Line scan Raman microspectroscopy

Bovenkamp et al. developed a line scan Raman microspectroscopy (LSRM) system to detect, discriminate and hyperspectrally visualize pituitary gland from pituitary adenomas based on molecular differences. By applying principal component analysis followed by a k-nearest neighbor algorithm, specific hormone states were identified and a clear discrimination between pituitary gland and various adenoma subtypes was achieved. The classifier yielded an accuracy of 95% for gland tissue and 84-99% for adenoma subtypes. With an overall accuracy of 92%, our LSRM system has proven its potential to differentiate pituitary gland from pituitary adenomas. LSRM images based on the presence of specific Raman bands were created, and such images provided additional insight into the spatial distribution of particular molecular compounds. Pathological states could be molecularly differentiated and characterized with texture analysis evaluating Grey Level Cooccurrence Matrices for each LSRM image, as well as correlation coefficients between LSRM images [1)].

1)
Bovenkamp D, Micko A, Püls J, Placzek F, Höftberger R, Vila G, Leitgeb R, Drexler W, Andreana M, Wolfsberger S, Unterhuber A. Line Scan Raman Microspectroscopy for Label-Free Diagnosis of Human Pituitary Biopsies. Molecules. 2019 Oct 4;24(19). pii: E3577. doi: 10.3390/molecules24193577. PubMed PMID: 31590270; PubMed Central PMCID: PMC6804209.