IMSC 2022 Short Course 9 **Clinical Proteomics**

Lecturers: Sander Piersma, Irene Bijnsdorp, Tamar Geiger & Connie Jimenez

Saturday Aug 27 2022

13.00-14.00 Introduction to clinical proteomics (Prof.dr. Connie Jimenez)
Clinical proteomics has been catalyzed in recent years due to technological advances allowing the rapid measurement of large numbers of samples at high precision and at increasingly lower cost thereby large-scale and systematic profiling of clinical cohorts is increasingly feasible. Clinical proteomics may encompass studies from pre-clinical discovery in clinical samples to applied diagnostics. Collaboration with clinicians Is key to obtain the right sample type of sufficient quality, that is suitable to address the purpose.

14.00-16.00 Experiment design and MS in clinical proteomics (Dr. Sander Piersma)
Clinical proteomics experiments are typically aimed at uncovering differences in proteins or phosphosites between clinical groups. These groups can include clinically and/or molecularly distinct disease subtypes, differences in response to treatment or differences in prognosis. In order to detect these differential proteins or phosphosites, experimental bias between groups needs to be minimized. Especially, in label-free experiments where the comparison is many vs. many and each sample needs to me measured individually, proper experimental design is important since samples are not pooled prior to data acquisition. When scaling up sample preparation, it is of high importance that is it standardized, parallelized in 96-well plates and ideally automated. Complete (block) randomization or alternation of samples across groups in addition to QA/QC samples is advised for large-scale clinical proteomics experiments to minimize bias and ensure high data quality. Different experiment strategies from sample preparation to LC and MS acquisition will be discussed.

Sunday Aug 28 2022

9.00-10.30 Liquid biopsy for clinical proteomics: from biobanking to high-throughput isolation (Dr. Irene Bijnsdorp)
Liquid biopsies are attractive for minimally or non-invasive diagnosis of disease. The discovery of extracellular vesicles (EVs) that are secreted into biofluids has started a revolution towards the identification of novel disease-biomarkers. This is mostly because EVs are -in part- highly similar in content as the cell of origin. Therefore, the collection and biobanking of biofluids has gained much interest for the purpose of LC-MS/MS proteomics profiling. However, for a good quality biobank, validated protocols are needed for the collection, processing and storage of the samples. Furthermore, current governmental regulations involving the signed informed consent, ethical approval, and correct data storage are important for research.

10.30-11.30/ 12.30-13.30 Clinical proteomics in practice 1 (Prof.dr. Connie Jimenez)
The road towards clinical application of clinical proteomics findings is a long, complex process. An overview of biomarker development strategies and typical clinical proteomics applications will be presented including some success stories from our biofluid and phosphoproteomics work in dementia and cancer.

13.30- 15.00 Clinical proteomics in practice 2 (Prof.dr. Tamar Geiger)
Dr Geiger will share her experience with clinical proteomics, highlighting lessons learned by illustrating selected clinical proteomics projects. She will cover tissue proteomics with microdissection and single cell proteomics as a future outlook.