The Taurine-Slc6a6 Axis Promotes Breast Cancer Progression by Alleviating Oxidative Stress and Accelerating Cell Cycle Progression

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Abstract

Taurine metabolism is emerging as an important player in cancer progression, yet its precise roles remain incompletely understood. Our study revealed that elevated serum Taurine levels and concomitant upregulation of its transporter, Slc6a6, are associated with enhanced tumor growth. Functionally, Slc6a6 overexpression drives tumor progression in vivo and accelerates cancer cell proliferation in vitro. Mechanistically, we identified a dual pro-oncogenic function for Slc6a6. First, Slc6a6 possesses intrinsic antioxidant regulatory capacity and further enhances cellular redox homeostasis by mediating the uptake of the antioxidant molecule Taurine. Second, beyond its metabolic role, Slc6a6 directly interacts with the cell cycle regulator Rprd1b to promote the G1/S phase transition, leading to uncontrolled proliferation. Clinically, bioinformatics analyses correlate high SLC6A6 expression with poor prognosis in breast cancer patients, underscoring its potential as a therapeutic target.