Exploring cancer cells metabolism by Magnetic Resonance Spectroscopy

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Non-invasive nuclear Magnetic Resonance spectroscopy (MRS) and imaging (MRI) technologies could play a crucial role in oncology by understanding cancer biochemistry and identifying cancer lesion respectively. In particular, through the exploration of the metabolic pathways within cancer cells, MRS provides precise insights into dynamic changes associated with malignancies such as alterations in glycolysis and lipid metabolism. Moreover, multiparametric MRS methodologies allow the identification and quantification of key metabolites, that could act as potent biomarkers for cancer progression and response to therapy. In this scenario, abnormal levels of choline- containing intermediates of the phosphatidylcholine (PC)-cycle, which contribute to the so-called 1H MRS peak (tCho, 3.2 ppm), are today held as a general feature of cancer cells and tissues. We have applied MRS-based metabolomics to elucidate the molecular mechanisms underlying altered MRS profiles and the relations between metabolic reprogramming and altered cell signalling in cancer cells.