

Isabel Dittmann: Detection of Lung Cancer Risks Using Serum Metabolomics

Lung cancer is the primary cause of cancer-related death in the United States in both men and women and is responsible for more than 1.3 million deaths worldwide per year, burdening both afflicted patients and healthcare systems. Regarding the current poor prognosis for late stage lung cancer and the fact that the majority of lung cancer patients are diagnosed at a very advanced stage, there is a striking demand for a reliable early lung cancer screening method. Unfortunately, the multiplicity of different lung cancer subtypes has so far been a challenge in the attempts at isolating a single lung cancer molecular marker generally applicable across the different types of disease. The approach of HRMAS ¹H MRS, however, has been able to integrate several molecular markers into one comprehensive metabolomic profile. In generating such metabolomic profiles from cancerous tissues and the serum of lung cancer patients for the two most common subtypes of lung cancer (squamous cell carcinoma and adenocarcinoma) we hope to identify metabolite patterns specific enough to be used for the non-invasive identification of lung cancer risks from patient serum. Preliminary results of our research group correlating serum and tissue samples of lung cancer patients have already shown to be promising.

During my stay at MGH, I scanned a third of the project's research population of 100 lung cancer cases (both cancerous tissue removed during surgery and serum from the same patient), on the Bruker 14T Spectrometer. This data was then processed using MatLab software, while the tissue samples were embedded in paraffin, cut and stained with Haematoxylin and Eosin, for pathological evaluation and correlation with the spectroscopic findings. The results will eventually be used for the creation of cancer-specific algorithms that will be tested for specificity and sensitivity in identifying the two lung cancer types from a testing cohort with a final statistical evaluation.