

A detailed metabolic pathway map, likely from a textbook or scientific reference, showing various biochemical reactions and molecules. The map is colorful and includes labels for numerous compounds such as Glucose-6-P, Fructose-6-P, ATP, NADPH, and various amino acids and lipids. The background is a complex network of lines and text, with some molecules highlighted in yellow or green boxes.

Lipid Metabolism Reprogramming in Malignancy, from De Novo Synthesis to Storage

Lipid metabolism is greatly altered in human cancer. Our studies have shown that increased lipid uptake, storage and lipogenesis promote rapid tumor growth. Sterol regulatory element-binding proteins (SREBPs), a family of membrane-bound transcription factors in the endoplasmic reticulum, play a central role in the regulation of lipid metabolism. We demonstrated that SREBP-1 is highly upregulated by oncogenic signaling in human cancers to promote tumor growth, and revealed the underlying molecular mechanism that links glucose to lipid metabolism activation in cancer cells. We found that glucose induces N-glycosylation of SREBP-cleavage protein (SCAP), a key regulator of lipid metabolism, enabling SREBP-1 trafficking and nuclear translation to activate lipid synthesis and uptake for rapid tumor growth. Recently, we further identified that human brain tumors contain large amounts of special lipid-storing organelles, lipid droplets, which are rarely detected in normal brain tissues. Our data demonstrated that lipid droplets represent a unique signature in glioblastoma, and serve as a novel diagnostic and prognostic biomarker, which could also have significant implication for current brain tumor therapy. In summary, targeting altered lipid metabolic pathways has become a very promising anti-cancer strategy.