Mass Spectrometry Imaging to Differentiate between Pancreatic Adenocarcinoma and Cholangiocarcinoma

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Introduction:
- Pancreatic adenocarcinoma (PDAC) and cholangiocarcinoma (CC) originate from epithelial cells of the pancreatico-biliary system.
- Histomorphological similarities between PDAC and CC present a challenge in diagnosis.
- Prognosis and treatment heavily rely on correct diagnosis.

Instrument and Methods:
- Tissue microarrays of PDAC (n=107) and CC (n=122) were digested with trypsin.
- Matrix (α-cyano-4-hydroxycinnamic acid) was evenly sprayed on the samples (TM Sprayer, HTX Technologies).
- Samples measured using a rapifleX MALDI-TOF mass spectrometer (Bruker Daltonik GmbH).
- Subsequently, matrix was removed, sections were stained by hematoxylin and eosin and tumor regions annotated.
- Data analysis was performed by using the SCiLS Lab and FlexImaging 5.0 software.

Results:
- Mass spectrometric analysis yielded 355 tryptic peptide peaks in the m/z range from 600 to 2200.

Overall sum spectra of both tumor sets: PDAC (blue) and CC (yellow)

For statistical analysis, the sample set was divided into a training set (60%), a validation set (20%), and a test set (20%). In the test set, 19 out of 21 pancreatic adenocarcinoma samples (90.48%) and 22 out of 22 cholangiocarcinoma samples (100%) could be classified correctly.

Conclusions and outlook:
MSI reliably differentiated PDAC and CC. This technology can potentially pave the way towards a reliable tool for clinical diagnostics. Further investigations will focus on the identification of a subset of peptide/protein candidate markers which have the potential to achieve a high level of diagnostic significance.

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