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"Personalised proteomics by means of individualised protein microarrays"

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11:00 a.m. - 12:00 noon
James Friesen | Cecil Yip Red Seminar Room

Abstract:

Recently, whole genome sequencing of individuals has become possible as a matter of days. Very soon, it will be applied routinely in clinical settings. Despite remarkable progress in understanding the level of nucleic acids, however, insights into disease biochemistry frequently remain preliminary. Much disease-relevant regulation and activity occurs at the protein level through control of both gene expression and protein isoform variations. Consequently 97% of all current therapeutic agents target proteins.

We are aiming at taking advantage of sequence information from individuals for a directed characterisation of disease-specific protein isoforms (mutations, polymorphisms and splice variations), utilising a newly developed technique of producing personalised protein microarrays. First, a tissue's RNA/cDNA is copied onto the microarray by an on-chip PCR amplification, using gene-specific primer pairs that are attached to the chip surface. The arrayed DNA copies then act as templates for an in situ cell-free expression, yielding a protein microarray that presents the protein content of a particular tissue of an individual person. This array format provides a basis for the analysis of protein interactions with other proteins, nucleic acids and small chemical compounds. The personalised array is complemented by a set of antibody pairs that recognise protein isoforms that a different between healthy and tumour tissue. Our overall objectives are the detection of disease-related protein variations, the development of personalised diagnostic methods and the identification of therapeutically relevant compound lead structures. For future therapy, knowledge of protein isoforms and their combinations in individual patients will be critical for therapeutic approaches that target disease-relevant protein conformations, leaving the molecules in healthy tissues unaffected.

Host: Dr. Igor Stagljar