like so intriguing and beautiful even, how they --- how they move together like a symphony or something…

Mien-Chie Hung, PhD
[0.15:13.6]
Yeah, yeah, yeah.

T.A. Rosolowski, PhD
[0.15:13;7
… you know. But you can stop there. That's enough…

Mien-Chie Hung, PhD
[0.15:16.0]
Yeah. And --- and …

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T.A. Rosolowski, PhD
[015:16.3]
… you know.

Mien-Chie Hung, PhD
[0.15:17.2]
… and that's fine, too.

T.A. Rosolowski, PhD
[0.15:17.9]
Yeah.

Mien-Chie Hung, PhD
[0.15:18.2]
That's fine, too.

T.A. Rosolowski, PhD
[0.15:19.0]
But going …

Mien-Chie Hung, PhD
[0.15:19.3]
As long as that one, there's a long-term impact in the future for that. That's fine.

T.A. Rosolowski, PhD
[0.15:24.6]
Right. But it --- it's interesting because you're asking, challenging a basic scientist to put that --- all of that good stuff in a larger context.

Mien-Chie Hung, PhD
[15:32.5]
Yeah. And also, this other thing about it. Because MD Anderson is MD Anderson. A busy cancer center. MD Anderson is very nice, allowing, you know, basic scientists to think about just pure basic science. That's fine. So that --- but if 100% of scientists in MD Anderson all think about basic science and not about cancer, then they're not a cancer center. Then --- then why don't we have a university?

T.A. Rosolowski, PhD
[15:54.2]
Right. Exactly.

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Mien-Chie Hung, PhD
[15:54.7]
And --- and --- and there's nothing wrong having a university, not ___ 15:57 but it's different --- it's just --- just like you are in the army. You're in the army, right? If you are in the army, you're in the army. You're thinking about what you supposed to do the army, you're not thinking about music. Stupid. And that doesn't mean that thinking music is wrong. It's --- in that place, you think of what? So some significant portion of scientists in MD Anderson should think about this. And we --- we should allow some people to think about their --- their own interests. That certainly is fine but proportion is important. Proportion.

T.A. Rosolowski, PhD
[16:25.4]
Yeah, I'm remembering some of the conversations, you know, in the '70s and about how you need speculative research. You know, just …

Mien-Chie Hung, PhD
[16:34.4]
Yeah.

T.A. Rosolowski, PhD
[16:35.2]
… just --- just go on out there …

Mien-Chie Hung, PhD
[16:35.3]
Be…

T.A. Rosolowski, PhD
[16:35.7]
…find something.

Mien-Chie Hung, PhD
[16:37.3]
… because in early 1970s when President Nixon award money to cancer, at that time, that's was cancer. And that cancer was very different from now. Because at that time, they said, hey, cancer is a problem. We don't want cancer but we don't want cancer. So now, we want to bring together all different disciplines – mathematics and physics and chemistry, biology, or whatever, to come to study cancer. And we allow you to imagine, think out of bounds, whatever, and doesn't need to be cancer directly. That's fine. Because at that time, we didn't know that. But

now, actually --- from --- early 1970's through 1990, my friend, we have 20 years, that basically put a lot of money in and started from 1.6 billion at that time. I still remember that. Then --- and we have so much money now, we have accumulated so much knowledge, it's time that we cannot just continue to do that. If we continue to do that, we're not going to move ahead. So, we have to translate. Right. And so every ten years, every ten years you have different kind of, you know --- and that's just fair. And so if we take the culture or the concept we had in the early 1970's, and say we use that identical strategy to deal with cancer now, then we will probably end up wrong, because that time and now is different, the knowledge is very, very different. Yeah, very different.

T.A. Rosolowski, PhD
[17:57.7]
Yeah, yeah. Well, and interestingly, I mean the --- the --- obviously what's going on today couldn't have happened without that --- that sort of imaginative …

Mien-Chie Hung, PhD
[18:07.6]
To a certain degree.

T.A. Rosolowski, PhD
[18:08.8]
… startup.

Mien-Chie Hung, PhD
[18:09.6]
To a certain degree. It's more like we train, we educate an individual from elementary school, high school and, you know, middle high, high school and college and graduate school. But --- because at different stages, you learn different things. You know, different goals, different milestones, right? So at the time when, early 1970's, we said cancer is the problem. What cancer? We don't know what is cancer. So let's bring everybody, all the knowledge in. Think about it then. Ten years, 20 years ago, we started to say, hey, we know what causes cancer. By the end of 1980, we already knew cancer was caused by a gene, right? Then we know how we should target the gene and it --- it's always --- always a different time, a different knowledge. And now, we have some data. We can complete sequencing and identify driver genes and that kind of stuff. Which we could not even imagine 40 years ago.

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Chapter 13
A Twenty-Year Study that Promises a Paradigm Shift: The Yeast Two-Hybrid System
A: The Researcher;

Story Codes
A: The Researcher;
A: Character, Values, Beliefs, Talents;
A: Overview;
A: Definitions, Explanations, Translations;
C: Discovery, Creativity and Innovation;
C: The Professional at Work;
D: On Research and Researchers;
D: Understanding Cancer, the History of Science, Cancer Research;

T.A. Rosolowski, PhD
[19:03.2]
Yeah, yeah. Incredible, incredible. Where would you like to go next? I know that there was….

Mien-Chie Hung, PhD
[19:09.6]
Sure, okay…

T.A. Rosolowski, PhD
[19:10.7]
… do you want to talk about the research …

Mien-Chie Hung, PhD
[19:11.5]
Sure.

T.A. Rosolowski, PhD
[19:12.1]
… and since we're kind of on the idea of …

Mien-Chie Hung, PhD
[19:14.0]
Yeah.

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T.A. Rosolowski, PhD
[19:14.7]
… paradigm shifts.

Mien-Chie Hung, PhD
[19:17.0]
The paradigm shift. These one was in early 1990. I was interested at that time that not much was known about signal pathways for this growth factor receptor including ER receptor and HER2/neu. They are also called growth factor receptor and by definition, they're receptors --- receptor meaning they were outside of this --- outside --- connected outside, inside the cell, right? And then you have a ligand ____ 19:43. At that time, our knowledge was that when you have ligand from outside the interactive receptor, then receptor worked just like a --- a relay, passed the knowledge to A; A pass to B; B passed to C, and all the way toward this, transferring the signal from outside of the cell, going to nucleus to cells, to tell the cells, hey, now you should replicate. One becomes two, the DNA has to replicate, then one cell become two, two becomes four, four becomes eight, and so on, right? So that's our traditional concept back to that time. So the receptor should be in the cell surface but not ___ **20:20** in the receptor. We were very surprised by an experiment that we were doing with a so-called yeast 2 hybrid system. That is, trying to identify a cellular protein –using a special technique and trying to identify what cellular protein may interact with the receptor, their --- their cytoplasm portion. Because the receptor has, you know, a certain memory, right? One part is outside, the other one part is inside. So they go. So we are interested to identify this A, B, C, the so-called, now the so-called signal. And there's a special technique called Yeast 2 hybrid system.

T.A. Rosolowski, PhD
[20:58.2]
What is that it?

Mien-Chie Hung, PhD
[20:57.3]
It's called yeast …

T.A. Rosolowski, PhD
[20:59.7]
Yeast?

Mien-Chie Hung, PhD
[21:00.6]
East 2 hybrid system. That's where the basic scientist….

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T.A. Rosolowski, PhD
[21:03.2]
Yeast 2….

Mien-Chie Hung, PhD
[21:04.5]
2 hybrid…

T.A. Rosolowski, PhD
[21:05.1]
.. hybrid. Oh, got you.

Mien-Chie Hung, PhD
[21:06.1]
2 hybrid system. But that's a special technique. But from that study, we actually had an unexpected discovery. HER2/neu associates with transcription RTK And, as you know, transcription occurs in the nucleus and HER2/neu within cell surface. It --- it's a receptor. But how can that receptor have transcription RTK? Just like the Chinese are supposed to be in Beijing, but now you see the Chinese, you know, two or three hundred you see a Chinese in New York speak English. It is just --- just impossible, right. So, but the data is reproduceable 21:49. So, i.e. we discovered a very unexpected result. A cell surface receptor could associate with the transcription RTK and apparently occur in the nucleus. And this is certainly anti____. This certainly not a subject and fortunately the experiment is reproducible. What's important is the cure. The experiment had to be reproducible. So when experiment reproducible, then I start to feel as if the experiment is reproducible, there are two things. First, they are probably real and important.

T.A. Rosolowski, PhD
[22:33.3]
They are probably …

Mien-Chie Hung, PhD
[22:34.1]
Real …

T.A. Rosolowski, PhD
[22:35.9]
Right.

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Mien-Chie Hung, PhD
[22:36.2]
… and important.

T.A. Rosolowski, PhD
[22:36.5]
Yeah.

Mien-Chie Hung, PhD
[23:36.7]
But people had just not discovered that. Second --- yeah, they are reproducible but they may not be important, which is less likely. The cell will not just have something happen and it's without some meaning. However, nobody believed this concept. So we discovered that --and my student, ____ ____, that he's a professional in Winston 22:57 University now. At that time, it's in early 1990 that we could not figure out what --- what is ___ relevant. We thought it's very important to start, so we went and wrote a paper for *Nature* and *Science*, you know, those are major journals. Of course, it been reviewed because it very novel. But it has not been accepted. And now, back --- I look back, I think it's fair because we made a very novel discovery but we did not say why physiologically that's important. And that may be a very interesting discovery but this may be nothing to do with the biology, right?

T.A. Rosolowski, PhD
[23:36.5]
Right.

Mien-Chie Hung, PhD
[23:37.2]
But then after that, we published a very small paper in BBRC. It's a very fast communication journal. Luckily, we published it, given it's a small journal. Because it's now on record, we are the first to report that --- that the receptor associated with transcription RTP is in the nucleus. We are the first. If we didn't publish it, we would never have a record --- we would never have a record. But then, after that, it is difficult field to study. Paper was very difficult to publish and technique is not --- I'm not --- the --- the paper difficult to publish. I'm not complaining anything, I am just saying because of the technology at that time, it's not easy to convince people, say that's real. It's difficult, you know, technical-wise. So I always try to ….

T.A. Rosolowski, PhD
[24:24.5]
So, excuse me … just … because of the technology involved, was the assumption that there are --- might have been some kind of, you know, error in the technology …

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Mien-Chie Hung, PhD
[24:35.0]
Yeah, yeah, yeah. ___ …

T.A. Rosolowski, PhD
[24:36.0]
Okay.

Mien-Chie Hung, PhD
[24:37.5]
___ For example --- for example, I say nuclear. I can take a cell and break the cell, isolate the nucleus and say, hey, it's there. But technically, it's very difficult to say whether you have small amount of contamination.

T.A. Rosolowski, PhD
[24:49.7]
Right, okay.

Mien-Chie Hung, PhD
[24:50.4]
Right?

T.A. Rosolowski, PhD
[24:50.7]
Right.

Mien-Chie Hung, PhD
[24:52.7]
So unless you see directly. But now there are more and more data now. Even more recently now, you can see a single molecule by trafficking, you know, after twenty years. The technique has improved. At that time, the experiment was a very difficult experiment to do, to show. But I --- since the data is reproducible, I firmly believe something is there. So therefore, from HER2, originally we discover HER2, then we switched to EGF receptor. And there is another reason to switch to the EGF receptor. One is not only HER2, but also EGF receptor is a problem, right? So if --- and this was done by different person so I'm more convinced that's real.

T.A. Rosolowski, PhD
[25:30.2]
Interesting.

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Mien-Chie Hung, PhD
[25:31.1]
Second, HER2 has no ligand. HER2 up to now is still --- is an orphan receptor because there is no ….

T.A. Rosolowski, PhD
[25:39.6]
Orphan receptor …

Mien-Chie Hung, PhD
[25:41.2]
There is no ligand. So for research per se, the EGF receptor is easier because of your ligand **stimulation 25:45.** So then, these two are very, very close. At that time back to the old day, we almost did these two side by side, because it is a very unusual phenotype. So only unless we have two different people, one seeing HER2 and one seeing the EGF receptor am I convinced this is real. So the first paper was published in 1994 in BBRC, although our observation in 1991 we already sent to Nature. The paper couldn't accept it because --- which --- which is fair, which is fair. I'm not complaining. Is, you know, scientifically, when is come out, is novel idea, a very unusual stretch. You have to show enough, otherwise you are --- you are generating junk. So our second paper on this area is 2001 …

T.A. Rosolowski, PhD
[26:30.8]
Wow! That's a big gap.

Mien-Chie Hung, PhD
[26:32.8]
… in Nature Cell Biology. And it doesn't mean that for seven years, I lie on the beach, okay? That same year, I was working with something else, trying to get funding to do it but using other funding to support this project and continue. And try to convince people to do it. People don't want to do it. Because student ____, it's difficult to publish and difficult to do. But I believe it's real. Because multiple people who did it until 2001, it was a more --- in a more well known journal, now it's in Nature Cell Biology, 2001. After that, people started to gradually believe it. And then, we started to back to literature. I thought we had first one. In HER2/neu, we are the first one to --- we are the first one to identify the transcription activity, but in terms of receptor in the nucleus, even before us, we are first one to discover HER2. Someone else already showed the EGF receptor in the nucleus.

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T.A. Rosolowski, PhD
[27:22.8]
How interesting.

Mien-Chie Hung, PhD
[27:24.1]
But they don't know what that means. And then, there are more and more people showing different receptors in the nucleus. But the --- the biological activity is just difficult to study because keep in mind it's a cell. Also, ___ 27:35 it's easier to study because you touch it. In the nucleus, the small amount it is always more difficult to study. More difficult to study, but this means as important. It's just historically you have to start from easy studies because of more difficulty. So we happened to discover. So up to now in the receptor tyrosine kinase, is the cell surface receptor. There are 20 --- more than 20 subfamilies, superfamilies. There are more than 10 --- more than 10, and more than 50% of them had been reported as being detected in the nucleus by all different groups. But the function is not as clear. The function study --- the function study, the one, the major lab for the country can't do more for this study on this particular area. I think my lab is the major one. And yeah, there are other people, too, but we are the ones who have been consistent in the 20 years. And now we know this receptor tyrosine kinase from cell surface can move into the nucleus. We know the mechanism and how they move in, and we know they're involved in transcription regulation. We know they're involved in DNA repair. So if a receptor could actually from cell surface move to nucleus and become involved DNA repair and transcription, this got to be important. And now, there are even more data which are from us and from other people showing that these receptors, when they go to nucleus, actually cause a resistance to certain types of anticancer therapy. And so, I think function will be gradually unraveled. It's not completely a, you know, shaking-earth impact yet but it's gradually developing. It's more than ____ **(00:29:20)**.

Now, there are people starting to accept this concept, and that is what's important to show. And this particular one, I still strongly believe in the near future, this will have to be in textbooks. The reason I'm saying this: because when we talk about signaling, we said cell, now cell biology textbook, is --- in the textbooks they say a ligand stimulates a receptor then the receptor passes through those signaling like a relay; A pass to B, B pass to C, then goes to nucleus. Which is still correct. But in addition to that, there's another pathway. It's a memory receptor. They --- they don't necessarily pass this way by a relay. They --- by itself, in the vesicle it translocates all the way to the nucleus and by itself, directly participates. And the first time, when the EGF receptor was found to be in the nucleus, when they discovered it, it was doing a liver regeneration. Liver regeneration is a kind of experiment that take any more liver. You cut the liver out. The liver is important. When you cut a liver out, the liver has to quickly regenerate. And when it quickly regenerates, using an electron microscope, they see the EGF receptor nucleus. That was not done by us, it was before us. And they didn't know what it means. My

interpretation, it's an SOS. SOS why? So usually you call these pathways but now because of liver regeneration --you want to quickly regenerate the liver. So why wouldn't this characteristic do something. So now, there are more and more of these cell surface proteins. At the very beginning, people thought it was cell surface protein, then we said it's nuclear. But now --I'm not alone in this-- people started finding that these cell surface proteins can go to different compartments of --- in --- you know, inside the cell, there are lot of different compartments – mitochondrial, Golgi, you know, ER, called the nuclear membrane, you got the nucleus. Just, i.e., they're cel --- intracellular compartments. These so-called cell surface receptors, one by one, have been discovered. We happened to be more focused on nuclear but now, this kind of cell --- so-called cell surface protein, you can actually detect it in mitochondria, in Golgi, in ER, nucleus. And they --- when they locate it different place, they have a different function. There is more and more of this kind of stuff. Which is common sense, okay? Three hundred years ago, you go to Europe, it's very difficult to find a Chinese. But in a different, you see world, you can see Chinese in France, you can see Chinese in Italy, and Chinese in Germany – just like that. Historically, we didn't know, we said the cell surface protein is on the cell surface. But cell surface protein can be internal. It can go to different locations and do different things. And if --- if nature --- that's occurring that way and they have an important function which is ____ **32:23**. We --- as a --- as a scientist, is basic --- I'm talking about basic science now, we try to use scientific knowledge to discover nature. If nature --- if that occurs in nature --- when I say occur in nature, meaning cell have that property, something is important there. So --- and then, we have to think about other parts because historically, all of the science was discovered because of people before us, they contribute, they make a discovery. They write a theory. But in reality, even one hundred years from now, we still have not completed all the science yet. How about --- we think about 40 years ago, how much did we know? We knew so much 40 years ago, and 40 years pass, and now we know much more than before, right? And a lot of stuff we discovered at that time, historically you thought that way. So we think that's --- I --- I --- I always, when I give a lecture on this one, my last slide always states that –that's an interesting story. That is, seven blind guys try to figure out an elephant. Scientist is like that. We, as scientists, we try to use scientific knowledge to under --- understand nature so we design experiments and then we use our experiments as ___ 33:42 system and that experimental result come out. That's what we like and thus we start with step by step establish our knowledge. Just like the seven guy. The seven guy --- the seven blind kid touch elephant and when he touch it, the first one he touch it most likely in this area because it's huge. Then he say, "So what is elephant? It is like a wall," right?

T.A. Rosolowski, PhD
[34:07.1]
It's growing more and more.

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Mien-Chie Hung, PhD
[34:8.2]
Yeah. And he's --- he's right. But how about another person, when he touch elephant ear, then you say, "what is an elephant?" "Oh, like a fan," right? So --- and --- if they were touch it at the same time, they may argue but if they touch at different time, "But this one is much larger." So many people come to touch it so what is elephant? "The wall." And the other says, "The wall? It look like – a wall. Then that's wall." Then 10 years later, another person touch …

T.A. Rosolowski, PhD
[34:36.2]
The trunk, yeah.

Mien-Chie Hung, PhD
[34:38.1]
And they say, "It look like what?" "Oh, maybe snake? I am wrong."

T.A. Rosolowski, PhD
[34:41.3]
How could --- how --- how could those other people possibly have said it was a wall…

Mien-Chie Hung, PhD
[34:44.4]
It's wrong. That --- it --- that's --- it happens all the time. So I start to educate my trainees. As long as data is reproducible, what's important is get high data reproducibility --- reproduce. The data not ___ 34:57, it all ___ anyway. Data reproduce --- data reproducibility, you have to think about what it means. And you have to think out of box because many, many, many, many things in the textbook --- I'm not saying they're wrong, they're right. But they are incomplete and that's why scientists need to be generation after generation in discovery mode. But if you always say whatever the textbook says is right, then you're not going to make an important discovery. Right? So but --- but what's important is a high degree reproducibility. And so this --- I'm still working on it. And I --- now I think we already know the mechanism, how they --- how --- originally don't even --- cannot even imagine how --- how a protein from cell surface can go to nucleus. We know --- we know the entire mechanism and now we try to design --- incorporate with our bioengineer, try to see if we ca --- can see, using different kind of technology, to see it and show its importance. So --- I --- I firmly believe this will be in the textbook. This is different from cancer now. This may be related to cancer, too, but may not --- not directly related to cancer but similar to the other project which I mentioned, the translation. These ideas are more in basic science but, however, they are still related to cancer.

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T.A. Rosolowski, PhD
[36:12.1]
But it's interesting. I mean, you're --- your focus on that story and, you know, before we turned on the recorder, you --- you used the word "persistence." I mean, you have an intuition that there's something going on here …

Mien-Chie Hung, PhD
[36:23.2]
Yeah.

T.A. Rosolowski, PhD
[36:23.6]
… and so you're sticking with it. And who knows?

Mien-Chie Hung, PhD
[36:26.7]
Yeah.

T.A. Rosolowski, PhD
[36:27.2]
I mean, it may even be tangentially connected. And so….

Mien-Chie Hung, PhD
[36:30.1]
Yeah.

T.A. Rosolowski, PhD
[36:30.7]
… you have to follow the pathway literally.

Mien-Chie Hung, PhD
[36:33.4]
And --- and --- and at that time, I told myself since the data is highly reproducible, right, so it's real. And as scientist, I don't want to say because the data reproducible and because it --- nobody believed it so we should not do it. And I understand it's difficult to get results published. I know it's difficult to get funded. But a lot of important stuff was not funded, including the Cetuximab that was Mendelsohn's antibody. At the very beginning, he could not get funded. Remember that story?

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T.A. Rosolowski, PhD
[37:1.4]
Yeah, yeah.

Mien-Chie Hung, PhD
[37:02.9]
But it's now, it's an anticancer drug. So as a scientist, I feel if it's real, you know, I know it. If I know it, it is our responsibility to ___ **37:13** up. And unless the data is nonreproducible, that's --- if its reproducible, we should do it, we should do it. We should do it. And if it's difficult, do it slowly. If you want to do faster, you get more money, you can --- easier to do it and can …. But we have a way to --- to, you know, convince the community and continue to do it. So I am a collector. Actually have been persistent for more than 20 years. Now there are more and more people who believe and then, this going to become an important area. I am not as lucky as saying this double helix. The double helix --when this came out, that concept, right away people accepted it. There are some scientists like that because of source intuition. But there are some scientists, no, that's impossible, but that impossible become possible. Including --- there's another protein called ____. Another guy took a risk prior to that. At the very beginning, he was saying, say, the protein need to be ___ and then degraded. And when his concept came out, nobody believed it. They said, how come he is so stupid? He says that protein ____ 38:17. But that's a regulation. You need to make a new one and then retire the old one. But at the very beginning, people didn't believe it, said that's stupid, why ___ but now it's become central dogma.

T.A. Rosolowski, PhD
[38:33.5]
Wow! Interesting.

Mien-Chie Hung, PhD
[38:34.8]
Yeah. So this --- I mean, this cell surface receptor was in the cell surface, because of the time when it was discovered. But this cell surface can possibly send messages by relay, traditionally, but can also by itself. Translocate --- translo --- translocate to different location and do --- do a different function. So what's wrong with that?

T.A. Rosolowski, PhD
[38:54.4]
Yeah, yeah.

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Mien-Chie Hung, PhD
[38:56.4]
So what's wrong with that? As long as it's important. So --- so I …

T.A. Rosolowski, PhD
[39:00.0]
Very interesting, yeah. And --- and very telling about the doing of science. You know …

Mien-Chie Hung, PhD
[39:05.1]
Yeah. And then --- and I also feel that if it's --- as long as reproducible, it's real. One had to be persistent to carry out --- if you don't want to --just because people don't believe it, it's not let's don't do it. Then what's point to the science? If you just do anything that people believe just because they read the textbook. You don't have to do anything. Now why don't you create by yourself, so in the future you can contribute to textbook. And that --- when I say contribute to the textbook, I am by no means saying just contribute to textbook, because this is nature. And then, our next generation, our kids and human being need to know it, it's nature. And they need to discover nature, that's passing the knowledge, you know, to the future generation. We should not just do science because it's easier to get funded, because it's easier to publish. We do science because we want to discover nature. Yeah. So that's all more --- more in fundamental science stuff.

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Chapter 14
The Department of Molecular and Cellular Oncology
B: Building the Institution;

Story Codes
A: The Administrator;
B: MD Anderson History;
B: Growth and/or Change;
B: Institutional Mission and Values;
A: The Leader;
C: Professional Practice;
C: Leadership;
C: The Professional at Work;
A: Character, Values, Beliefs, Talents;
B: MD Anderson Snapshot;
B: MD Anderson Culture;
A: The Leader;
C: Leadership;
A: The Mentor;
C: Mentoring;
B: MD Anderson in the Future;
D: Understanding Cancer, the History of Science, Cancer Research;
D: The History of Health Care, Patient Care;
D: Business of Research;

T.A. Rosolowski, PhD
[40:02.4]
Yeah. Do you want to go back to some of your other admin roles…..

Mien-Chie Hung, PhD
[40:08.4]
Sure.

T.A. Rosolowski, PhD
[40:08.8]
… because since 2000, you've been …

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Mien-Chie Hung, PhD
[40:13.6]
Department Chair.

T.A. Rosolowski, PhD

40:14.4]
Yeah, Department Chair. And it was a new department?

Mien-Chie Hung, PhD
[40:17.6]
Oh, let me give you the big long story.

T.A. Rosolowski, PhD
[40:19.2]
Yeah, please.

Mien-Chie Hung, PhD
[40:19.8]
I was recruited by Garth Nicholson who is my Department Chair, who used to be in this office. Before Tomasovic [oral history interview], there was Garth Nicholson. Garth Nicholson recruited Tomasovic and recruited me. And of course, I am much more junior. And at that time, we were called the Department of Tumor Biology, but Garth left, and there's a long story in there behind that you can forget that I told you. You may already know it.

T.A. Rosolowski, PhD
40:45.1]
No, I don't but that's okay.

Mien-Chie Hung, PhD
[40:50.6]
You laugh. I respect him. He's --- but he had long disgruntled issue and he left. So after he left, this department was in limbo. So, Steve Tomasovic was head interim Chair. And then, we were kind of informed that the department should be dissolved.

T.A. Rosolowski, PhD
[41:06.9]
Why was that?

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Mien-Chie Hung, PhD
[40:07.1]
Yeah, because there's no Chair, and they didn't think that, you know --once you talk of details. But the faculty actually discussed that we wanted to stay as a department. So we talked to our administrator at that time --our Executive Vice President-- and they all came to talk to us. So they, after discussion, they decided following. Originally, this department was called the Department of Tumor Biology. But in Smithville --the Smith Building-- Josh Fidler [oral history interview] has another department called The Department of Cell Biology. At this time, I was working very closely on cancer, so at that time, the institution decided to rearrange. So, Josh Fidler was the Department of Cell Biology, and he became the Department of Cancer Biology. And the Department of Tumor Biology disappeared. But because we in this department focused more on molecular cell biology, we become the Section of Molecular Cell Biology. And for this section, I served as Section Chief then reported to Josh Fidler. So there was one period of time after the rearrangement, this department actually became a section and I served as the Section Chief, kind of autonomous, but I reported to Josh Fidler in Department of Cancer Biology. So if you see my CV, there's one short period of time where names change a lot, because Tumor Biology came under Cancer Biology, and Cancer Biology become a new department. And then, we were section, and there was section here, but they were on the other side so I went over there once a week to report him. And after two years, it was more or less retention. I was recruit outside and also Josh --- I get along very well with Josh. Josh Fidler is a point to this way. And we are very molecule cell biology, orie --- oriented, and the Cancer Biology over in Smith is much more metastasis biology-oriented. So then, they join institution, change this section into a Molecular Cell Oncology Department. So I became Department Chair. And then, so I spin off. Originally this department and Cell Biology Department but then we were not dissolved, we become section under --- the Cell Biology become Cancer Biology. And then two years later, there was spinout again, become Molecular Cell Oncology and I served as Chair.

T.A. Rosolowski, PhD
[43:34.8]
So what --- what were the implications of becoming a department. You know, what did that mean in terms of growth, admission, all that?

Mien-Chie Hung, PhD
[43:52.7]
Yes. There was some difficulty, because at the time when I became Department Chair, I was reporting to Executive Vice President Margaret Kripke [oral history interview]. So we discussed this, okay, you, Mien-Chie, you are good molecular cell biologist so we want --- we want you to head this department but maybe you should have some sort of vision. So at that time, I actually committed to her. This is real, I committed so… At that time, our basic research is not as

strong. So I say, oh, and department is very small, it's probably less than 10 faculty. And I have….

T.A. Rosolowski, PhD
[44:19.2]
And this was just so I'm making sure I got the date. So, 2000 was when the department was renamed as a department? Okay, so we're talking 14 years ago.

Mien-Chie Hung, PhD
[44:28.9]
Yeah. So I committed to the upper levels: Okay, if I build out this department, I want to make sure our basic science builds up and we are doing translation. So there are two commitments. I want to make sure our basic science, our publications can be in the Nature, Science, Cell series kind of paper. Say, on average, I would like to see three per year. That commitment, just maybe based on my colleagues, ___ 44:52 say I'm not going to do that, I'm not going to commit to that. I mean, it's stupid that, why do it, why commit that? I say I'm _____ going to say something, I'm going to set a goal. ____ say you don't set a goal that you cannot reach, but we reached it. We are actually now much better than that. But keep in mind, 14 years ago, our department was very small. But now, it's a piece of cake, but because you set a high goal. That's one goal, I set it. And at that time, that wasn't easy. But now, MD Anderson, after 15 years is much, much better than before, okay?

T.A. Rosolowski, PhD
[45:23.7]
Let me ask you. When you set that goal, because that's a pretty incredible goal. It really is.

Mien-Chie Hung, PhD
[45:27.9]
Yeah, I --- I know that goal is very difficult …

T.A. Rosolowski, PhD
45:29.5]
But how did you motivate people? I mean, so --- so people didn't feel like, Oh my God, I can't possibly do this. I'm just going to keep doing what I'm doing. They rose to the challenge. So how did you get them to do that?

Mien-Chie Hung, PhD
[45:39.6]
Okay, so I --- first I had to set up myself as a role model. Then I as a Department Chair, I talked to faculty. You can talk to my faculty like me. I spend a lot of time because I consider their

successes as part of my success. The whole department's success is not my own. But of course, importantly, I had to serve as role model. I cannot just keep on asking them to do, do this. I don't have to do that, I cannot do that, I had to be a role model. But --- and as a role model, I encouraged them, write more grants, do good science, and if you have some good science to publish, let me take a look, I'm more experienced: hey, this good, go ahead and publish it. Or, hey, this good, but why not add this and that? Then you can publish in better journal. And I do this to help them. And so, people start to learn by experience. After that, gradually the whole department came up. So that was one of my goals, that which --- actually very successful now. In terms of basic science, it's not fair for me to say that it probably come from my interest. But if you talk to other scientists, basic science departments at this moment in the last 7, 8 years, the based --- based on the productivity and funding and publication, I probably --- we're probably number one at MD Anderson. I think this --- but it's not fair for me to say that, okay, because ___ (inaudible) 46:53. And the other thing I set as a goal here – this --- that was from my experience on the breast cancer basic research program. So I learned. I said, "I'm the Department Chair now. I am going to encourage, I'm not going to force. I'm going to recruit faculty. I'm going to encourage my faculty to commit to certain decisions and let them commit to decision related to their own research." The molecule they're working on. ___ in prostate cancer, I encouraged him ____. No, I'm encouraging. I think here a longer time. I know the clinicians, I link them together. I play matchmaker. It --- I don't have to be involved by matchmaking. Right before I came, I'm just calling --- making another phone call, try to help one of my faculty to get research data from prostate cancer program.

T.A. Rosolowski, PhD
[47:37.7]
How interesting, yeah.

Mien-Chie Hung, PhD
[47:38.5]
Because it's not for me. It's for Phil, and this person is good. Then you have money and then this guy is good in prostate cancer, why don't you guys talk to each other? And then … just like what I did for the breast cancer program. So then after that, almost now --- every in my faculty member --- we have faculty working on liver cancer, we have faculty in breast cancer, no doubt about it, and then prostate cancer, lung cancer, and kidney cancer, pancreatic cancer, and so on.

T.A. Rosolowski, PhD
[48:09.3]
Wow.

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Mien-Chie Hung, PhD
[48:10.1]
So --- and --- and they are not necessarily working on that cancer per se. They are all like me, molecular cell biologist. But when it come to ___ and because of the culture of the department. So my department --- I actually feel if all MD Anderson's basic science departments were like my department, it would be very nice. I mean, you still do basic science, you still publish it in the high quality journals. But, you also commit certain decisions because of your --- your expertise, your interests. It's --- it's just --- just makes sense, just --- I'm not forcing that. I'm not saying, you have to do that. I'm not saying, you should not do basic science. No, that's not what I mean. But because the culture environment, you --- you want to learn Chinese, go to Beijing. You learn German, you go to Berlin, right? I mean this is cancer center. There are a lot of good things here. Why not take your expertise to ___. If I wanted to Alzheimer's disease and yeah, I can do it here but what does that do me any good?

T.A. Rosolowski, PhD
[49:03.8]
Right, right. You don't have a critical mass of people also sharing that.

Mien-Chie Hung, PhD
[49:07.4]
Yeah. Yeah. So --- so now the department, every faculty, has a ____ 49:11. And I feel good about that. And, if this department move to a regular campus like MIT or Harvard, it probably would not be right. But this is a cancer center and this would be a --- a very good way for a basic science department to be in a cancer center. That you do use your expertise with a molecular cell biology ___ 49:33. But we commit to a certain disease.

T.A. Rosolowski, PhD
[49:38.0]
How long did it take you to really feel as though that was gathering momentum and that the department was --- was on track?

Mien-Chie Hung, PhD
[49:44.6]
At the very beginning from 2000 when I --- I had become Department Chair, I also on learning curve, right? Learning curve, I made mistakes. I made a lot of mistakes. Then what I feel good about is that when I made mistake, I learned and I didn't make the same mistake.

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T.A. Rosolowski, PhD
[50:00.3]
Can you tell me some of those mistakes? I mean, I'm not, you know, just --- just --- just for the sake of wisdom for other folks.

Mien-Chie Hung, PhD
[50:06.3]
Sure. For example, one thing. I learned never to face-to-face confront. I have a bad temper, they all know it, but I don't do that anymore. Because everything can be communicated. Once you communicate well, there's no point to it. But once you face-to-face confront, then you break things. There --- there's a Chinese saying, saying a mirror, once broken, is very difficult to piece together. But if you don't break it, you just have to heal it a little bit, but you still have a mirror. So I learned that. So I also edu --- all educated all my senior faculty to have leadership. I also give opportunities for my senior faculty to be in certain leadership roles so they have to learn. Everybody learns. I tell them if you're wrong in a meeting or something, give an opinion, the last thing you want to do is you have a face-to-face confront. No, never ever, don't do that. Communicate. And you really cannot control yourself, walk out. Walk out. And --- and that happened to me.

T.A. Rosolowski, PhD
[51:10.6]
Especially men in public situations.

Mien-Chie Hung, PhD
[51:12.1]
Yeah. If you really cannot control yourself because everybody has different --- you realize that, walk out. So you don't have it. And then --- and now, when I do that, you know, lots of things happened a couple times and then I learned it. And now I feel much better. And then I started use this experience to share with my senior faculty. And ___ 51:34 I saw it just a few days ago, at another symposium. I don't tell everybody that somebody publicly said something that's very inappropriate. I have not talked to him yet. I am going to talk to him, and say hey, my friend, _____ 51:47. And so, leadership first. Leadership, you're in that position and so therefore, you have that opportunity and things happen, and so you learn. You know, because at the same time, you take --- you take some courses and that will help your job. So the leadership position for scientists, many scientists don't really care about leadership but --- I'm not saying all of them, but many of them. But those are important because you can have impact, not only your laboratory. You're having impact, you know, at a different level. So I do enjoy that, I do enjoy that.

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T.A. Rosolowski, PhD
[52:23.1]
Yeah, and I can hear from your conversations that, you know, you even integrate the educational --- your educational interest into leadership because you're passing on your wisdom as you learn it to your faculty.

Mien-Chie Hung, PhD
[52:34.8]
If I learn something, I tell people in my lab right away. Even if they are student postdoc fellows, I say this is not your level yet, but in the future, you will come to this level. You know, what I learned this and that. And then, I pass this message to you for the future, you know, when that happens to you. And then, some of them are probably more relevant for junior faculty or senior faculty. I then, whenever possible, I share my experience with them. I know some of the senior faculty appreciate that. They appreciate it because people are not going to tell them that. If you are a professor, you're big professor, why do I have to tell you how to do things? But I --- but I don't tell them you're wrong or something, I just tell them, I'm sharing my experience with you. I'm not saying you're wrong, you're right, whatever. But I'm sharing my experience with you.

T.A. Rosolowski, PhD
[53:19.6]
So, we --- we were talking before about kind of the momentum in the growth of the department, when you felt there --- you could really see the effect of you vision and your decisions to --- that commitment to that amazing standard. …

Mien-Chie Hung, PhD
[53:34.3]
Yeah. And then I --- now the faculty --- we --- we're not a large department, but we've about 15 faculty, doing very well, overall speaking. As a matter of fact, you know, in our department evaluation, and this is probably off --- off the record…

T.A. Rosolowski, PhD
[53:48
Do you want me to turn the recorder off for a moment?

Mien-Chie Hung, PhD
[53:54.2]
Doesn't matter, I'm just let you know. Helen --- Helen [Pimwica-Worms], now she, she reaches, you know, Vice Provost. She just told me, your department is a model department. But just look at it. We are in the very ___ and they are supposed like a basic fundamentals, but we are a model department. And this are not the first time for department, just quote what she said,

because she's relatively new. She just came last year and that --- the previous, you know, when we had to ___ 54:22 my department is ____ department, too. Because it's just like a --- If any basic science department can be like department at MD Anderson basic science _____ 54:29, okay, there's no problem.

T.A. Rosolowski, PhD
[54:31.9]
And Helen's last name? I'm sorry, I …

Mien-Chie Hung, PhD
[54:34.2]
Ray DuBois

T.A. Rosolowski, PhD
[54:35.1]
Oh, oh, Ray DuBois, yeah.

Mien-Chie Hung, PhD
[54:37.0]
Before --- before Helen, was Ray over me. Before Ray, it was Margaret Kripke. And my department is all one. And then, at a time when our department was supposed to be dissolved.

T.A. Rosolowski, PhD
[54:47.0]
Right, I know.

Mien-Chie Hung, PhD
[54:48.0]
Supposed to be bad.

T.A. Rosolowski, PhD
[54:49.4]
Incredible.

Mien-Chie Hung, PhD
[54:50.0]
Supposed to be bad and now become at the top.

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T.A. Rosolowski, PhD
[54:53.6]
Well, hard work here.

Mien-Chie Hung, PhD
[54:55.1]
And then, yeah, and of course I am lucky that I recruited the people who are --- who are good citizens and who can be educated. And of course, probably also related to my leadership so that I convinced them and I served as a role model. I work very hard, and so I am not asking something --- I am not asking faculty something that they cannot do, because what I ask them is something I already achieved. So --- and then I can share experience with them, it's good for their career. They --- they should not complain about it.

T.A. Rosolowski, PhD
[55:20.9]
Well, and you also have the benefit of achieving that so you can tell them the how. How do you do it.

Mien-Chie Hung, PhD
[55:26.0]
Yeah. And now, even when I help my junior faculty --- my own lab set up --- I have been here longer time --- set up takes some certain --- certain kind of special skill. I have my own priorities. But if my junior faculty, a certain person came in and they need that, I tell my people their project is higher priority than my project. Not every project, but at the very beginning, a couple of important projects. The reason is --- of course my --- my project is important. But one more paper or one less paper is not going to affect me a lot. But for junior faculty who just came to my department, in one --- first year, second year, third year, if they have a paper come out, people are watching. So I help them. They --- some of them know, some don't know it. But people in my lab know, when they come, I say, this project is higher priority than our project, the junior faculty. And they just come. And they need help, I want to help them to finish that so they can wrap up on the study and publish it. So in this way, the whole department can come up. So because I wear a department hat --- hat, I'm not wearing my own lab hat. Because for me, one more paper of course is better but for them, one more paper is different. If I have 400 papers, they have 20 papers, you --- you know what I'm saying? And also, they were new here.

T.A. Rosolowski, PhD
[56:45.8]
Right, absolutely.

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Mien-Chie Hung, PhD
[56:46.4]
They were new here.

T.A. Rosolowski, PhD
[56:47.8]
So it's --- it's really an investment in not only faculty members but the future of the department and the institution. It's huge.

Mien-Chie Hung, PhD
[56:52.0]
Yeah. So --- so --- so …

T.A. Rosolowski, PhD
[56:55.2]
And it helps with the culture, too. I mean, there are certain departments in which junior faculty do not get that kind of support.

Mien-Chie Hung, PhD
[57:00.0]
Yeah. Even --off the record-- we even have a department chair.

[The recorder is paused]

T.A. Rosolowski, PhD
[00:01.1]
Thank you. Can we go back on record?

Mien-Chie Hung, PhD
[00:01.4]
Sure, sure.

T.A. Rosolowski, PhD
[00:01.5]
Sure, okay. Okay, we're back on record after a --- a brief pause and Dr. Hung was talking about the mentorship …

Mien-Chie Hung, PhD
[00:07.6]
Yeah.

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T.A. Rosolowski, PhD
[00:08.2]
.. program.

Mien-Chie Hung, PhD
[00:08.9]
So --- so now the institution has lots of mentorship programs for junior faculty, which I think is good. But at the time when it started, I was surprised, why do we need that? So I thought it was the Department Chair's job.

T.A. Rosolowski, PhD
Okay.

Mien-Chie Hung, PhD
[00:20.9]
So, if you have good department chair, you don't need that. The department chair would mentor them. Then if you --- I cannot do it, I can get somebody to help. But not every department chair is doing that. And so there are some junior faculty in the wrong division and therefore not every student comes under the general rule. So every junior faculty who need a mentor --- a committee with two or three senior faculty in addition to the department chair. So I follow that. You see, I --- I am a --- the --- one of the faculty and issued this rule. I'll do it. But frankly speaking, my department probably don't think they need to do it because all my junior faculty are being well taken care of. But since that institution rule, so I do it in addition to my original commitment.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[01:06.5]
But I also formed a committee. So I fulfill the requirement for institution but, you know, it's a good anyway. I was shocked at the time when I heard that.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[01:16.7]
Pretty funny. Very funny.

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T.A. Rosolowski, PhD
[01:17:3
Well, different --- different cultures need different --- departments, for sure.

Mien-Chie Hung, PhD
Yeah. Very funny.

T.A. Rosolowski, PhD
[01:19.6]
Absolutely. What --- what is your plan, you know, your future vision for the department at this point?

Mien-Chie Hung, PhD
[01:29.9]
Now you know we have new leadership, you know, just changed two years ago, and there was some change and we're now having the Moon Shot project, right? I kind of like the concept of Moon Shot because it's Moon Shot, not because we are going to shoot the moon. It's because it would take the present candidates, the spirit, saying, within one decade we are going to be on the moon. But in one decade we're going to have a significant impact on the patient survival, right? So that's good. So this is a basic science department, and in last decade or so, we have been quite successful, although could be better. Now, to do translation, we work on basic scientist stuff and as I told you, every faculty has committed disease. So what I would like to see as a basic science department, Molecular Cell Oncology inside MD Anderson, is our molecular cellular level of cancer research --- cancer science or cancer cell signaling. We can be in the top -- in the nation. And we can --- not only the --- our basic science can be on the top, we can serve as resources to work with different clinical departments that --- to interact, to collaborate with them to help our faculty in my department, and also help a specific disease to unravel important discoveries in cancer research, and ideally could develop to using the Moon Shot concept to develop something to --- to make some impossible thing possible.

[03:13.3]
So this disease cannot be cured only because of our contribution --- not because we only --- because our contribution can help to make it --- this uncurable disease become curable, to make it --- use a serial marker, as a example, to ---to be able to predict which patient is going to have a recurrent cancer and then if they recur, what's the ___ **(0:03:33.2)** and those kind of … And the fun part now is because we know so much about what causes cancer, we have a lot of know --- knowledge at hand, compared to 20, 30 years ago. So if you apply that knowledge to clinical applications, there's just too many thing that we can do. Too many things. And if you have enough money, enough time, there are a lot ____ (0:04:00). And we don't even have to create a new drug. I think we discuss that ….

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T.A. Rosolowski, PhD
[04:06.8]
Yeah, we talked about that, yeah.

Mien-Chie Hung, PhD
[04:08.1]
And --- because we can just help identify the right patient for the right drug. Of course, sometime we still need to develop new drug. But, I'm just saying the knowledge we have now, without create new drug, we probably can do some sort of a very quick research that can benefit a lot of patients. And --- and until that saturated, then we need to create new drug, we create new drug. And in the future, my --- my dream is all this molecular cell, all this stuff that --- all this cancer diagnosis, you don't have to go to hospital, you go to CVS. Or --- it's --- it's most likely that's going to happen. Is that 10 year, 20 years or 30 years? And it's not impossible. That's why I love this Moon Shot concept. Moon Shot, we're not saying we're going to shoot the moon. We say that concept because of 1963, right? When he said we're going to shoot the moon, many people say, yeah, give me a break. But 19 --- what, -67, we did it. A decade.

[05:05.0]
Seven, no, '69, we were on the moon. So we said, within one decade, if we focus our research -- including even basic scientists like us have that concept, start to think about that. We don't have to be treating patients, but from our study, we can help the right patient to be treated with the right drug. That's going to have a significant impact on cancer survi --- patients. And then now, we --- we have 15 --- more than 15 million cancer survivors now. In the future, cancer will be a ___ disease.

T.A. Rosolowski, PhD
So what --- what do you think needs to happen to reach that --- that goal? That vision that you have?

Mien-Chie Hung, PhD
[05:46.5]
That's a good question. I sometime joke that cancer is different from 30 years ago, when you didn't know what causes cancer. And so, you try to understand it. But now, we have so much knowledge that we know what cause cancer, we know how to develop cancer drugs. If you put in enough money, get the right person to do it, then those thing can be shortened up a significant amount of time. So if I drew a curve, depend on --- if you put more money in, then – how to say that? If you see the cancer death rate and compare to the money you put it in, the more money put in you, the cancer death rate can be shorter. I think the curve should be like this. You put a lot of money here, then cancer death rates going decease. It going to depend on how much

money you're going to put in it. Of course, as a nation, as a society, you have some other thing to consider so how to balance that? Unfortunately, currently the NIH NCI funding are very limited, so it's going to slow down a little bit.

[06:59.6]
But now in the United States, we should be global. Because keep in mind, this is different from 30 years ago. When President Nixon announced that we don't know what causes cancer, we didn't know anything about cancer. We only knew --cancer, just don't talk about it. We didn't know what causes cancer. But now we know, and we can design drugs. Because of this person's cancer, because of this molecule. This person got cancer because of what reason? Then once you know the reason, you can design a drug, right. So, if you have enough money, you can really proportionally increase the survival rate. So I don't know whether I answered your question because I cannot come out with quantitation number. But it's all related to funding.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[07:43.4]
Look at NASA's project. Last week, I was in NASA…

T.A. Rosolowski, PhD
Oh, really?

Mien-Chie Hung, PhD
[07:47.8]
I took my family there. Because NASA, those are big projects. At the time when they wamted to shoot the moon, of course, you needed a big project. But right now --- but at that time, because the knowledge was there. Now, we are just like that. If you have enough funding, cancer management ____ 08:05. And I love the MD Anderson logos, say --- MD Anderson…… cancer, red color, cancer out. It's possible. I'm not saying next year, but step by step, cancer by cancer, certain type of cancer by certain type of cancer. It's going to happen. It's going to happen. I always like to use the number, 15 mill --- more than 15 million cancer survivor now

T.A. Rosolowski, PhD
[08:31.2]
It's amazing.

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Mien-Chie Hung, PhD
[08:31.9]
It's amazing.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[08:33.4]
Thirty years ago, terminal cancer, everybody talk wants to talk about it. _____**(0:08:36.1)** anyway. It's amazing. I think that number is going to increase again. So it's going to ____ disease. So then --- and that --- that should a human --- if that we reach that day, human beings should feel proud, you know, because the terminal disease, now it becomes, you know, manageable. Of course, by that time, you have some other disease come out so that how ….

T.A. Rosolowski, PhD
(Laughter)

Mien-Chie Hung, PhD
[09:02.3]
We have some disease which --- which we have not discovered yet or which has not happened yet.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[09:05.3]
Like a --- almost one decade when SARS came out …

T.A. Rosolowski, PhD
Ah…

Mien-Chie Hung, PhD
[09:10.5]
… bottom of scale. And because of the infectious disease. Luckily, cancer is not infectious.

T.A. Rosolowski, PhD
Yeah.

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Mien-Chie Hung, PhD
[09:15.5]
Luckily --- luckily. But is, you know, critical disease.

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Chapter 15
Vice President of Basic Research; The Institute for Basic Science
A: The Administrator;

Story Codes
A: The Administrator;
B: MD Anderson History;
B: Institutional Mission and Values;
C: Professional Practice;
C: The Professional at Work;
A: Character, Values, Beliefs, Talents;
B: MD Anderson Culture;
C: Leadership;
C: Portraits;
C: The Institution and Finances;
B: Philanthropy, Fundraising, Giving to MD Anderson;

T.A. Rosolowski, PhD
[09:20.7]
What about your appointment to Vice President for Basic Research in 2010? Tell me how that came about.

Mien-Chie Hung, PhD
[09:27.3]
Oh yeah. That --- that was --- at that time, I actually was having, say, a long debate with myself. It was kind about an offer by an institution to build a cancer center ____ 09:38. It was a big chunk of money like a 100 million behind that. So --- I --- that was very attractive leadership for me. But of course, that's different. That cancer center --- it's a ___ 9:51 cancer center but I --- I had to call other people. At that time, both John Mendelsohn and Ray Dubois --- John actually asked me to go his house, saying, we don't want you leave but you must have a reason then, you know. I said, I'm not looking for job, people just come to me. And then he said, you want to tell me about the work? What you would like to do to have more impact? So I ---I debated. I thought, if I ---- This institution, this a great institution. It is not easy to leave this institution. But at this institution, we have discussed that, there's only so many thing you can do here. Of course, when you go to another institution to have a leadership position, that's a different kind of --- how you say that --- no, you know, that's different kind of legacy, okay? So you have to think a different way. But John actually convinced me that, why not tell me you what you want to do and then we decide institution. Compare institutions. At that time, we had a Vice President of Translation Research, there's a vice president of clinical research. It's a ___ [0:11:00.5] booster. So, we are thinking, why not? Let's create a Vice President of Basic

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Research in fact. At that time, I was very _____ [0:11:08.3]. Do I want to spend more on the administration side or on the faculty research side? And part of the reason I didn't take that leadership position, is also --- if I took that leadership position in the cancer center ____ , I would probably have to be the majority in administration.
[11:25.0]
And so I thought, it's --- there's no right or wrong, it's just debating. So I --- I still want enjoy some in research and education, so why not stay in the institution as a Vice President, Basic Research? So I can help the Provost. At that time, when the Ray DuBois was Provost, he was overwhelmed. Now, his position has enough. But Provost and two Vice Provosts, by that time, only one person. And --- and John also told me that Ray needed help, too. So then, they created this position and I stayed --- that's why I'm still Department Chair because I --- at that time, choose to still run the labs to do research. **B**ut I can spend extra time to help institution to share my experience and to help my senior, my boss. So then, that work out really well. So a lot of my administration at that time and even now, too, is involved in the promotion of, you know, research excellence. For example, when we have staff recruitment [0:12:24.2]… Staff recruit, you know, staff recruit…[12:30.4] Outside, we give a pitch on money. All those things, we have to put a right package, right --- working with our, you know, administration office, design the portion, I have input on that. So I have been involved in a lot of recruitment, even at a time when Ron came here and when Ray was still here. And now, of course, there's some of the administration work when Ethan [Dmitrovsky (oral history interview)] came in and having time with some of the major work that they were doing. So I kind of more --- had more time to do research, actually I enjoy, too. So I still do some administration work, in particular for those for major recruitment and then some of the --- when Helen need help on, you know, when she's overloaded. So whenever she needs help with the research side, I help her to do it. But otherwise, right now, I probably more --- spend less time in the administration work but more in running the department …

[13:25.0]
… and, you know, back to as a Department Chair. But before Ray left, I had more administration work. But still, even at that time, I still want to maintain my faculty position. I --- I more ---- that's why my office. At the time when they move over there, they want me to move office there.

T.A. Rosolowski, PhD
Oh, yeah.

Mien-Chie Hung, PhD
[13:43.8]
I don't have office there.

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T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD:
[13:46.8]
Because I want to stay on this side. So I go there to help. So at that --- that actually worked out very well.

T.A. Rosolowski, PhD
[13:51.8]
What impact did you feel you had under Ray DuBois? And what do…

Mien-Chie Hung, PhD
[13:58.2]
Actually, at that time, I kind of felt good because Ray, before Ron come in, I worked with Ray very closely. Virtually every basic science activity, I'm involved. You know, the department, the evaluation and then --- so, I know kind of which department doing well and not doing well. I ____. A lot of stuff was kind of Helen's doing, I know. And --- and then I have input, and then if Ray could not do it, you know, I helped him to do it. So I don't really have real authority on --- in a lot of resource or things like that. But I'm involved in the discussion and involved in the policy decision and help the institution to promote basic science. And then…

T.A. Rosolowski, PhD
[14:51.1]
Can I --- can I ask you before we move on, I'm just curious. What --- what are some of the big --- because, you --- you know, part of the mission of the --- this project, interview project, is to kind of get a sense of the institution's evolution. So, what are some of the conversations or decisions you were involved with Ray Dubois that you felt were kind of landmarks for the institution?

Mien-Chie Hung, PhD
[15:14.2]
No, I remember the time when I was appointed, he and I were talking about it. Because one thing was very interesting that we should only recruit those who are better than us.

T.A. Rosolowski, PhD
[15:21.7]
What?

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Mien-Chie Hung, PhD
[15:23.1]
I said, better than me or better than you? That's what we need to recruit. And we started to use that concept to recruit good people. And, it's sometimes difficult to say who's better, but just concept-wise, we wanted to recruit. We didn't want to just recruit mediocre people. We didn't need --- we had enough people. We should --- I remember we sometime joked and said we should only recruit people who are better than you and better than me. And then when Ron came in the first year, we --- three of us actually all get together …

T.A. Rosolowski, PhD
And …

Mien-Chie Hung, PhD
[15:54.3]
… because Ron has a lot of ….

T.A. Rosolowski, PhD
[15:55.9]
You're talking about Ron --- Ronald DePinho?

Mien-Chie Hung, PhD
[15:56.2]
Yeah.

T.A. Rosolowski, PhD
[15:57.0]
Yeah.

Mien-Chie Hung, PhD
[15:58.4]
Remember when he came, and Ray DuBois overlapped one year. That year, we have --- Ron want to have a lot of recruitment. Major recruitment. At that time, three of us actually meet every two weeks ….

T.A. Rosolowski, PhD
Wow.

Mien-Chie Hung, PhD
[16:10.5]
… so I was involved in --- all the major recruitment. I don't do that anymore because now we

have, you know, after Ray step down, we have a new Provost and a new Vice Provost, and the substructure changed. So I --- I --- as I have mentioned, I come back to more in the Department Chair side, although I still do --- help Helen to do a lot of stuff. But more like on the recruitment. But that time, I'm involved virtually every day.

T.A. Rosolowski, PhD
[16:34.3]
So, what is Dr. DePinho's philosophy about basic sciences and its role here?

Mien-Chie Hung, PhD
[16:41.1]
Oh, she … No. Ron, he --- he --- he's by himself. He's a clinician but he can by himself, a very, very strong scientist. So when he came, actually, he brought another kind of revolution to a certain degree, that is, the high impact publication. He himself is a very strong role model. Role model is important. John Mendelsohn give us a different kind of role model. John Mendelsohn, he's a clinician. He's a good coordinator, gets things together and moves into clinical trial, develops new drugs, different clinical trials. But Ron DePinho himself, his laboratories are very strong as basic --- basic scientist, as a scientist per se. They publish --- his lab publish always in the top journals, *Nature*, *Science*, *Cell*, and then better than all faculty here. So, he serves as role model and so he --- when he came, he was starting to raise the bar. Which I think is important because MD Anderson is clinically very, very strong. Our science, it has become much, much better than before. If in the, you know, last two decades, I can see every five years, we are jumping up, right? But when Ron came in, certainly he had that capacity and his vision, he wanted to make it even bigger.

[17:58.7]
So on the basic scientist side, that I think that he does give us a very high standard and which _____ [0:18:03.8] for a science institution. So especially the focus on cancer science. We want to bring cancer science to the top, okay? And also because of his concept, for the Moon Shot concept for which he used the name "the Moon Shot" because to certain degree to say if somebody can do it, MD Anderson can do it. MD Anderson should be the right place to really say, we have so much resources and that's all focus --- and let's just not --- let's organize that. Just not have everybody doing your own onsite research. Let's organize that and then aiming say, in one decade, I would like to significantly reduce cancer death rates or cancer survivor rates and so that we have a real impact. So when he started with that concept, the Moon Shot concept --- of course, not everybody-- but I think the majority of people, many people include --- including myself, started thinking toward on that line. And then, indeed, we have --- as I mentioned, we have so much knowledge there. I want to discover another new drug. I can always help patients. It's just the patient. Used to be I always want to develop new drug --- develop new drug, but it's okay but you don't have to.

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T.A. Rosolowski, PhD
[19:20.8]
Yeah, interesting.

Mien-Chie Hung, PhD
[19.21.9]
Can be even faster...

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
[19:23.6]
using an existing drug. Because one drug here takes 20 years.

T.A. Rosolowski, PhD
[19:28.8]
It is a mindset shift.

Mien-Chie Hung, PhD
[19:29.7]
Yeah.

T.A. Rosolowski, PhD
[19:30.3]
Very interesting.

Mien-Chie Hung, PhD
[19:31.7]
And then, he used those terms like a low-hanging fruit, right? It's true. You know, low-hanging fruit, why do you to climb up, you know, to the top to get the fruit. Yeah, so I think --- so I think the institution now is in a new transition and I understand that, you know, hope that we understand, not you…

T.A. Rosolowski, PhD
Let me turn off the recorder.

[The recorder is paused.]

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T.A. Rosolowski, PhD
[0:00:02.6]
Okay, so we're recording again. And we've been off record for about eight minutes. It is twenty-eight minutes after eleven.

Mien-Chie Hung, PhD
[0:00:10.8]
So, the issue of Basic Science following, that one is more like rotated. So the …

T.A. Rosolowski, PhD
[0:00:15.5]
So this is the Institute for Basic Science.

Mien-Chie Hung, PhD
[0:00:17.1
Yeah. Okay. So let me give the background. So this is --originally when John Mendelsohn, before he retired-- he actually has a very long-term --- only half a year. Once a month, we --- all the leaders joined together to discuss the future of MD Anderson. So there's some strategical planning. And in the strategic plan, we created several in the basic science portion --several centers. And I was one of the center directors, for the Center for Biology pathway --- and there are several centers there. And among these several centers, for fundraising purposes, it is better to put all these basic science centers into an Institute of Basic Science. Just like ____ 0:00:59 …

T.A. Rosolowski, PhD
[0:01:01.2]
Interesting.

Mien-Chie Hung, PhD
[0:01:02.9]
And then on South Campus, there are several institutes. They have been very successful at fundraising. Traditionally, basic sciences don't really have much fundraising. Then there were a lot of times we --- I think it's six or seven centers joined together and called --- it's the Institute of Basic Science. And that Institute of Basic Science that --- then among all these center directors, we discussed, we just kind of --at the very beginning, I think Sharon Tinn**?** [phonetic] 0:01:24.7 was the first [Institute] director. And I believe it was for one year. And after that, we said, well, why not just vote and then take turns?

T.A. Rosolowski, PhD
[0:01:35.1
Now, it was established in 2008, correct?

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Mien-Chie Hung, PhD
[0:01:38.3]
Yeah.

T.A. Rosolowski, PhD
[0:01.39.0]
Okay.

Mien-Chie Hung, PhD
[0:01:40.0]
And I think the first director was Sharon Tinn **(0:01:41.0)**, and then I was the second director. But after I was the second director, I also happened to be Vice President of Basic Research. And also it happened that the presidency was open for search, all closed that time.

T.A. Rosolowski, PhD
[0:01:54.1]
Oh, okay. Yeah.

Mien-Chie Hung, PhD
[0:01:56.7]
So at that time, Ray [DuBois] told me, why not --- why not just stay there? First --- I'm Vice President of Basic Research, right? Second, we're going to change leadership soon. So --- we didn't want a change so Ray told me, why not stay there for a --- for a period of time? I think I stayed there for --- in the Institute of Basic Science directorship for quite a few years.

T.A. Rosolowski, PhD
[0:02:24.9]
Yeah, it was --- I have until 2013. Does that make sense?

Mien-Chie Hung, PhD
[0:02:28.1]
That's four --- yeah, probably it was four, five years.

T.A. Rosolowski, PhD
[0:02:29.4]
Yeah.

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Mien-Chie Hung, PhD
[0:02:30.4]
Maybe not that long --- maybe, so from 2009 to ----. Anyway, so four, five years. So I served in that capacity and tried to coordinate all these multiple center together.

T.A. Rosolowski, PhD
[0:02:38.2]
Now, the centers, I'm not sure if I've got them all. There is Biochemistry and Molecular Biology, Immunology, Genetics, Carcinogenesis, Cancer Biology, and Molecular and Cellular Oncology.

Mien-Chie Hung, PhD
[0:02:51.6]
Yeah. All these department all have a center.

T.A. Rosolowski, PhD
[0:02:53.6]
Okay, okay.

Mien-Chie Hung, PhD
[0:02:54.9]
All have center.

T.A. Rosolowski, PhD
[0:02:56.9]
So now --- I ac --- actually, I didn't realize that these institutes were really fundraising organs.

Mien-Chie Hung, PhD
[0:03:02.3]
No, this is --- to a certain degree, yes. But this institute is a virtual institute.

T.A. Rosolowski, PhD
[0:0:03:06
Okay.

Mien-Chie Hung, PhD
[0:03:08.5]
It's virtual, it's not like that there's a building there. It's all the center … but the center --- the institution gave the center a different kind of a research funding to help them to --- to promote science.

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T.A. Rosolowski, PhD
[0:03:18.6]
Okay.

Mien-Chie Hung, PhD
[0:03:19.2]
And --- and that's why, you know, remember when I told you that when I served as a basic research vice president, my role was to promote basic science. So that's part of the activity.

T.A. Rosolowski, PhD
[0:03:26.3]
Okay.

Mien-Chie Hung, PhD
[03:27.2]
Although this institution is basic science historically, it's come from there. And therefore, after Ray left – I think it was last year – we did --- we decided to go back to the old system. So we voted again. So now, Gigi is the Institute of Basic Science Chair.

T.A. Rosolowski, PhD
[0:03:48.2]
I --- I'm sorry, her …

Mien-Chie Hung, PhD
[0:03:48.7]
Gigi Lozano.

T.A. Rosolowski, PhD
[0:03:49.9]
Oh, Lozano.

Mien-Chie Hung, PhD
[0:03:51.0]
___. And then we decided --- at that time originally, it was a one-year term, but now it's a two-year term. So --- so he will be off next year. And then next year, we're going to --- all the centers are going to vote and --- who can serve with that. So, the Institute of Basic Science directorship is more like --- to help all these centers work together and promote basic science interaction. And now, with Helen here --because the administration brought a new structure. This pretty much all under Helen now. Because Helen is the Vice Provost of Sciences so all the

are basic sciences under her, you know. So institution does not really have a division of basic science. So Helen is more like --- now is the head of the division of ____ [0:04:33.1]. We didn't form that structure, but is more like that now. So all the basic science department chairs report to Helen. And each of the basic sciences is slightly different. It's all in the center which pretty much --- and called by a specific department. And the center, that's for fundraising purposes. And then --- with the center director, we kind of get together, communicate and then vote to have somebody to be the leader and communicate with the upper level.

T.A. Rosolowski, PhD
[0:05:00.7
And what --- what effects have you seen from that? I mean, how has --- you know, what's the evidence that you have, in the sense that this communication is really helping …

Mien-Chie Hung, PhD
[0:05:10.2]
I think because many basic science departments here --- I don't know whether it's appropriate word to say that. Because for example, I told you my department --- I encourage faculty to commit to a disease. But some basic science departments are still very, very basic. They --- their interaction with the clinical departments is limited. Although they are --- becoming more and more interactive now. So, this Institute of Basic Science is more like it, too. Among basic scientists, they join together to see whether basic scientists should also work together to enhance science.

T.A. Rosolowski, PhD
[0:05:41.5]
Interesting.

Mien-Chie Hung, PhD
[0:05:42:0
Yeah.

T.A. Rosolowski, PhD
[0:05:42.3]
Okay.

Mien-Chie Hung, PhD
[0:05:43.3]
Because otherwise, our basic science departments still don't really have a --- they are different from clinical divisions. A clinical division is Surgery. Breast Medical --- the --- Cancer Medicine, they are under that division, all those different departments work together. But basic

sciences are pretty much on their own. It used to be the Basic Science Chair just reported to the Provost directly. But in the clinical division, the department chairs report to the division head, the division head reports to the Provost. So, the basic science chair reports to the Provost directly. So the Institute of Basic Science is more like a try to at the ---- the historic reason is for the Institute is fundraising. But then, ____ (0:6:25.1) because all these center directors get to together, they discuss how can we interact with each other. So we have actually run a few joint retreats to enhance interaction and cooperative.

T.A. Rosolowski, PhD
[0:06.35.8]
What is that? How is that ….

Mien-Chie Hung, PhD
[0:06:36.7]
Joint retreat. Because …

T.A. Rosolowski, PhD
[0:06:37.5]
Yeah.

Mien-Chie Hung, PhD
[0:06:38.0]
… these are all different centers, all from different departments. So they are different --- kind of like very different, right? So we say, okay, how about once a year we join together and we have a theme. And then, have a joint retreat. So, each center has a couple of people representing the center to present what kind of science they are doing. Because all of the basic sciences come from different expertise. Like, my center of my department is more like molecular cell biology --- biology part-way. And metastasis from Josh Fidler --that metastasis --- _____ genetic ____ [0:07:09.4]. So --- so people with different kinds of expertise join together to discuss to enhance cooperation. And then in a way, it's similar to how we try to interact with a clinical department. Clinical departments --- among clinical departments, they have a different disease sites. But let's say with each center, each department, we also interact with the clinical department. But inside of basic science department, we also have different expertise – biochemistry …

T.A. Rosolowski, PhD
[0:07:34.7]
Right.

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Mien-Chie Hung, PhD
[0:07:35.1]
… genetics, molecular cell biology, right? With all different expertise. But, Institute of Basic Science is to coordinate this so that we can work together to enhance collaboration, interaction, too. So, the Institute of Basic Science --this kind of concept is pretty common in many other regular campuses. But here, we originally were more emphasized on basic science interaction with clinical departments. The Institute of basic science was also more to help all the basic science centers and departments also interact with each.

T.A. Rosolowski, PhD
[0:08:05.3]
Interesting.

Mien-Chie Hung, PhD
[0:08:05.7]
Yeah.

T.A. Rosolowski, PhD
[0:08:06.06
What's been the impact on fundraising? And why traditionally has it been difficult to do --- or not --- or why has it not been traditional to do fundraising for the basic sciences?

Mien-Chie Hung, PhD
[0:08:15.9]
Yeah, because we have a very strong Development Office here. And obviously, the upper level has, you know, some direction they want to go in, for example, fund raising for the Moon Shots.

T.A. Rosolowski, PhD
[0:08:27.9]
Right.

Mien-Chie Hung, PhD
[0:08:29.4]
And then, at the time when John Mendelsohn was here, he was fundraising for South Campus and all those different institutes. So --- so, those are big projects. Of course, you know, every faculty sometimes have their individual connections and they also can do individual fundraising but those are on a small scale. So, I believe this is probably the --- the first time the basic science has large scale fundraising. And, because, you know --- can we off the record?

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T.A. Rosolowski, PhD
[0:08:56.7]
Sure.

[The recorder is paused.]

T.A. Rosolowski, PhD
[0:00:00.6]
To …

Mien-Chie Hung, PhD:
Sure. Sure.

T.A. Rosolowski, PhD
[0:00:01.7]
Share the numbers. So okay we're back after about a four minute pause. And so I wanted to ask you, Dr. Hung, how successful has the Basic Science Institute been in raising

Mien-Chie Hung, PhD
Okay.

T.A. Rosolowski, PhD
--- what's --- how much money has been raised?

Mien-Chie Hung, PhD
[0:00:15.4]
Okay. So at this moment I may not know how much money was raised, but, however, as I told you this is the first very large scale …of Basic Science Center and getting together departments --- and --- and becoming an Institute for Basic Science. At that time, based on the strategic plan a --- we were aiming at $50 million to $70 million.

T.A. Rosolowski, PhD
[00:40.9]
This is 5-0 and 7-0 right, not 15 and 17.
00:44.6]

Mien-Chie Hung, PhD
[00:44:5
Yeah, it is 5-0 and 7-0 mill ---

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T.A. Rosolowski, PhD
Okay.

Mien-Chie Hung, PhD
Of course this is talking about in a long term. And to build up a very, very, very strong basic science program. But the Institute---- that was a vision of strategic plan at the time when Dr. Mendelson was president. Now we have a change in leadership and the institution may have a different kind of a --- a --- a --- a direction now. So that is still there. But in terms of fundraising priority, whether this is still the highest priority for the Development Office that I don't know. Probably in the Provost's and President's Office, and certainly now in the Science institute we have a very large Moon Shots which are likely --- I --- my understanding is they would be probably the highest priority. However, at least on record, that to support the Basic Sciences with very strategically and then to come out with this kind of large number, I believe this is the largest one.

T.A. Rosolowski, PhD
[01:49.3]
Wow. That's amazing
01:49.7]

Mien-Chie Hung, PhD
[01:49.8]
Although I could be wrong, though, but I believe it is the largest one.
01:51.9]

T.A. Rosolowski, PhD
[01:52.0]
Now I'm curious what --- what was your strategy to convince people to give to

Mien-Chie Hung, PhD
For Basic Science?

T.A. Rosolowski, PhD
[01:59.1]
Yeah, for Basic Science.

Mien-Chie Hung, PhD
[01:59.2]
It won't be d --- it won't be difficult.

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T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
For example, like is --- the one I told you --- we --- we do **____ ____, right? 02:03.0** Just using myself. By identifying this **____ ____ 02:08.2** pathway to predict response to a specific anti-cancer drug.

T.A. Rosolowski, PhD
Okay.

Mien-Chie Hung, PhD
[02:15.3]
So that's one right away.

T.A. Rosolowski, PhD
[02:15.8]
So it's very concrete.
02:15.9]

Mien-Chie Hung, PhD
[02:16.8]
Oh yeah --- yeah. And then
02:17.0]

T.A. Rosolowski, PhD
[02.17.1]
Very patient related.
02:18.1]

Mien-Chie Hung, PhD
Oh yeah --- yeah --- yeah.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
Because when we do fundraising we always have the patient --- because that's in --- technical that's also more easier to fund, to run basic science.

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T.A. Rosolowski, PhD
Sure.

Mien-Chie Hung, PhD
Yeah. Because those people who come to MD Anderson to donate it's not --- it's very different from those people who go to Harvard or MIT to di --- to donate.

T.A. Rosolowski, PhD
Oh, I didn't realize that.

Mien-Chie Hung, PhD
No because they are all cancer oriented. If they say, oh, I'm interested in supporting your basic concept on, you know, to develop a --- some sort of engineer something --- they're not coming to MD Anderson.

T.A. Rosolowski, PhD
Gotcha.

Mien-Chie Hung, PhD
And many of them are patients themselves or a patient relative or some sort of organization interested in cancer. So --- and all our research is related to cancer directly or indirectly. So it won't be difficult for us to link to cancer per se. It's --- It's not difficult at all. We do that all the time. And we can even use lay terms to --- to talk about it. For example we study some serial markers, and to study why this serial marker is higher in cancer patients and lower in other patients, and then understand what the mechanism is. But that --- the serial marker by itself may be a therapeutic target. And that serial marker by itself may be a predictor for a specific anti-cancer drug. And so that's very patient related.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
So it won't be difficult

T.A. Rosolowski, PhD
Yeah. Very interesting.

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Mien-Chie Hung, PhD
[0:03:35.7]
It won't be difficult.

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Chapter 16
Leaving a Legacy in Research, Education, and MD Anderson Culture
A: View on Career and Accomplishments;

Story Codes
A: Contributions to MD Anderson
A: Career and Accomplishments
A: Professional Values, Ethics, Purpose
B: MD Anderson Impact
B: Institutional Mission and Values
B: MD Anderson Culture

T.A. Rosolowski, PhD
[0:03:35.7]
We've got about 15 minutes left and, you know, I want to ask you what --- what you would like to say at this point. I mean

Mien-Chie Hung, PhD
Well…

T.A. Rosolowski, PhD
We could probably sit down for another hour or so, I don't want to

Mien-Chie Hung, PhD
Sure. I..

T.A. Rosolowski, PhD
[0:03:55.1]
Impose on your time.

Mien-Chie Hung, PhD
[0:03:55.4]
--- I first I will say thanks for coming and then I do enjoy my --- you know, talking to you and because a lot of stuff, as --- as you said, when I talk to you I don't prepare. I just inform you, my friend.

T.A. Rosolowski, PhD
Sure.

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Mien-Chie Hung, PhD
You know, re --- right away I say. And at the very beginning we talk about it all day --- I almost forgot it --- its --- its very touching for me to think about that. And if I'm thinking about our --- our future, I personally have to say that I say this because I do feel it. I was benefitted by working at MD Anderson so long. At the time when I looking for job --if I came to Anderson or if I went to other place, if you asked me do I regret coming to Anderson, no. I'm so happy I accepted the job and I'm so happy I've stayed here 28 years. And because I have been benefited by this great institution and all the colleagues here --the best doctors in the cancer area --and by knowing them I feel honored. And by knowing them I can pick out the important clinical questions so that we can use our basic science knowledge to help --- to contribute. And by no means directly cure a patient per se, but contribute to that direction. And we do have a significant contribution. And I feel I have been very honored to be able to do that. At the time when I was student as a basic scientist --I'm thinking about remember I talked _____ ____ [0**:05:13.4].** I mean thinking about that, but thinking is one thing and here I --- make me feel I am really part of team. I'm the Moon Shots Women's Cancer leader, right? I'm part of team too. I'm --- the patients, say I'm not a physician. I'm not --- I cannot see pat --- patients but the stuff we're doing does help them. And I feel this is very meaningful. And as a basic scientist I can enjoy my basic science and still have this kind of a --- a impact on a patient. And well, I watched my mom pass away, but when --- I told you when my mom stayed with me I talked to her about basic science. She doesn't understand, but when I talked to her while my preclinical trial de – development drugs, devel --- animal tumors and then curing the animal and then we are going to move to humans, then she understands.

T.A. Rosolowski, PhD
Yeah.

Mien-Chie Hung, PhD
And she thinks that's important. And I feel the same too. And the nice thing in --- this institution, is not only is it all cancer oriented, even for fundamental sciences we --- we don't forget our fundamental sciences. The last story I share with you, this nuclear EGF receptor which is totally out of box which is, how do you say that? Yeah it's out of box because it's --- it's anti-science dogma. But science is science and when we see that we can stay and we can continue to do it and contribute to the understanding of nature. I just feel this place is a wonderful place. And I've been so lucky being in this place for 20 years and then I'm going to continue to stay and I will probably not retire because if I retired, I don't know what I'd do. But, if I --- I was forced to retire I would retire but not retire. You know what I'm saying.

T.A. Rosolowski, PhD
[0:06:55.5]
What --- What legacy do you feel --- would you like to be known for? How do --- How --- when

you finally do retire, if ever, how do you want people to think about you and what you've done at this institution?
0:07:07.8]

Mien-Chie Hung, PhD
[0:07:08.1]
I actually never thought about that. It's a good question. So I have always been thinking about how to move ahead, move ahead, move ahead, move ahead. But I never thought about the legacy issue. Say, by the time I'm at the end of life, what I want to be recognized. I wish our research outcomes indeed not only contributed understand nature but could really benefit cancer patient. And that's the hope of what MD Anderson is about. And on top of that I --- I run a ____ ____ [0:07:43.8] lab. Running a la --- very large lab is much more labor intense, much more --- yeah, you have to do fundraising and certainly you have to spend time. And part of the reason I like to run a large lab is not just because I want to run --- run the large lab. When I say large lab of 40 to 50 people. It's for scientific productivity. It may not be the most productive way in terms of your personal recognition. But part of the reason to run such a lab, big lab is because I want to do a couple things. In teaching the research, I feel education is important. And I do not just say, people come to my lab, just come to do research, publish good papers, publish good --- good outcomes. However, if somebody, for example some physician who doesn't have research experience, they want to come here to train.

They may not be the best scientist but they train. After they, after a couple years they gain the knowledge. When they back to their clinical work --it's either inside the United States or they go back to other countries, their knowledge helps them be able to apply the --- the knowledge to the patient or to interact with other scientists to develop some other stuff. So for the education purpose that's important. And for me to train PhD students, train post doc fellows --it's probably my personality. I just enjoy it. And also I think, to train the next generation of scientists. It's critical for --- ____ which field [0**:09:18]** not only cancer. I told my trainee that today you are working in the lab because we are all focused on cancer but you are young. They are 20 or so year old kids --- well not kids. But in the future they may not work on cancer. They may work on aging. They may work on Alzheimer's disease, they may just work on, you know, whatever. But that's how science develops. And the --- the knowledge you learn from cancer re --- related research certainly can apply to something else.

T.A. Rosolowski, PhD
Right.

Mien-Chie Hung, PhD
[0:10:18.7]
And so I enjoy a lot of that. So I h --- I like to see I myself , my lifetime contribution to science

not only being --- our research outcomes to benefit patients and then to advance cancer science and certainly basic science. And I also feel very honored to train a lot of young, you know, scientists and the --- and the clinicians. Because I --- at the very beginning, they come to learn but at the end I learn from them. I learn from them both in the science and how to behave.

T.A. Rosolowski, PhD
To behave.

Mien-Chie Hung, PhD
And this institution is a great institution. At the time when I came here in 1986, MD Anderson wasn't the number one Cancer Center --- but --- nu --- number two. But num --- number is not just number two per se. MD Anderson was not as well known. But after 20 years we are number one all the time and even our PhD program, I told you, right? Our PhD program --- our Cancer Biology Program was the number two in the nation. And you cannot imagine Texas has a num --- a PhD program that is number two in nation. And our number two was together with Harvard, Stanford, and Johns Hopkins. That's almost impossible for me to believe 20 --- 20 --- 28 years ago. And of course certainly we are part of it and we contributed and we are proud of. And this institution continue to be a great institution.

T.A. Rosolowski, PhD
[0:11:17.5]
Is there is anything else you'd like to --- to add at this point?

Mien-Chie Hung, PhD
[0:11:22.8]
Not in particular. I just kind of enjoyed talking to you.

T.A. Rosolowski, PhD
[0:11:25.9]
Yeah. I enjoyed talking to you too. Well, thanks very much. It's been fun.

Mien-Chie Hung, PhD
[0:11:29.8]
Well. Thanks for coming.

T.A. Rosolowski, PhD
Yeah.

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Mien-Chie Hung, PhD
[0:11:35.8]
And I hope your --- if when you come out to do some of the stuff you want me to --- check --- check --- check accuracy, I will be happy to.

T.A. Rosolowski, PhD
[0:11:36.1
Yes. Yes. Well you'll get a copy of your transcript so that you can check all that stuff.

Mien-Chie Hung, PhD
[0:11:40.6]
I --- I --- I can mention that the --- the stuff --- that come out either in the future will become a book or some sort of website in the institution.

T.A. Rosolowski, PhD
[0:11:47.1]
Yeah, it's going to be available on…

Mien-Chie Hung, PhD
[0:11:48.2]
And it might turn out to be a book.

T.A. Rosolowski, PhD
[0:11:49.7]
Yeah it could. It could.

Mien-Chie Hung, PhD
[0:11:51.0]
It might turn out to be a book.

T.A. Rosolowski, PhD
[0:11:51.8]
Yeah. I'm sure will be used by scholar's writing all kinds of things.

Mien-Chie Hung, PhD
Yeah.

T.A. Rosolowski, PhD
[0:11:56.4]
Well I'm turning off the recorder at 11:57. Thank you again Dr. Hung.

Interview Session: 03
Interview Date: Aprul 21, 2014

Mien-Chie Hung, PhD
[0:12:02.4]
Okay. Thanks for coming and I --- I enjoyed talking to you.