

Cinema Seminar as a guidance resource in the election of undergraduate dissertation in the subject of physiology

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Summary

Physiology, in the medical and other health sciences or experimental degrees, is one of the subjects with more variety of themes that a student can choose for the development of his undergraduate dissertation. The complexity of the syllabus, together with the disorientation to the lack of ideas, incapacitates the students to choose their project. As a main objective, the development of a seminar using the Cinema as an auxiliary tool would help to guide in the choice of an initial idea of the whole physiology syllabus. The review of each theme, or specific thematic block, would be linked to the visualization of short film fragments (30 seconds - 3 minutes) that would reflect a crucial moment of different physiological states of an individual. The transition of topics should be paused to opt to comment or reflect on aspects and ideas. A template with different options per unit helps to mark the most valued aspects. From the conclusions obtained, a final summary of the assimilated allows to obtain a previous idea of a possible chosen theme. We can assure that the Cinema offers the students a useful experience for the resolution of conflicts after acquiring knowledge, thinking skills, attitudes and values.

Keywords: undergraduate dissertation; physiology; cinema; medicine; orientation.

Seminario de Cine como recurso orientativo en la elección de Trabajo Fin de Grado en la asignatura de Fisiología

Resumen

Fisiología, en los grados de Medicina y otras ciencias de la salud o experimental, es una de las asignaturas con más variedad de temas que puede optar un alumno para el desarrollo de su trabajo de fin de grado. La complejidad del temario, junto con la desorientación ante la falta de ideas, incapacita al alumnado para la elección de su proyecto. Como objetivo principal, el desarrollo de un seminario empleando el Cine como herramienta auxiliar ayudaría a orientar en la elección de una idea inicial de entre todo el temario de fisiología. El repaso de cada tema, o bloque temático específico, estaría vinculado a la visualización de fragmentos cortos de películas (30 segundos - 3 minutos) que reflejarían un momento crucial de diferentes estados fisiológicos de un individuo. La transición de temas debe ser pausada para optar a comentar o reflexionar sobre aspectos e ideas. Una plantilla con distintas opciones por unidad ayuda a marcar los aspectos más valorados. De las conclusiones obtenidas, un resumen final de lo asimilado permite obtener una idea previa de un posible tema electo. Podemos asegurar que el Cine brinda al alumnado una experiencia útil para la resolución de conflictos tras la adquisición de conocimientos, habilidades de reflexión, actitudes y valores.

Palabras clave: trabajo fin de grado; fisiología; cine; medicina; orientación.

The author's state that this article is original and has not been previously published.

Introduction

Guyton and Hall already explained that the goal of physiology is to explain the physical and chemical factors responsible for the origin, development and progression of life¹. Therefore, in human physiology tries to explain the specific characteristics and mechanisms for the functioning of the organs and tissues of the human body. The extension of the syllabus makes the physiology, as a subject per se, a rather complex discipline for those students who decide to do their undergraduate dissertations (UD). The choice of a topic for UD must be appropriate and that, in turn, motivate the students. It can try on a subject that they dominate and want to know more or, failing that, they do not know but attract them because of their relevance in the present and the evolution they have experienced. Otherwise, the process of UD developing will be tedious, encountering a multitude of difficulties that will be difficult to resolve. The reality is that unfortunately many students are not clear about the idea of their final work, either by indecision or apathy, and decide to accept the projects of the lines of research offered by their tutors. A low involvement in the UD reflects a misconduct or lack of interest on the part of the students, when really a good UD can be an excellent letter of introduction to the working world or, on the other hand, the entrance to a new line of investigation that will culminate in a Master's or doctoral thesis.

The UD should be the academic result of everything learned, assimilated and understood on the curriculum subject, to be able to project it into something concrete. In short, the UD demonstrates the maturity and skills acquired throughout their training. The problem that most complicates the student is not finding the specific questions: 1) what is wanted to investigate, 2) who has done it, 3) what conclusions they obtained, 4) where I start and what I contribute in a differentiated and novel way, 5) how I investigate. The tutor plays a crucial role here in guiding students to give clues and focus on various work possibilities. In this work, cinema is used as an "aid" tool. The realization of a seminar that integrates the whole physiology theme adapted to the Cinema helps and stimulates all students interested in performing a UD in Physiology Unit.

Cinema as a resource for choosing an UD

The cinema offers a narrative experience that educates the viewer emotionally and sentimentally. Within medicine, the use of cinema has a high educational power to teach students about a variety of

subjects². As in other disciplines of medicine^{3,4}, we can consider that each thematic block of the subject of physiology can be analyzed through a wide cinematographic production that would provide sufficient resources to elaborate different materials, from a UD to a thesis of master or doctorate.

Given their ability to reflect the different facets of the disease, films or their sequences can be useful in teaching to illustrate clinical issues of the disease, research (stages of planning, obtaining and analyzing data), presentation at conferences or congresses (oral and written communication), aspects of ethics (conflict of interest) and work in interdisciplinary teams, among others. In addition, throughout the academic career, most medical students have rarely had occasion to contact patients with special characteristics, such as, for example, the so-called rare diseases. A previous contact with this reality can be approached from the hand of the Cinema. The visualization of these patients in an environment that simulates reality involves more the future doctor to empathize with them, to understand them and to reflect more on their pathology (origin, cause and treatment). On the other hand, cinema is also useful among students because they develop intercommunicative skills and create debates on ethical issues^{3,4}.

In this work, we detail a complete filmography linked to the teaching imparted in the subject of physiology, divided by thematic blocks, which allows to generate a manual to help undecided students, or with unclear ideas, in the development of a line of work for their academic projects.

Material and methods

The great potential that films display as a vehicle in medical education is evidenced by the diverse methodology applied in numerous publications^{5,6}. This paper describes a qualitative methodology with an unconscious self-learning format, consisting of a seminar in a tutorial for undergraduate medical students (it can also be applied to any academic discipline). The session, approximately 90-120 minutes, consists of the demonstration of short film fragments (30 seconds to 3 minutes) by theme or thematic block (Units) of the subject of physiology. The films shown (Table 1) are identified by the syllabus followed in the degree of medicine of the University of Cadiz. The films selected are intended to arouse interest in the audience, to "enlighten" certain points, and to alleviate academic stress. The films related to the content of the physiology

were obtained from bibliographic sources^{4,7} and specialized websites (www.allmovie.com, www.imdb.com, www.filmaffinity.com). Different indicators and codes within the table allow the identification of those films with a marked plot in the character of the clinic (C), basic science or research (I), and / or bibliographical (B). In any case, the student can acquire the knowledge and transfer it to fit his own needs to perform a UD on a clinical film, it is not necessary to work on something clinical, can be molded with bibliographic data or studying a research model that carry out results on the chosen project. On the other hand, in the filmography is represented if the theme explained within the film is found throughout the plot (TOTAL: film based on that theme) or at a specific moment (PARTIAL: film without direct relation to the theme).

The teacher gives a survey (Table 2) where the student will mark certain options while participating in the seminar. Small pauses are made to take notes, clarifications, reflections, or discussions between students/teacher during the transition of each theme viewed. The ideas and reflections aloud from workmates help the remainder to remain attentive, to be more

receptive to capture the maximum possible information, and to build associations between the physiological concepts and the different conditions of clinical, investigating or bibliographical study. This implies that with each evaluation arise new hypotheses, more debates and lines of research.

At the end of the session, under the survey, the student has the obligation to work on a final abstract to analyze the film, or films, selected as the most interesting topic, as a central component and strategic purpose in the approximation of his ideas. This summary must be delivered within one week, with an oral presentation of the topic he wishes to discuss for ten minutes.

This list in Table 1 shows the films highlighted for the performance of each unit in the subject of physiology. Undoubtedly some relevant films will not be referred to in this list due to the complexity of the syllabus and the extensive filmography, along with the need to standardize and not overstep in the orientation time of the seminar, thus avoiding the physical and

Table 1. Selected films.

UNIT 1: Introduction to Physiology: Cell and General Physiology				
THEME 1: Functional organization of the human body and control of the internal environment				
THEME 2: The cell and its functions				
THEME 3: Genetic control of protein synthesis, cell functions and cell reproduction				
Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Osmosis Jones</i> (2001)	1,2 (Homeostasis)	C	Total	http://imdb.to/2wSdimU
<i>Godsend</i> (2004)	2,3 (Cell and Gene Manipulation; Cloning)	I	Total	http://imdb.to/2wE4QIE
<i>The Immortal Life of Henrietta Lacks</i> (2017)	3 (Cáncer; Tumor Cell Line)	I/B	Total	http://imdb.to/2uAxxh5
UNIT 2: Physiology of the membrane, nerve and muscle				
THEME 4: Transport of substances through cell membranes				
THEME 5: Membrane Potentials and Action Potentials				
THEME 6: Contraction of skeletal muscle				
THEME 7: Skeletal muscle excitation: neuromuscular transmission and excitation-contraction coupling				
THEME 8: Smooth muscle excitation and contraction				
Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Osmosis Jones</i> (2001)	4,6,7 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>Foreverland</i> (2011)	4 (Cystic fibrosis; Mutation chlorine channel)	C	Total	http://imdb.to/2wSsock
<i>Alex: The Life of a Child</i> (1986)	4 (Cystic fibrosis; Mutation chlorine channel)	C	Total	http://imdb.to/2hVTfb1
<i>The Fundamentals of Caring</i> (2016)	5-8 (Muscular dystrophy)	C	Total	http://imdb.to/2uyE7jt
<i>Frankenstein</i> (1931)	5,7 (Electrophysiology)	I/B	Parcial	http://imdb.to/2uBhUgJ

Table 1. Selected films (cont.).

UNIT 3: The heart
THEME 9: Cardiac muscle: the heart as a pump and the function of the heart valves
THEME 10: Rhythmic excitation of the heart
THEME 11: Normal electrocardiogram
THEME 12: Electrocardiographic interpretation of cardiac muscle abnormalities and coronary blood flow
THEME 13: Cardiac arrhythmias and their electrocardiographic interpretation

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Fantastic Voyage</i> (1966)	9 (Heart)	C	Parcial	http://imdb.to/2fBbKui
<i>Osmosis Jones</i> (2001)	13 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>Flatliners</i> (1990; 2017)	10-13 (Cardiac arrest/ electrocardiogram)	C/I	Total	http://imdb.to/2vwUWIL ; http://imdb.to/2vtg4kP

UNIT 4: The circulation
THEME 14: Overview of circulation, biophysics of pressure, flow and resistance
THEME 15: Vascular distensibility and functions of the arterial and venous systems
THEME 16: Microcirculation and lymphatic system: exchange of capillary fluid, interstitial fluid and lymphatic flow
THEME 17: Local and humoral control of blood flow by the tissues
THEME 18: Nerve regulation of circulation and rapid control of blood pressure
THEME 19: Dominant role of the kidneys in the long-term control of blood pressure and in hypertension
THEME 20: Cardiac output, venous return and its regulation
THEME 21: Muscular blood flow and cardiac output during exercise
THEME 22: Heart Failure
THEME 23: Heart valves and tones; Valvular and congenital heart disease
THEME 24: Circulatory shock and its treatment

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Osmosis Jones</i> (2001)	16,22 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>Fantastic Voyage</i> (1966)	14,20,23 (Generalized Circulation)	C	Parcial	http://imdb.to/2fBbKui
<i>Flawless</i> (1999)	22 (Embolism and treatment)	C	Parcial	http://imdb.to/15KDXoy
<i>The Secrets</i> (2007)	22 (Heart failure)	B	Parcial	http://imdb.to/2vtbXoJ
<i>Something The Lord made</i> (2004)	22,23 (Blue Babies, Tetralogy of Fallot)	C/B	Total	http://imdb.to/2uyrncs

UNIT 5: Body fluids and kidneys
THEME 25: The compartments of the body liquid: extracellular and intracellular fluids; edema
THEME 26: Formation of urine through the kidneys: I. Glomerular filtration, renal blood flow and its control
THEME 27: Formation of urine by the kidneys: II. Reabsorption and tubular secretion
THEME 28: Concentration and dilution of urine; Regulation of extracellular fluid osmolarity and sodium concentration
THEME 29: Renal regulation of potassium, calcium, phosphate and magnesium
THEME 30: Basic Acid Regulation
THEME 31: Nephropathies and diuretics

Table 1. Selected films (cont.).

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>From the Land of the Moon (Mal de pierres)</i> (2016)	28,29 (Nephrolithiasis)	C/B	Parcial	http://imdb.to/2hVpMHZ
<i>A Few Good Men</i> (1992)	30 (Lactic Acidosis)	B	Parcial	http://imdb.to/2uSxvrp
<i>First Do No Harm</i> (1997)	30 (Ketogenic diet as a treatment for epilepsy)	C/B	Parcial	http://imdb.to/2wT3DMZ
<i>An Introduction to the Ketogenic Diet</i> (1994)	30 (Ketogenic diet as a treatment for epilepsy)	C/B	Total	http://imdb.to/2uAd5lp
<i>It Runs in the Family</i> (2003)	31 (Kidney failure)	C/B	Total	http://imdb.to/2vxbQHo

UNIT 6: Blood cells, immunity and blood coagulation

THEME 32: Erythrocytes, anemia and polycythemia

THEME 33: Resistance of the organism to infection: I. Leukocytes, granulocytes, monocytophagocytic system and inflammation

THEME 34: Resistance of the organism to infection: II. Immunity and allergy. Immunity Innata

THEME 35: Blood groups; transfusion; Organ and tissue transplantation

THEME 36: Hemostasis and blood coagulation

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Osmosis Jones</i> (2001)	33,34 (Generalized)	C	Total	http://imdb.to/2wSdimU
<i>Philadelphia</i> (1993)	33,34 (HIV/AIDS)	C/B	Total	http://imdb.to/2hUyTbX
<i>The Motorcycle Diaries</i> (2004)	34 (Leprosy)	C/B	Parcial	http://imdb.to/1UjmlFe
<i>My Daughter Must Live</i> (2014)	35 (Liver transplantation)	C/B	Total	http://imdb.to/2fDkNLn
<i>The Andromeda Strain</i> (1971)	36 (Coagulation)	I	Parcial	http://imdb.to/2vRWoYZ

UNIT 7: Breathing

THEME 37: Pulmonary ventilation

THEME 38: Pulmonary circulation, pulmonary edema, pleural fluid

THEME 39: Physical principles of gas exchange

THEME 40: Transport of oxygen and carbon dioxide in blood and tissue fluids

THEME 41: Regulation of breathing

THEME 42: Respiratory insufficiency: pathophysiology, diagnosis, oxygen therapy

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Osmosis Jones</i> (2001)	37,38 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>Fantastic Voyage</i> (1966)	38 (Lung)	C	Parcial	http://imdb.to/2fBbKui
<i>Foreverland</i> (2011)	37 (Cystic Fibrosis, Spirometry, Steam Inhalers)	C	Parcial	http://imdb.to/2wSsock
<i>Alex: The Life of a Child</i> (1986)	37 (Cystic fibrosis)	C	Total	http://imdb.to/2hVTFb1
<i>Something The Lord made</i> (2004)	38 (Tetralogy of Fallot)	C/B	Parcial	http://imdb.to/2uyrnsc
<i>Coma</i> (1978)	40,41 (CO intoxication)	C/B	Total	http://imdb.to/2t6Wef6

UNIT 8: Physiology of aviation, space and deep diving

THEME 43: Physiology of aviation, great heights and space

THEME 44: Physiology of deep diving and other hyperbaric situations

Table 1. Selected films (cont.).

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>2001: A Space Odyssey</i> (1968)	43 (Linear Acceleration, Microgravity, Creation of Gravity, Centrifugal Forc)	I/B	Total	http://imdb.to/1e5blCn
<i>Dive Bomber</i> (1941)	43 (Hypobaric; Fainting by linear acceleration)	C/I/B	Total	http://imdb.to/2vxAQy4
<i>Everest</i> (2015)	43 (Hypobaric; altitude sickness)	C/B	Total	http://imdb.to/1e5JUQL
<i>The Big Blue</i> (1988)	44 (Hyperbaric; Diving in apnea)	C/B	Total	http://imdb.to/1TKOXbR
<i>Apnea</i> (2010)	44 (Hyperbaric; Diving in apnea)	C/B	Total	http://imdb.to/2uRPXAp
<i>Das Boot</i> (1981)	44 (Hyperbaric)	B	Total	http://imdb.to/1joNaoR
<i>K-19: The Widowmaker</i> (2002)	44 (Hyperbaric)	B	Total	http://imdb.to/2wUafuD

UNIT 9: The nervous system: A. General principles and physiology of sensitivity

THEME 45: Organization of the nervous system, basic functions of synapses and neurotransmitters

THEME 46: Sensitive receivers, neural circuits for information processing

THEME 47: Somatic sensitivities: I. General organization, tactile and positional sensations

THEME 48: Somatic sensitivities: II. Pain, headache and thermal sensitivity

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Fantastic Voyage</i> (1966)	45 (Brain)	C	Total	http://imdb.to/2fBbKui
<i>Hilary and Jackie</i> (1998)	47,48 (Multiple sclerosis)	C/B	Total	http://imdb.to/2vt0XYy
<i>Concussion</i> (2015)	46-48 (Postconcussion syndrome)	C/I/B	Total	http://imdb.to/2wUux7b

UNIT 10: The nervous system: B. Special senses

THEME 49: The Eye: I. Vision Optics

THEME 50: The eye: II. Receptor and nerve function of the retina

THEME 51: The eye: III. Central Neurophysiology of Vision

THEME 52: The Sense of Hearing

THEME 53: The chemical senses: taste and smell

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Fantastic Voyage</i> (1966)	49,51 (Optic nerve and retina)	C	Parcial	http://imdb.to/2fBbKui
<i>Blindness</i> (2008)	49 (Blindness)	I	Parcial	http://imdb.to/2nYVgS
<i>Notes on Blindness</i> (2016)	49-51 (Progressive blindness)	C/B	Total	http://imdb.to/2w0Hff1
<i>Dancer in the Dark</i> (2000)	49,50,51 (Retinitis pigmentosa)	C/I/B	Total	http://imdb.to/2uQRZ3Y
<i>Garage Olimpo</i> (1999)	52 (Hearing Acuity)	B	Parcial	http://imdb.to/2uCWuzP
<i>The Miracle Worker</i> (1962) (2000)	49,52 (Blindness and deafblindness)	C/I	Total	http://imdb.to/2hWrn0k ; http://imdb.to/2w0SGNc
<i>Johnny Belinda</i> (1982)	52 (Deafness)	C/I	Total	http://imdb.to/2wUAQb1
<i>In the Land of the Deaf</i> (1992)	52 (Coexistence with hearing loss)	C	Total	http://imdb.to/2vRNN8D
<i>Sweet Nothing in My Ear</i> (2008)	52 (Cochlear Implant)	C/I/B	Total	http://imdb.to/2vz6Xxx
<i>Perfect Sense</i> (2011)	49-53 (Loss of all senses)	C/I/B	Total	http://imdb.to/2vs4OzH

Table 1. Selected films (cont.).

UNIT 11: The nervous system: C. Motor and integrative neurophysiology
THEME 54: Motor functions of the spinal cord: the spinal reflexes
THEME 55: Control of motor function by the cortex and brainstem
THEME 56: Contributions of cerebellum and basal ganglia to global motor control
THEME 57: Cerebral cortex, intellectual functions of the brain, learning and memory
THEME 58: Brain mechanisms of behavior and motivation: the limbic system and the hypothalamus
THEME 59: States of brain activity: sleep, brain waves, epilepsy, psychosis
THEME 60: The autonomic nervous system and the adrenal medulla
THEME 61: Cerebral blood flow, cerebrospinal fluid and cerebral metabolism

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>The Theory of Everything</i> (2014)	54,55 (ALS)	C/B	Total	http://imdb.to/1rrzobl
<i>The Pride of the Yankees</i> (1942)	54,55 (ALS)	C/B	Total	http://imdb.to/2uRxVyo
<i>The Tic Code</i> (1999)	56 (Tourette syndrome)	C/B	Total	http://imdb.to/2uS7vMU
<i>1 Litre of Tears</i> (2005-2007)	56 (Spinocerebellar degeneration)	C/B	Total	http://imdb.to/2uyQ4Fl
<i>Lucy</i> (2014)	57 (Development of the cerebral cortex)	I	Parcial	http://imdb.to/1odNfNH
<i>Memento</i> (2000)	57 (Temporal lobe lesion)	B	Total	http://imdb.to/1npFPlo
<i>Osmosis Jones</i> (2001)	58 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>28 Days Later</i> (2002)	58 (Behavioral disorder)	B	Total	http://imdb.to/1XCyrcM
<i>First Do No Harm</i> (1997)	59 (Childhood Epilepsy)	C	Total	http://imdb.to/2wT3DMZ
<i>night, Mother</i> (1986)	59 (Adult epilepsy)	C	Total	http://imdb.to/2wThsuR
<i>Take Shelter</i> (2011)	59 (Paranoias)	C	Total	http://imdb.to/2vZLYXN
<i>The Discovery</i> (2017)	59 (Brain waves)	I	Total	http://imdb.to/2fAEtzw
<i>Crank</i> (2006)	60 (Adrenaline function)	B	Total	http://imdb.to/2hTJZ00
<i>Unforgettable</i> (1996)	61 (Cerebrospinal fluid)	I	Total	http://imdb.to/2hU202l
<i>The Sea Inside</i> (2004)	61 (Cadasil)	C	Parcial	http://imdb.to/K7VSKe

UNIT 12: Gastrointestinal Physiology
THEME 62: General principles of gastrointestinal function: motility, nervous control and blood circulation
THEME 63: Propulsion and mixing of food in the digestive tract
THEME 64: Secretory functions of the digestive tract
THEME 65: Digestion and absorption in the digestive tract
THEME 66: Physiology of gastrointestinal disorders

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Osmosis Jones</i> (2001)	62-66 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>Foreverland</i> (2011)	62-66 (Obstruction of organs by mucus)	C	Parcial	http://imdb.to/2wSsock
<i>Alex: The Life of a Child</i> (1986)	62-66 (Obstruction of organs by mucus)	C	Total	http://imdb.to/2hVTFb1

Table 1. Selected films (cont.).

UNIT 13: Metabolism and regulation of temperature
THEME 67: Carbohydrate metabolism and formation of adenosine triphosphate
THEME 68: Lipid Metabolism
THEME 69: Protein Metabolism
THEME 70: The liver as organ
THEME 71: Energy balance; Prandial regulation; Obesity and fasting; vitamins and minerals
THEME 72: Energetics and metabolism
THEME 73: Regulation of body temperature and fever

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Simon Birch</i> (1998)	67 (Morquio's syndrome)	C/B	Total	http://imdb.to/2vxo7vg
<i>Lorenzo's Oil</i> (1992)	68 (Adrenoleukodystrophy)	C/I/B	Total	http://imdb.to/2vsMpZa
<i>My Daughter Must Live</i> (2014)	70 (Liver transplantation)	C/B	Total	http://imdb.to/2fdkNln
<i>The Madness of King George</i> (1994)	69,70 (Acute intermittent porphyria)	C/B	Total	http://imdb.to/2qhpYkw
<i>Fed Up</i> (2014)	71 (Obesity Epidemic)	C/I/B	Total	http://imdb.to/2hVUIHU
<i>Super Size Me</i> (2004)	71 (Obesity)	B	Total	http://imdb.to/2uRbg5d
<i>Gordos</i> (2009)	71,72 (Obesity Therapies)	C/B	Total	http://imdb.to/2uCEJAN
<i>Osmosis Jones</i> (2001)	71,73 (Generalized)	C	Parcial	http://imdb.to/2wSdimU

UNIT 14: Endocrinology and Reproduction
THEME 74: Introduction to endocrinology
THEME 75: Pituitary hormones and their control by the hypothalamus
THEME 76: Thyroid metabolic hormones
THEME 77: Adrenal cortical hormones
THEME 78: Insulin, glucagon and diabetes mellitus
THEME 79: Parathyroid hormone, calcitonin, calcium and phosphate metabolism, vitamin D, bones and teeth
THEME 80: Reproductive and hormonal male functions (and function of the pineal gland)
THEME 81: Female physiology before pregnancy and female hormones
THEME 82: Pregnancy and lactation
THEME 83: Fetal and neonatal physiology

psychological exhaustion produced by an excess Information when choosing an academic theme. Decision-making about the choice of filmography falls under the responsibility of a multidisciplinary group that also includes personnel not related to the health sciences (humanities and engineering) to seek an acceptable intersubjectivity. The plots are based on their clinical (C), investigator (I) or bibliographic (B).

Results and Discussion

This work, along with the descriptions of other authors^{4,6,7,8}, coincide in its ability to bring about the discovery of self-learning by the students, being of help in choosing a topic for their UD. Through the humanities and the arts, especially film, students can understand patients in their full context. The films on the history of patients allow the union of the physiology with different

Table 1. Selected films (cont.).

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>Maribel</i> (2004)	74,75 (Prader-Willi syndrome)	C/B	Total	http://imdb.to/2uBioDy
<i>Osmosis Jones</i> (2001)	75 (Generalized)	C	Parcial	http://imdb.to/2wSdimU
<i>The Fault in Our Stars</i> (2014)	76 (Thyroid cancer)	C	Total	http://imdb.to/1tizeAL
<i>Sick to Death!</i> (2016)	76 (Hashimoto's thyroiditis)	C/I/B	Total	http://imdb.to/2wU6RQn
<i>It Runs in the Family</i> (2003)	78 (Diabetes)	C/B	Total	http://imdb.to/2vxbQH0
<i>Patch Adams</i> (1998)	78 (Diabetes)	C	Parcial	http://imdb.to/1NtM9ZL
<i>Wonderful World</i> (2009)	78 (Diabetic coma)	C	Parcial	http://imdb.to/2uBoWss
<i>Amélie</i> (2001)	79 (Imperfect osteogenesis)	B	Parcial	http://imdb.to/1qGpXP0
<i>Mask</i> (1985)	79 (Bone Leontiasis)	C	Total	http://imdb.to/2uRcvNs
<i>From Beyond</i> (1986)	80 (Pineal gland)	I	Total	http://imdb.to/2uBHbY9
<i>Rosemary's Baby</i> (1968)	80 (Abnormal births)	B	Parcial	http://imdb.to/2wTEGBi
<i>XXY</i> (2007)	80-81 (Sexuality in adolescence; Hermaphroditism)	C/B	Total	http://imdb.to/2irdtSp
<i>The Blue Lagoon</i> (1980)	81 (Menarche)	C	Parcial	http://imdb.to/2hXHieS
<i>The Diary of a Teenage Girl</i> (2015)	81 (Female sexuality)	B	Total	http://imdb.to/2wGmfU
<i>Juno</i> (2007)	82 (Teen Pregnancy)	B	Total	http://imdb.to/2wTzi10
<i>Shallow Hal</i> (2001)	83 (Spina bifida)	C	Parcial	http://imdb.to/1xbBT5v
<i>Sueños de sal</i> (2015)	83 (Spina bifida)	C	Total	http://imdb.to/2wTtYdO
<i>Everything Put Together</i> (2000)	83 (Sudden Infant Death Syndrome)	C/B	Parcial	http://imdb.to/2uzgkQC

UNIT 15: Sports Physiology

THEME 84: Sports physiology

Title (Year)	Corresponds to themes	Plot	Relationship with plot	Source
<i>The Program</i> (2015)	84 (Stress test)	C/B	Total	http://imdb.to/2uQLBK6

conditions (clinical, research or bibliographic scenario). The students can correlate the characters and situations of the filmography as real situations, within an environment defined by their curricular subject. This virtual scenario not only allows to recognize the actors as real characters, but also they attend to think like future health personnel posing questions: "As a doctor in that situation, what would I do? How would you do it? Probability of guessing or miss my diagnosis with the result of the film?". All these involuntary responses of students during the viewing are transformed into an opportunity to stimulate learning, reflection, critical evaluation of the message offered and, despite being offered from fiction, to the simulation of possible real cases that help to better consider what happens outside the classroom. In short, the Cinema used as an

orientation tool within education provides a positive reinforcement to influence as a source of knowledge and understanding for students who are going to perform a UD. From another perspective, they also identify it in equal parts as medical education and training for different diagnoses or constructions of medical decisions.

The advantages of using Cinema as audiovisual material with educational character grow exponentially. Using video⁶ or images⁷, instead of verbal digressions, to create pauses offers several advantages for the educator. González-Blasco⁶ and Zagvazdin⁷ showed that even the performance of audiovisual material resulted in benefits in the teacher-student duality: 1) both images and videos are powerful resources for attracting

Table 2. Survey model.

Model of the choice of matter survey for the development of the UD

Dear student,

During the orientation process of this seminar, proceed to complete this survey in each transition of themes. Considering the needs that are detected during the self-evaluation, you will be able to develop an UD project according to the final decision of your chosen topic in which you carry out improvement actions at the thematic and methodological level.

Sincerely, your teacher.

A series of self-evaluation criteria are set out below with regard to the motivating role of this seminar. You should respond with numbers 4 to 0, indicating 4 = Much, 3 = Very often, 2 = Sometimes, 1 = Rarely and 0 = Nothing.					
UNIT #:	4	3	2	1	0
Maintains the interest of the subjects during the viewing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The use of these examples gives you enthusiasm to better understand the subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stimulates reflexive criticism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It presents problems for didactic purposes that arouse curiosity and desire to search for knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collaboration and participation of peers in discussions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (add):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FINAL SUMMARY (make a reflection on the themes or units with the first two best rated results)

attention and generating emotions; 2) require little time to induce an effect and to acquire information; 3) they are easy to implement; 4) offer the teacher a vocal break to rest; 5) avoid the risk of failure associated with jokes or stories; 6) can facilitate the reception of a joke or later anecdote; 7) finally, the images promote a fast learning fostering the creative thought and the formation of new associations and analogies.

Our experience with teaching methodology using key fragments of movies suggests that it is well adapted to the audiovisual culture in which our students are immersed, impacting well with the need to learn from the affective and cognitive dimensions, and concluding in high levels of motivation and participation.

Conclusions

The common analogy of all methods that implement films in medical education is their powerful effect on the affective domain of students. While the reactions evoked by the images seem to be short-lived,

the videos can have far-reaching effects. In fact, qualitative methodology using film fragments is a powerful resource for promoting reflective attitudes and providing learning linked to experience. Fragment selections for physiological purposes can be used as effective elements for orientation presentations that can gain student attention, facilitate creative thinking and memorization, and impart information in a pleasant way. In other words, feedback from students suggests that captivating short-lived images of the actors' situation help to establish thematic associations between clinical-basic research entities and pathophysiological mechanisms. Despite being well-known the application of the Cinema in the medical education, its potential role to guide in the choice of academic works (UD and/ or master's and doctoral thesis) deserves to be more explored to obtain more detailed analyzes in each discipline.

References

1. Hall JE, Guyton CA. Guyton & Hall. Tratado de Fisiología Médica. 12ª edición. Barcelona: Elsevier; 2011.

2. Darbyshire D, Baker P. A systematic review and thematic analysis of cinema in medical education. *Med Humanit.* 2012;38(1):28-33.
3. Karasik RJ, Hamon R, Writz J, Moddu Reddy A. Two thumbs up: using popular films in introductory aging courses. *Gerontol Geriatr Educ.* 2014;35(1):86-113.
4. Weber CM, Silk H. Movies and medicine: an elective using film to reflect on the patient, family, and illness. *Fam Med.* 2007;39(5):317-9.
5. Wolkenstein AS. Application of movies helpful for teaching. *Fam Med.* 2002;34(8):563-4.
6. Gonzalez Blasco P, Moreto G, Roncoletta AFT, Levites MR, Janaudis MA. Using movie clips to foster learner's reflection: improving education in the affective domain. *Fam Med.* 2006;38(2):94-6.
7. Zagvazdin Y. Movies and emotional engagement: laughing matters in lecturing. *Fam Med.* 2007;39(4):245-7.
8. Cabedo García VR, Mañez Arocas C, Suñiga Menendez JF, Baquero Toledo L, Sid Ahmed El Khaïat G, Saiz Catero C. El médico de familia en el discurso cinematográfico. *Rev Med Cine [Internet]* 2017;13(3): 103-112.



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