2011

Bioanalysis Young Investigator Award – sponsored by Waters- Michelle J. Yoo

David S. Hage
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Michelle J Yoo

Position

Graduate Research Assistant

Research area

Bioanalytical chemistry and separations

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Supervisor's supporting comments

I have always been impressed with Michelle's ability to conduct research in an independent and yet highly effective manner. Part of her research in my group has examined the use of affinity columns to examine drug–protein binding with serum proteins, such as human serum albumin. This work is extremely important to the fields of pharmaceutical chemistry and clinical chemistry in providing the data needed for the development of new drugs or in the optimization of treatments for patients with new, or existing, drugs. Another topic that Michelle has examined in her research is the use of new supports based on monolithic materials and ultrafast-extraction methods for affinity-based separations of biological samples and high-throughput screening of drug–protein binding. She was the lead author on a review written on this topic and also has several research publications related to this area of work. During her graduate studies, Michelle has emerged as a real leader in my group. She has excellent people and communication skills and is highly motivated in her pursuit of an advanced degree in analytical chemistry and bioanalysis. I have extremely high expectations for her in the future as she continues her career.

Nominated by: David S Hage, University of Nebraska, Department of Chemistry, Hamilton Hall 704, Lincoln, NE 68588, USA

What drove you to choose a career in bioanalysis?

The biological interactions that occur within the body have been a topic of interest to me since beginning my coursework as a graduate student. There are many interactions, such as the binding between drugs and proteins, which are important in everyday life. Through my graduate research experiences in an analytical chemistry laboratory, I was further interested in the use of analytical techniques to characterize these interactions in a quantitative manner. A career in bioanalysis allows me to research topics that are more biologically related and use analytical methods to measure the extent of these interactions in the same environment.

Describe the main highlights of your bioanalytical research, and its importance to the bioanalytical community both now and in the future.

My research focus is to develop microaffinity columns for use in high-performance affinity chromatography that can be applied towards the creation of new approaches for high-throughput analysis of drug–protein interactions. Microaffinity columns can analyze these interactions on a much smaller timescale (minutes to seconds). With the use of materials such as silica monoliths, I can analyze drug–protein interactions on a much smaller time scale (milliseconds) by using higher flow rates with silica monoliths while immobilizing ligands using similar chemistry schemes as with particle-based supports.

My research has also shown that traditional longer columns, used in high-performance affinity chromatography, can be replaced with much shorter columns (from cm to mm) to reduce analysis times even further. One application of shorter columns is the ultrafast-affinity extraction for free-drug fraction analysis. This involves using a short column to rapidly extract the free-drug fraction of a drug by taking into account the short time required to separate the free and protein-bound drug fractions. This is also requires the avoidance of any errors due to the dissociation of drug–protein complexes as they pass through the column. These advancements can play a role in the transition to their use in a clinical setting where shorter analysis times are needed.

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Q Where do you see your career in bioanalysis taking you?

From my experiences with studying biologically related interactions and using analytical techniques, especially high-performance affinity chromatography, I have developed a great interest in examining other biological systems and using this knowledge to aid in the research and development of new pharmaceutical agents. I would like to continue working in the field of rapid analysis and high-throughput screening of drug candidates by using different types of support materials and taking advantage of the many different available techniques, such as CE and MS. In addition to using other methods, I envision my career in bioanalysis incorporating the high-throughput settings into a clinical environment, where rapid analysis times are desired. I see a big part of my career to include working with others, whether it is through collaborations, training or teaching. I will strive to constantly learn something from each person I work with and hope to relay a part of my knowledge to that person as well.

Q How do you envisage the field of bioanalysis evolving in the future?

I see the field of bioanalysis as constantly emerging with newer, improved techniques and materials, which, I believe, will help bring about more novel ideas and research, especially in areas that tie together biology, analytical chemistry and biochemistry. I envisage these new developments will bring more research that can perform analyses with fewer amounts of sample requirements and faster analysis times. With the ongoing research pointing in the direction of more analyses performed in a high-throughput setting, I hope that the transition into a clinical setting will more quickly arise. I also see more research conducted through collaborations from several different experts in the fields of biology, chemistry and biochemistry, in addition to those in medical research fields. The research conducted by each expert will only aid in more successful progress to attain the eventual goal of the research study. With more experts from different areas working together, I believe that the field of bioanalysis will grow quickly and strongly over time as more experts contribute to this field and as technology continues to improve.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties. No writing assistance was utilized in the production of this manuscript.

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Each issue of *Bioanalysis* features a Young Investigator profile, where young bioanalysts have the opportunity to describe their work and future aspirations. At the end of each year a winner will be selected by the editorial advisory board and will be presented with a $1000 award, sponsored by Waters. A travel fund is provided by Waters to assist with the cost of travel to the award ceremony.

For a young scientist, being recognized for your hard work at such an early stage in your career is a tremendous honor.

Young Investigators should be early career researchers, including Masters and Doctorate students, PostDoctorate researchers and those working in industry.

If you wish to nominate a Young Investigator, please contact the Editor for more details.

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