Structural & Functional Proteomics: Delving into Molecular Details

14-15 January, 2013
Utrecht

Workshop
Organized by
Michiel Vermeulen
Frank Sobott
4DCellFate

Free registration
http://www.4DCellFate.eu

January 14
Albert Heck
Alex Leitner
Kasper Rand
Frank Sobott
Henning Urlaub
Juri Rappsilber

January 15
Anne-Claude Gavin
Tiziana Bonaldi
Michiel Vermeulen
Jesper Olsen
Matthias Selbach

4DCellFate
7th Framework Programme
European Commission
Cancer IGENOMICS CENTRE
Waters
Structural and Functional Proteomics: Delving into Molecular Details

Structural proteomics
Monday, January 14th

13:30 – 14:00 Registration
14:00 – 14:05 Frank Sobott: introduction
14:05 – 14:35 Albert Heck (U Utrecht)
Native mass spectrometry: a bridge between interactomics and structural biology
14:35 – 15:05 Kasper Rand (U Copenhagen)
Analysis of protein conformation and interactions by H/D exchange mass spectrometry (HDX-MS)
15:05 – 15:35 Frank Sobott (U Antwerpen)
Ion mobility-MS for native proteins and complexes
15:35 – 16:05 Coffee break
16:05 – 16:35 Juri Rappsilber (U Edinburgh/Berlin)
Determining complex protein networks with residue-level resolution - science fiction or science reality?
16:35 – 17:05 Alex Leitner (ETH Zuerich)
An integrated workflow for chemical cross-linking/mass spectrometry: technology and applications
17:05 – 17:35 Henning Urlaub (MPI Biophysical Chemistry, Goettingen)
Mass spectrometric investigations of protein-RNA interactions
17:35 – 19:00 Discussion/Beer session (open)
19:30 – 22:00 Dinner with speakers (4DCellFate)
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 – 9:05</td>
<td>Michiel Vermeulen: introduction</td>
</tr>
<tr>
<td>9:05 – 9:35</td>
<td>Anne-Claude Gavin (EMBL, Heidelberg) Systematic screens for protein–lipid interactions in Saccharomyce cerevisiae</td>
</tr>
<tr>
<td>9:35 – 10:05</td>
<td>Tiziana Bonaldi (IFOM, Milano) The regulatory potential of protein methylation in gene expression investigated by MS-based proteomics</td>
</tr>
<tr>
<td>10:05 – 10:35</td>
<td>Coffee break</td>
</tr>
<tr>
<td>10:35 – 11:05</td>
<td>Jesper Olsen (U Copenhagen) Global proteomic analysis of PTMs in tissue samples</td>
</tr>
<tr>
<td>11:05 – 11:35</td>
<td>Matthias Selbach (MDC, Berlin) Proteome dynamics</td>
</tr>
<tr>
<td>11:35 – 12:05</td>
<td>Michiel Vermeulen (UMC, Utrecht) Quantitative proteomics reveals dynamic readers for 5-(\text{(hydroxy)methyl})cytosine during development</td>
</tr>
<tr>
<td>12:15 – 14:00</td>
<td>Lunch buffet</td>
</tr>
<tr>
<td>14:00 – 17:00</td>
<td>Workshop (4DCellFate only)</td>
</tr>
</tbody>
</table>
Summary

Structural and Functional Proteomics: Delving into Molecular Details

4DCellFate workshop, Utrecht, 14-15 January 2013

The workshop “Structural & Functional Proteomics: Delving into Molecular Details” was organised in the framework of the “4DCellFate” collaboration but open to other participants from across Europe.

The first session on Monday, Jan 14 dealt with aspects of Structural Proteomics which are of particular relevance to the research activities of the FP7 project.

Albert Heck (U Utrecht) started the scientific session with an overview of current methods in “native” mass spectrometry and ion mobility, reporting recent data on intact virus analysis and related developments on instrumentation. This was followed by a talk by Kasper Rand (U Copenhagen) focussing on H/D exchange methods in combination with ETD sequencing, and by a talk by the co-organiser of the workshop, Frank Sobott (U Antwerpen).

The second part of this session had an emphasis on crosslinking of protein complexes with subsequent digestion and data analysis, a currently very active but still challenging field. Three of the worldwide experts in this field gave talks on various aspects of protein-protein and protein-DNA interaction analysis: Juri Rappsilber (U Edinburgh/Berlin), Alex Leitner (ETH Zuerich, Aebersold lab) and Henning Urlaub (MPI Goettingen).

An extensive and very productive discussion ensued on various practical aspects of this work, including results from the collaboration between Alex Leitner and some partners of 4DCellFate. The aim of the consortium is to extend this collaboration and involve other experts in this field, in order to firmly establish crosslinking know-how within 4DCellFate.

The second day of the meeting focussed on global proteomics, post-translational modifications and interaction proteomics.

Anne-Claude Gavin (EMBL Heidelberg) started the session by describing approaches to profile interactions between lipids and proteins and between metabolites and proteins. Tiziana Bonaldi (IFOM Milano) described technology that combines chromatin immunoprecipitation experiments with quantitative mass spectrometry. This technology can be used to profile the in vivo interactome of particular histone modifications of interest. Michiel Vermeulen (UMC Utrecht) described a project in which quantitative mass spectrometry-based proteomics was used to profile interactions with (hydroxy)methylated DNA during stem cell differentiation. Jesper Olsen (U Copenhagen) then described affinity purification methodologies to profile the cellular acetylome and phosphoproteome in different functional states and in different organisms. Matthias Selbach (MDC Berlin) finished the session with a talk on how disease-associated mutations can affect protein-protein interactions and can initiate pathological processes, in this case neurodegenerative disorders.

The second day of the meeting was once again well attended, and interesting discussions were initiated after each of the scientific talks. This session provided a comprehensive
overview of the current state-of-the-art in interaction proteomics and PTM profiling technology, both of which are also important within the 4DCellFate consortium.

The meeting concluded with a focused round-table discussion between 4DCellFate consortium members and two speakers of the workshop (Alex Leitner and Henning Urlaub). These scientists provided some important practical insights into the cross-linking/MS approaches that are of interest to the 4DCellFate consortium.