

Proteomic Comparison of the ACI Rat Mammary Gland and Mammary Tumors Induced by 17 β -Estradiol

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The ACI rat is uniquely susceptible to mammary carcinogenesis by estrogen an appropriate animal model for studying human breast cancer. This study was designed to analyze the differential expression of proteins from ACI rat mammary gland and tumor tissues, to identify potential biomarkers for breast cancer diagnosis. The cytosol of normal and tumor tissues were collected after continuous 17 β -estradiol for 38-46 weeks. Using 24 cm gel strips for Isoelectric focusing, 500 μ g of proteins were focused on each gel, followed by 12% SDS-PAGE. Both samples were in triplicate. Two-dimensional gel patterns were analyzed with Non-Linear Dynamics' PhoretixTM 2D Evolution 2005. Seventy spots were significantly different between normal and tumor mammary tissues. All protein identifications were obtained by LC-MS/MS and TurboSEQUENT after trypsin in-gel digestion. Twenty six proteins were identified, 12 of 26 proteins are associated with carcinogenesis: glutamate dehydrogenase, chloride intracellular channel 1, cytokeratin 19 and nucleolar phosphoprotein B23.1 are up-regulated with tumor development; whereas transaldolase 1, beta-galactoside-binding lectin, mammary growth derived inhibitor, GDP-dissociation inhibitor, glycosylation dependent cell adhesion molecule 1, Annexin V, tropomyosin 1 and calreticulin were down-regulated. Cytokeratin 19 has been suggested as a marker in breast cancer while chloride intracellular channel 1 as a marker in colorectal cancer. MDGI has been reported as a growth inhibitor for breast cancer, since its high expression in normal mammary tissue vs. very low presence in tumor tissue on 2D gels, it can be considered as a bio-marker for mammary carcinogenesis. This is the first protein expression analysis of ACI rat mammary gland compared to spontaneous tumors arising in the mammary glands following continuous estrogen exposure.