

INVITED LECTURE H5

Quantitative proteomics and systems biology

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Systems biology attempts to reach a comprehensive understanding of complex biological processes and to study such processes as integrated systems rather than as a collection of isolated parts. Systems biology is made possible by the availability of the complete genome sequence of the human and other species and by advances in biology, engineering and computer science that have collectively catalyzed the emergence of technologies for the systematic and quantitative measurement of genomic and proteomic profiles and the integrative analysis of the obtained results.

Proteomics is a central technology of systems biology because essentially any biological process consists of or involves proteins as structural elements, catalysts, regulators or in other functions. We therefore need to ask to what extent current proteomic approaches are capable to comprehensively analyze the proteome of a cell, tissue or species and how quantitative differences in the proteomes of perturbed cells can be analyzed. In this presentation we will discuss our attempts to comprehensively analyze the proteome of eukaryotic cells and the challenges such projects face. We will also introduce methods for the quantitative analysis of proteomes by targeted mass spectrometry.

References:

1. Kuster B, Schirle M, Mallick P, Aebersold R. (2005) *Nature Rev. Mol Cell. Biol.* 6(7):577-83.
2. Aebersold R. (2003) Constellations in a cellular universe. *Nature* 22(6928):115-116.