Cancer Screening via Infrared Spectral Cytopathology (SCP): Results for the Upper Digestive Tract

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Instrumental advances in infrared micro-spectroscopy have made possible the observation of individual human cells at acquisition rates that allow the construction of large datasets. The observed spectra represent a snapshot of the biochemical composition of a cell; this composition varies subtly but reproducibly with cellular effects such as progression through the cell cycle, cell maturation and differentiation, and disease.

The aim of this summary is to provide a synopsis of the progress achieved in infrared spectral cytopathology (SCP) – the combination of infrared micro-spectroscopy and multivariate methods of analysis – for the detection of abnormalities in exfoliated human cells of the upper digestive tract, namely the oral cavity and the esophagus. The efforts included the development of data acquisition protocols and methods for data pre-processing and analysis.

These results have demonstrated the sensitivity of SCP toward detecting cellular abnormalities, and have confirmed earlier observations from several research groups that SCP detects disease earlier (i.e., for cells that still exhibit normal morphology) and not only from an abnormal lesion but from the vicinity of such a lesion. These results will be discussed in terms of the overall accuracy and clinical utility of SCP.

References


