**TWO-DIMENSIONAL DIFFERENCE GEL ELECTROPHORESIS (2D-DIGE) PROTEOMIC ANALYSIS IN EPITHELIAL HUMAN THYROID CARCINOMA IDENTIFIED VOLTAGE-DEPENDENT ANION CHANNEL 2 PROTEIN (VDAC2) AS AN APOPTOTIC KEY FACTOR**

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**Background/Purpose:** The role of the BAX (Bcl-2–associated X protein)/BAK1 (Bcl-2 homologous antagonist/killer) and VDAC2 in thyroid tumourogenesis is controversial; however, in other neoplasias the overexpression of VDAC2 selectively inhibited the mitochondrial apoptotic pathway through the arrest of the BAK1 activation. Moreover, VDAC-2 appears to be a major inhibitor of pro-apoptotic functions of BAK1.

The aim of this project was to apply (2D-DIGE) to identify differential protein patterns in thyroid tumours with different histological pattern.

**Methods:** Surgical snap-frozen specimens obtained from patients with papillary carcinoma (PC), follicular carcinoma (FC), poorly differentiated/anaplastic carcinoma (ATC), adenomas (AD). 2-Proteomics by 2D-DIGE. Then, spot cutting, digestion and identification of proteins processed by MALDITOF MSMS.

**Results:** 120 proteins were identified showing differential expression in the tumours and moreover, they are organized in different biological networks. Among of the protein we identified VDAC2, BAX and BAK1, involved in the apoptosis pathways via mitochondrial. The expression of these proteins were confirmed by real-time reverse-transcription PCR (qRT-PCR) and they showed a very high up-regulation of VDAC2 protein in all subtypes of tumours analyzed (PC, 24-fold-change, FC, 29- fold-change, ATC, 16- fold-change) when was compared with adenomas and normal tissue; down regulation of BAK1 in FC and PC (0,5 fold-change); and a discrete up-regulation in the ATC was observed (1,2 fold-change). Finally, BAX is down- regulated in FC (0,5 fold-change) and a discrete up-regulation in PC (1,2 fold-change) and ATC (2 fold-change) were detected.

**Discussion & Conclusion:** These findings open a new focus to investigate the role of these proteins in future experiments to be conducted in epithelial thyroid tumours.