Lab-on-a-tissue : optimization of on-tissue chemistry for improved mass spectrometry imaging

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Stellingen behorende bij het proefschrift: "Lab-on-a-tissue: Optimization of On-Tissue Chemistry for Improved Mass Spectrometry Imaging"

– Bram Heijs –

1) Biomarker discovery using on-tissue digestion mass spectrometry imaging requires the use of high mass-resolution mass spectrometry to increase the chance of correctly assigning the protein identity and ultimately identifying the putative biomarker (*this thesis*).

2) In on-tissue digestion mass spectrometry imaging, the spatial distribution of a detected molecule is key in the assignment and validation of correct protein identities (*this thesis*).

3) The discovery of protein biomarkers from formalin-fixed tissues using mass spectrometry imaging is currently limited by the reversal of the crosslinking and the lack of understanding of its effects on the proteome. Basic research into the chemical processes underlying formalin fixation and antigen retrieval is required to use fixed tissues to their full potential (*this thesis*).

4) The reproducibility of an on-tissue digestion mass spectrometry imaging experiment is in the eye of the beholder. A different focus can lead to opposite conclusions (*this thesis*).

5) MSI is initially an easily accessible assay that will always produce some level of results, but as many MSI researchers new to the field will have found, if more than "pretty pictures" are to be produced then rigorous experimental optimization will be required (*Richard Goodwin, J Proteomics, 2012, 75, 16, 4893-4911*).

6) Proteome deterioration postsampling is a major problem facing proteomic research in general and temporal proteomics in particular (*Svensson et al., J Proteome Res, 2009, 8, 974-981*).

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7) In order for mass spectrometry imaging to be adopted by pathologists, the technique should not be promoted as a replacement of the pathologist, but as a tool that can enhance their performance and assist in cases where common histopathological tools fall short.

8) The optimal acquisition and interpretation of complex data, like MSI data, can only be achieved by a multi-disciplinary team of open-minded scientists.

9) Necessity is the mother of invention (*English proverb*).
Being deprived of immediate assistance is one way to spark creativity.

10) If you consider the parallels between the art of making music and performing science, you can conclude that science is an art.

11) Someone studying molecules is just molecules trying to understand themselves *(unattributed)*.
Only time will tell whether the collaborative effort of many individuals working in a complex system will be able to unravel the complexity of an individual. At least we should give it a try.