

## EVALUATION OF FTIR SPECTRA OF THYROID ASPIRATION

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Thyroid nodules are a common disorder. The risk of developing a clinically significant thyroid nodule is among 4% and 10%. Although the fine needle aspiration biopsy (FNAB) is a highly accurate method for thyroid tumors diagnosis though histopathology analysis, the discrimination between benign and malignant papillary neoplasm is currently not possible, leading to a surgical interventions due to the risk of carcinoma. In this case, there is a lack of biological marker able to identify malignant transformation. The aim of this pilot study is to verify any possible differences on FTIR spectra of FNAB of thyroid carcinomas and goiters. Samples of FNAB of thyroid nodules and corresponding normal surrounding gland, suspended in 2 ml of saline solution at 0,9%, were surgically collected and frozen in liquid nitrogen. A drop of 5  $\mu$ L of the cell suspension was dried and placed on one infrared transparent CaF<sub>2</sub> window. The FNAB samples were measured on a Nicolet 6700 FT-IR spectrometer, between 525 and 4000  $\text{cm}^{-1}$ , at a nominal resolution of 4  $\text{cm}^{-1}$  with 120 scans. The spectra were corrected by the baseline and vector normalized as well as their 1st and 2nd derivatives in order to minimize variations of sample homogeneity. Then, these spectra were converted into second derivatives using the Savitzk-Golay algorithm with a 9 points window. The Ward's minimum variance algorithm and Euclidean distances among the points were used. For each sample of FNAB used in the study, the cytological diagnosis was determined by a trained pathologist/cytologist using Giemsa staining.

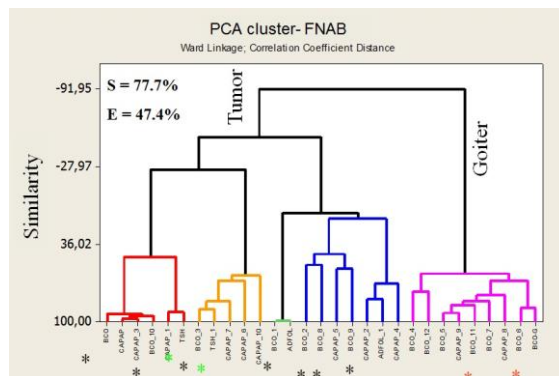


Figure 1. Thyroid aspirates dendrogram.

40 samples, including 19 adenomatous goites and 13 papillary carcinoma, 2 Graves disease, 2 follicular adenoma and 4 Hashimoto thyroiditis, were evaluated. Some thyroid aspirates showed a more complex spectral pattern. Generally, patients are diagnosed with colloid goiter when the FNAB contains many blood cells and large amount of thyroglobulin, that it represents the bands of 1545 and 1655  $\text{cm}^{-1}$ . Bands in regions between 1409, 1412, 1414, 1578 and 1579  $\text{cm}^{-1}$  were found, indicating presence of sugar, DNA, citric acid or metabolic products. Preliminary results suggest that FT-IR spectroscopy may be useful differentiate thyroid carcinomas from goiters (fig. 01), but further evaluation is necessary to find a pattern on papillary thyroid spectra. *Acknowledgments: FAPESP - CEPID (05/51689-2), CNPq - INFO (573916/2008) and CNPq (143166/2009-3).*