Proteomics and metabolomics studies of adrenal cancer and benign adrenal neoplasia: new insights in the pathogenesis of adrenal masses

The management of adrenal benign (AAs) and malignant tumors (ACCs) still represents a challenge being hard the characterization of these lesions exclusively on the basis of radiological criteria (especially if small in size), because of the limited knowledge about clinical behaviour of AAs (hormonal hypersecretion, growth rate, progression towards malignancy) and the lack of relevant biomarkers which detect malignancy with certainty.

The aim of our work is to analyse the "dark side" of ACCs and benign adrenal neoplasia, by characterization of the molecular mechanisms involved in the neoplastic transformation of the adrenal gland, taking advantage from the experience obtained by the proteomics and metabolomics studies.

In this study we examined proteomics and metabolomics signature in a subset of patient tissues submitted to adrenal surgery.

Tissue samples from adrenal surgery of ACCs and AAs patients and from normal adrenal gland, were analysed using 2D-DIGE technology, which was established as a sensitive and quantitative detection method of several thousand of proteins at once. Proteins statistically changed among the three conditions were recognized by mass spectrometry MALDI-Tof and protein pathways of interest were further investigated.

The same samples were than used to perform metabolomics study; the quantitative variation of a large number of cellular metabolites in neoplastic cells, were evaluated by mass spectrometry coupled with gas chromatography (GC) or liquid chromatography (HPLC).

Integration of metabolomics and proteomics information were aimed at revealing molecular pathways as well as at identifying molecular features decisive in stratifying the patients.

Moreover, concerning ACCs, we expect to discover new biomarkers able to consent an earlier diagnosis and treatment of this malignant tumor, possibly through new pharmacologic targeted therapies (the inefficacy of the conventional chemotherapies have been clearly demonstrated) and at last improving the prognosis and the disease-free survival.

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