

Micro-FTIR can identify differences in cells from normal and abnormal thyroid follicular cells.

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The thyroid cancer is the most common endocrine tumor and its incidence has more than double in the last 40 years. The women incidence is growing faster among all types of cancer. The papillary carcinoma is the most common type of malignant cancer and represents around 80% of all cases[1]. In the other hand, the nodular goiter is an enlargement of the gland and leads to hyperthyroidism. The goal of the study is to show the biochemical differences among follicular cells, normal, goiterous and papillary cancer thyroid tissue. Selected Samples from three thyroid tissue microarray (BiomaxUS) were used throughout this study. Tissue sections for spectral data acquisition were cut into thickness of ca. 5 μm and mounted on low-e microscope slides. Infrared spectral maps were collected in transfection (transmission/reflection) mode using a Perkin Elmer Spectrum 1/Spotlight 400 (Shelton, CT) instrument that incorporates a 16 element focal plane array (FPA) detector system. The nominal pixel area projected onto a detector element was $6.25\mu\text{m} \times 6.25\mu\text{m}$. Raw image data sets were imported into a software written in-house in the MATLAB environment. All spectra were vector normalized, noise-filtered, and corrected for water-vapour and scattering effects before being subjected to Hierarchical Cluster Analysis (HCA), in order to segment all spectra into classes that were correlated with histological structures obtained from images of H&E-stained parallel tissue sections. Our results show several differences in the IR spectra. The most remarkable differences are observed on the amide I region that is related to changes in secondary structure of the protein due to iodination process (1468 cm^{-1}). There are also differences in carbohydrates ($1000\text{-}1100\text{ cm}^{-1}$) that reveal differences in glycosylation of thyroglobulins patterns on goiterous and cancerous cells.

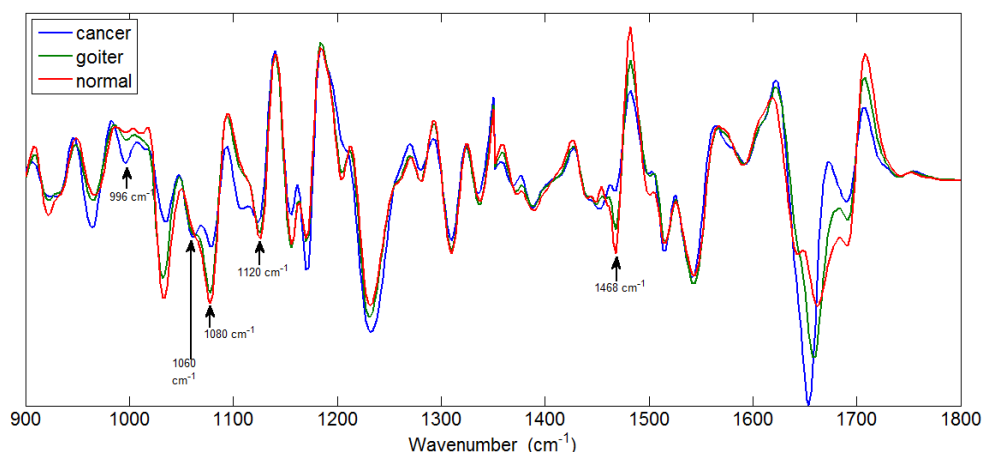


Fig. 1. Mean of 2nd derivative spectra from normal, goiterous and papillary tumor tissues.

References

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Acknowledgements

CNPq-INFO(573916/2008), CNPq(143166/2009-3; 555621/2009-0; 308277/2009-0), FAPESP-CEPID (05/51689-2) and CAPES (9036-11-3).