

Hydrogen Exchange & Covalent Labeling Interest Group Summary Report for ASMS 2006

06/14/2006

Meeting time: Tuesday, May 30, 12:30-1:30
Attendance: 93 people

The hydrogen exchange and covalent labeling interest group was just formed in February 2006 on the heels of a very successful Sanibel Meeting of the same title and topic. The interest group met and got organized during lunch on Tuesday in room 603 of the convention center in Seattle. Although this was the first time the group met, the attendance was near 100 people.

The agenda for the meeting was:

1. Welcome/ Introduction (Engen, Przybylski)
2. Discussion of Handouts
 - List of posters and orals on hydrogen exchange and covalent labeling
 - Email listing for the group
 - Suggestions for next ASMS meeting
 - Suggestions for next interest group meeting in Indianapolis
 - References related to discussion topic
3. Discussion Topic: scrambling of deuterium in MS/MS analyses
 - Three 10-15 minute talks
 - "ECD Provides Some Site-Specific Amide Hydrogen Exchange Rates in Melittin"*
Kristina Hakansson, University of Michigan
 - "Hydrogen Scrambling: Facts and Fiction"*
Igor Kaltashov, University of Massachusetts-Amherst
 - "Electron Transfer Dissociation for the Finnigan LTQ"*
John E. Syka, Thermo Electron
4. Floor open for discussion
5. Mix and interact

After introduction and welcome, the handout was discussed. Participants provided their email address so that a database and listserve can be set up to communicate with the group. It was decided that a webpage for the group would be put on the internet including a summary of the meeting, copies of the handouts and slides of the presentations. The group members would also be distributed. As this was the first meeting of the group, it was expressed that poor communication hindered the attendance at the first meeting. Plans by ASMS to require interest group selection during subscription renewal were met with enthusiasm.

Participants made suggestions about what they would like the group to be, including: a workshop next year rather than a lunchtime meeting, the most popular suggestion for next year's interest group meeting was a discussion of tips and tricks for HX and labeling. A number of suggestions for oral sessions at ASMS 2007 were given and a summary report will be sent to the President of ASMS, Alan Marshall.

Michael Przybylski spoke for 5 minutes on what covalent labeling is. Then he introduced a proposal for a Sanibel Meeting in 2008, organized by himself and Ken Tomer, on the topic of mass spectrometry in immunology. This topic is of interest to the HX and covalent labeling group as much of the methodology for uncovering the interactions of antibodies and protein antigen interaction involves some kind of labeling methods (as shown nicely by Ken Tomer and others).

In the remaining 40 minutes of the meeting, three 12 minute presentations were given (as listed above) on the topic of deuterium scrambling in MS/MS experiments. Scrambling is the phenomenon in which deuterium at various amide positions migrates around to other positions during dissociation. If one wishes to determine where deuterium exchanged into a protein in solution, the deuterium cannot migrate around during analysis or the resulting data will be useless. It is desirable to do MS/MS on deuterium labeled samples as one would like to know which amino acids were labeled. Currently, exchange information is obtained at the whole peptide level and not at the individual amino acid level. A list of relevant publications in this area was distributed in the handout for those less familiar with this topic.

Kristina Hakansson gave an overview of what ECD is and then described her experience with analysis of deuterated melittin. One important point about trying to verify scrambling is that a sample must be prepared in which the experimenter is certain of where the deuterium gets incorporated, otherwise migration cannot be verified. Melittin seems good for the application as it's small enough to not require digestion and one is fairly certain of where deuterium is incorporated based on other experiments (i.e. NMR).

Igor Kaltashov gave a short talk summarizing his experience with scrambling. He reported that hydrogen scrambling does not occur (or else is minimal) in HDX MS/MS experiments if the precursor ion charge state is high. Generating highly charged protein ions may be a necessary step for successful execution of scrambling-free HDX MS/MS experiments. This can be accomplished without altering the distribution of ^2H atoms along the polypeptide backbone by placing protein into "slow exchange" buffers (pH 2.5-3.0, 0°C) prior to MS/MS analysis.

John Syka from Thermo Electron presented a short summary of Thermo's new ETD instrument. It may be possible to use ETD for MS/MS experiments. John summarized how the instrument works, and why it may be of value to HX experiments. Because the time required for dissociation is so short, there may not be enough time for scrambling to occur. It remains to be seen if this instrument will be suitable for MS/MS experiments on deuterium labeled samples. The group was interested to learn of its commercial availability as the expense of ECD in an FT instrument has hindered analysis of the scrambling effect.

The meeting concluded at 1:30.

Respectfully submitted,

John R. Engen
Interest Group Coordinator