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EDITORIAL

Yaohua Wang wins ABC Best Paper Award

Nicola Oberbeckmann-Winter

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Yaohua Wang was born in 1982. She received her PhD degree in analytical chemistry from the University of Minnesota in 2010. The main focus of her PhD research was on the development of capillary electrophoresis based techniques for analysis of an anti-cancer drug, doxorubicin, in tissues, cells, and subcellular fractions. Her work also covered the development of techniques and methods for sample preparation, sampling, and separation to monitor the distribution and metabolism of doxorubicin in rat and human liver tissues, cancer cells, and subcellular fractions. In 2008–2009, she received the Merck Research Laboratories Fellowship in Analytical/Physical Chemistry in recognition of her research work.

The ABC Best Paper Award 2012 for outstanding work published in Analytical and Bioanalytical Chemistry (ABC) goes to Yaohua Wang (30) who is lead author of the paper "Analysis of the bioactivity of magnetically immunoisolated peroxisomes" which reports a method for isolation of peroxisomes with biological function from other cellular organelles. Dr. Wang's research focuses on investigation of the subcellular distribution and metabolism of doxorubicin (DOX). DOX is effective in the treatment of hematological malignancies and cancers in solid tissues; use of this drug is, however, restricted by its side effects which may be associated with subcellular-specific accumulation of DOX metabolites. Her findings could lead to further developments in investigation of the anticancer drug doxorubicin.

Accompanied by EUR 1,000, the award is sponsored by Springer to honor the work of exceptional young scientists and to stimulate their research careers. The article "Analysis of the bioactivity of magnetically immunoisolated peroxisomes" by Yaohua Wang, Thane H. Taylor, and Edgar A. Arriaga was published as a Paper in Forefront in ABC's 10th Anniversary issue (Vol. 402/1, pp. 41–49), available online at http://link.springer.com/article/10.1007/s00216-011-5476-3 or at www.springer.com/abc.

Who is Yaohua Wang?

Yaohua Wang talks about her research, her motivations, and about herself to Nicola Oberbeckmann-Winter.

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What was your motivation to perform research in your area of interest?

Although studied for many years, cancer and cancer treatment are still mysterious in many areas. Most studies are on the cellular level or above. With the possibility of isolating pure and functional organelles, we can begin to study the subcellular level. This should help explain the mysteries of cancer and cancer treatment.

Why do you think your work merits the ABC Best Paper Award?

The bioanalytical techniques we developed for isolation of organelles with biological function will enable study of anti-cancer drugs at a new level, i.e., the subcellular level. This will lead to better understanding of the efficacy and toxicity of anti-cancer drugs, and will aid the design of more specific anti-cancer drugs.

How does the Award-winning work relate to your PhD research and your current work?

My PhD research focused on developing analytical and bioanalytical techniques and methods for study of the subcellular distribution and metabolism of the anti-cancer drug, doxorubicin. The study of doxorubicin in peroxisomes was an indispensable part and had never been studied before.

How would you explain your research to your child?

I would tell her that our body is like a big mansion which is built up with numerous small blocks. The blocks we study are called organelles. Our work is to identify the blocks in which anti-cancer drugs accumulate and how they change in these blocks.

What is the most difficult problem you have had to overcome in that research? How did you solve it?

The hardest part of the research was to ensure the peroxisomes were isolated with high purity and functionality. We carefully controlled the isolation conditions and tried different methods to block the nonspecific binding sites of the materials we used. We also used different assays to check the purity and functionality of the isolated peroxisomes.

How do you see your field developing and how do you see it affecting bioanalytical research?

Research is increasingly being conducted in attempts to understand biological activity at the subcellular level. On the one hand, this provides valuable organelle-specific information. On the other hand, subcellular analysis provides opportunities for the development of new bioanalytical techniques, for example subcellular fractionation.

Which incident or discovery has proved most valuable for your own research?

The development of laser-induced fluorescence detection is very valuable in my research, because it is an ultra-sensitive detection technique. In our laboratory, by use of laser-induced fluorescence detection coupled with capillary electrophoresis, we can detect amounts of analytes as low as zeptomoles (10^{-21} mole). With this technique, it is possible to monitor anti-cancer drug metabolism in subcellular compartments, even in individual organelles.

Which incident or discovery most inspired you during your education and scientific career?

Single cell and individual organelle analysis comes to mind. Heterogeneity from cell to cell and from organelle to organelle can have important consequences on the function of the whole system. With the development of new analytical techniques, single cell and organelle analysis can reveal more fundamental biological principles that help to improve the detection and treatment of diseases. This inspired me to perform my research on cells and organelles and, further, on single cells and individual organelles.

Which recent discovery might prove most valuable to (bio)analytical research or beyond?

Micro total analysis systems will be one. These enable all steps of an analysis to be performed on a chip, saving time, labor, and cost. Their application to a variety of fields, for example biological, clinical, and environmental analysis, is promising. With these devices, the work described in my paper (immunoisolation of peroxisomes and monitoring of peroxisomal anti-cancer drug metabolism) could be achieved on a chip.

What was the best or worst advice you ever received?

The best advice was: All things work together for good.

Whom do you admire most or who inspired you the most, and why?

My advisor, Edgar Arriaga, supported me not only scientifically but also emotionally. I enjoyed brainstorming my plans and results with him. My colleagues also gave me great suggestions.

What are your future plans?

I would like to continue to develop analytical and bioanalytical techniques and methods to solve problems in different areas, for example pharmaceutical and environmental analysis.

What do you do in your spare time?

I like to travel to different places, but now I enjoy spending all my spare time with my seven-month-old daughter. Playing with her and watching her grow is rewarding.