

News & Analysis

Highlighting the latest news and research in bioanalysis



Ian Blair honored by the Eastern Analytical Symposium for contributions to MS

In November 2011, Ian Blair (University of Pennsylvania, USA) received the Eastern Analytical Symposium award for Outstanding Achievements in MS, sponsored by ThermoFisher Scientific, an extremely prestigious award for MS scientists.

The award session was chaired by Naidong Weng (Johnson and Johnson) and sponsored by ThermoFisher Scientific. During the session, Ian Blair's past students, including Ajai Chaudhary (Merck) and Wenying Jian (Johnson and Johnson), recounted their fond memories of life in Blair's laboratories, as well as his influences on their current scientific research. Blair's collaborators, Brad Ackermann of Eli Lilly and Gary Valaskovic from New Objective, showcased their fruitful collaborations with Blair on some cutting-edge technology and novel applications.

Shane Lamos of St Michael's College, an admirer of Blair, spoke about conducting research in a undergraduate college and Blair presented a grand summary of some of the research work conducted in his laboratories. He always credits his past and current students (93 in total) for a highly productive and distinguished career (over 300 publications including

several in top journals *Nature* and *Science*, and in *Bioanalysis*). In addition to the excellent scientific presentations, the award session was filled with humorous tales from Blair as well as photos collected from the presenters to show his many talents, including marathon running, skiing, racing cars and many more.

Blair studied for his PhD at Imperial College (London, UK) under Nobel Laureate Sir Derek Barton. During his career, he has worked in Uganda, Australia, back to London and then to the USA, first at Vanderbilt University in Nashville and then to his current position at the University of Pennsylvania. He holds numerous titles at the University of Pennsylvania: the AN Richards Professor of Pharmacology Vice-Chair at the Department of Pharmacology; Director, Center for Cancer Pharmacology; Director, Proteomics and Systems Biology Facility; and, Director, Systems Biology, Institute for Translational Medicine and Therapeutics. He is renowned for his work on MS of biomolecules, DNA and protein adducts, drugs and metabolites; much of his current research is focused on biomarkers and many of his former students are renowned analysts.

Other award winners at this year's Eastern Analytical Symposium (EAS) included Uwe Neue, Waters Corporation for Outstanding Achievements in Separation Science;



Ian Blair being awarded by Dave Russell.
Image courtesy of Eastern Analytical Symposium.

CONTENTS



News & Views

- **Lead story:** Ian Blair honored by the Eastern Analytical Symposium for contributions to MS
pg 5
- New method to help precisely identify tumor margins during neurosurgery
pg 6
- New method for quantifying carcinogenic metabolites in human lung cells
pg 7
- One-step detection using immunobeads-MS
pg 7



Jonathan V Sweedler, University of Illinois-Urbana-Champaign, for Outstanding Achievements in the Field of Analytical Chemistry; and Roderick Wasylshen, University of Alberta, for Outstanding Achievements in Magnetic Resonance.

Congratulations to Blair for receiving the EAS Award for Outstanding Achievements in MS!

Written by Ryan De Vooght-Johnson, Managing Commissioning Editor.

Sources: 2011 EAS Awards: www.eas.org/askeas/Awards.pdf; Information from Naidong Weng (Johnson and Johnson).



Ian Blair awarded in the presence of (left to right): Naidong Weng (session organizer), Wenying Jian, Shane Lamos, Dave Russell (presenter), Ajai Chaudhary, Gary Valaskovic and Brad Ackermann. Image courtesy of Eastern Analytical Symposium.

New method to help precisely identify tumor margins during neurosurgery

If tumor cells remain in the body after surgery, cancer can recur in the patient. Therefore, as a precaution, surgeons typically remove extra tissue surrounding the tumor in the body. However this leaves neurosurgeons limited, as the removal of extra tissue can affect the patient's memory, mobility and other vital functions. It is therefore important the neurosurgeons are able to precisely identify tumor margins, whilst completing brain surgery, in order to maximize the removal of tumors and increase patient survival.

Currently, methods for identifying tumor margins during surgery take too long and can be unreliable. With this in mind, a collaboration of scientists from Germany and Hungary aimed to develop a tool to accurately and rapidly identify

the margin between cancerous and healthy tissue during an operation.

The method, documented in *Analytical Chemistry*, directly combined the commercially available surgical device cavitron ultrasonic surgical aspirator (CUSA) and a Venturi easy ambient sonic-spray ionization (V-EASI) MS. This combination was achieved by introducing liquefied tissue debris into the Venturi air jet pump.

Tests proved successful on human brain samples, with the identification of cancerous margins taking half the time of previous techniques. In order to test the dynamic range, sensitivity and suppression effects of the method, the scientists analyzed standard solutions of phospholipids and peptides. The spectra of the intact tissue specimens were found

to be highly specific to the histological tissue type.

The principal component analysis and linear-discriminant-based data analysis method was developed for real-time tissue identification in a surgical environment. Results showed that the method was successful in testing post-mortem and *ex vivo* human samples, which included astrocytomas, meningiomas, metastatic brain tumors and healthy brain tissue.

Written by Ruth Williamson, Assistant Commissioning Editor.

Source: Schäfer K, Balog J, Szaniszló T *et al*. Real time analysis of brain tissue by direct combination of ultrasonic surgical aspiration and sonic spray mass spectrometry. *Anal. Chem.* 83(20), 7729–7735 (2011).

The editorial team welcomes suggestions for timely, relevant items for inclusion in the news. If you have newsworthy information, please contact: Ryan De Vooght-Johnson, Managing Commissioning Editor, *Bioanalysis* Future Science Ltd, Unitec House, 2 Albert Place, London, N3 1QB, UK
Tel.: +44 (0)20 8371 6090
Fax: +44 (0)20 8343 2313
E-mail: r.devooght-johnson@future-science.com



New method for quantifying carcinogenic metabolites in human lung cells

Benzo[a]pyrene (B[α]P) is a type of polycyclic aromatic hydrocarbon (PAH) whose metabolites have toxic and carcinogenic properties in the organs of many species. PAHs are found in environmental sources such as the deposits from coal, oil and tar, as well as in food cooked at very high temperatures.

“While it is known that B[α]P metabolites are carcinogenic, the relative contributions of the metabolites from each of the three different pathways is as yet unknown.”

One of the best-known PAHs is naphthalene, which is used commercially as a principal constituent of moth balls and experimentally as a tumorigenic compound. B[α]P can be broken down by three alternative metabolic pathways *in vivo*; the radical-cation pathway, diol-epoxide pathway and that of o-quinone. While it is known that B[α]P metabolites are carcinogenic, the

relative contributions of the metabolites from each of the three different pathways is as yet unknown. It has been suggested that exploring the details of these pathways may provide information that could be used to treat or prevent human cancer.

To this end, a team at the University of Pennsylvania (PA, USA) conducted a study to quantify the relative involvement of each of the pathways in the development of carcinogenic metabolites in human bronchoalveolar H358 cells. Previous studies investigating the same issue had used HPLC–radiometric detection to measure the levels of products of PAH metabolism, whereas the new method, described by Trevor Penning and colleagues, made use of stable-isotope dilution LC–APCI-MS/MS. The novel technique was developed with the aid of a library of B[α]P metabolite standards and displayed a 500-fold increase in sensitivity when compared with quantification

using HPLC–radiometry. The limit of quantitation of the pinnacle biomarker of B[α]P exposure – 3-hydroxybenzo[a]pyrene – was 6 fmol on column.

The results of the study suggest that the three pathways of B[α]P metabolism contribute equally to the overall level of PAH metabolites found in human lung cells. The authors suggest that the sensitivity of their method lends itself to potential application for biomonitoring of carcinogens in humans and the analysis of cell-type differences in PAH susceptibility.

Written by Emily Tulk, Assistant Commissioning Editor.

Source: Lu D, Harvey R, Blair I, Penning T. Quantitation of benzo[a]pyrene metabolic profiles in human bronchoalveolar (H358) cells by stable-isotope dilution liquid chromatography–atmospheric pressure chemical ionization mass spectrometry. *Chem. Res. Toxicol.* 24(11), 1905–1914 (2011).

One-step detection using immunobeads-MS

In clinical diagnosis, one-step detection of biological molecules is highly desirable and, in conjunction with MS, is proving to be a promising new approach within the field. Thus, a research team from Japan (Shimadzu Corporation, Kyoto, Japan) have described a new, highly sensitive method that combines immunoprecipitation and MALDI-TOF-MS, termed immunobeads-MS (iMS), for the detection of target peptides in serum or biological fluid.

The team, led by Taka-Aki Sato, demonstrated their newly developed method as a powerful biomarker detection tool through the 1-fmol detection of amyloid β peptide in spiked serum. As Sato told *Bioanalysis*, “amyloid β ratio is

very important for clinical diagnosis. The iMS platform can be detected in its mixture by identical antibody.” He continued, “Ionization efficiency of molecular itself is intrinsic, so peak height is normalized by external standard peptide and quantifiable peptide ratio.”

One of the key features of the iMS technique is the MS-compatible condition of immunoprecipitation using detergents with a monosaccharide-C8 alyl chain or a disaccharide-C10 alkyl chain. Another advantage includes the minimal number of steps required for high sensitivity, achieved through optimized wash buffering conditions and direct MALSI-TOF-MS analysis of the immunobeads.

Sato went on to explain the ultimate research objective, “Our final goal is to establish a new diagnostic system using MALDI-TOF-MS, which is much more sensitive than current ELISA. Our next goal is to establish a clinical tiny TOF-MS as a new diagnostic system.”

Written by Thomas Payne, Assistant Commissioning Editor.

Source: Shimada T, Toyama A, Aoki C, Aoki Y, Tanaka K, Sato TA. Direct antigen detection from immunoprecipitated beads using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry; a new method for immunobeads-mass spectrometry (iMS). *Rapid Commun. Mass Spectrom.* 25(23), 3521–3526 (2011).