Mass Spectometry Based Proteomics

Lecturer: Pawel Ciborowski, Ph.D., Associate Professor

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Course description:

This course is designed to offer students a comprehensive overview of the current status, methodology and practical applications of mass spectrometry based quantitative analysis of proteins and peptides including their post-translational modifications. In the first part will briefly discuss fundamentals of protein and peptide ionization focusing on Electrospray Ionization (ESI). This will include an overview of instrumentation i.e. mass spectrometers and nano-flow liquid chromatography interfaced with various ion traps (IT), quadropole time of flight (qTOF) analyzers. We will discuss principles of Collision Induced Dissociation (CID), Higher Energy Collision Dissociation (HCD) and Electron Transfer Dissociation (ETD). In the second part we will focus on identification and quantification of proteins by tandem mass spectrometry. Brief overview of protein fragmentation, chemical and enzymatic, will be part of this section. Third part will be devoted to three mass spectrometry based quantitative methods: SILAC, iTRAQ and SWATH. In the fourth part identification and analysis of post-translationally modified peptides and protein isoforms will be discussed.

Syllabus of the lecture:

1. Ionization of proteins and peptides by electrospray (ESI)
2. Mass Spectrometry Instrumentation: Ion Traps
3. Mass Spectrometry Instrumentation: QTof
4. Nano-flow HPLC – Why it is so important?
5. Principles of protein and peptide fragmentations (CID, HCD, ETD)
6. Sample preparation for quantitative proteomics –chemical labeling or label free?
7. iTRAQ
8. SILAC
9. SWATH
10. O^{16}/O^{18} labeling
11. Post-translational modifications of proteins – fundamentals
12. Acetylation, methylation, citrullination
13. Phosphorylation
14. Identification of protein isomers and single amino acid mutations
15. Test

Projekt „Rozwój interdyscyplinarnych studiów doktoranckich na Politechnice Gdańskiej w zakresie nowoczesnych technologii" jest współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego.

TERMINY WYKLADÓW			
Data	Dzień tygodnia	Godzina	Sala
10 marzec 2014	Poniedziałek	12-15	LUWR (Chemia A)
11 marzec 2014	Wtorek	12-15	LUWR (Chemia A)
12 marzec 2014	Środa	12-15	LUWR (Chemia A)
13 marzec 2014	Czwartek	12-15	LUWR (Chemia A)
14 marzec 2014	Piątek	12-15	LUWR (Chemia A)

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