

Metabolic reprogramming of cancer cells for proliferation and metastasis

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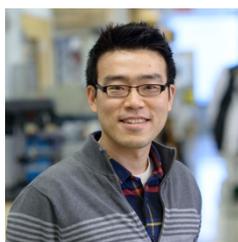
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Abstract

Aberrant metabolism is essential for cancer cells to meet their needs for biosynthetic and bioenergetic processes. We are mainly interested in the serine synthesis pathway (SSP) in cancer cells due to its versatile role. The SSP generates serine and glycine, which are non-essential amino acids. However, they are pseudo-essential for cancer cells because they are required for nucleotide and lipid synthesis and redox homeostasis. We discovered that leukemic cells exhibited significantly higher SSP flux in fructose-rich conditions compared to glucose-rich conditions for their fructose metabolism. The proliferation rates of leukemic cells in fructose-rich conditions were similar to or higher than in glucose-rich conditions, and SSP inhibition significantly inhibited the proliferation in fructose-rich conditions. Also, we have recently found that higher expression of E-cadherin, a major adherens junction molecule, upregulates the SSP enzymes in triple-negative breast cancer (TNBC) cells. This metabolic reprogramming significantly benefits TNBC cells for their proliferation and oxidative stress resistance. Targeting PHGDH, a rate-limiting enzyme in the SSP, hampers the tumor growth and lung metastasis in breast cancer xenograft mouse models.

Bio



Sangmoo Jeong is an Assistant Professor in the Department of Chemical & Biomolecular Engineering at Johns Hopkins University. His lab is interested in how cancer cells reprogram their metabolism to adapt and continue their malignant growth in various conditions. With expertise in device engineering, his lab focuses on developing technologies to deepen our understanding of local and systemic metabolic malfunctions in diseases and identify how our daily diet affects disease progression. He received a Bachelor of Science degree in Electrical Engineering from the KAIST in Korea and a Master of Science and a Ph.D. in Electrical Engineering from Stanford University. He completed his postdoctoral research at Mass General Hospital, and later, Memorial Sloan Kettering Cancer Center. He is a recipient of the NIH K99/R00 and MIRA awards.