Glutamine, an important metabolic target in cancer cells

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Abstract

Introduction

Metabolic alterations, which are necessary for survival and aberrant growth of cancer cells, are mediated by oncologic changes during carcinogenesis. glutamine, the most abundant amino acid in the blood and tissues, is necessary for proliferative neoplastic cells, and marked changes in its metabolism are characteristic of the host with cancer.

Methods

Number of articles included key words glutamine, metabolic alterations, cancer cell targeting, were extracted from databases pubmed, scopus, and web of science

Results

The high rate of glutamine uptake in malignant cells results from its vital role as a nitrogen donor in nucleotide and amino acid biosynthesis. glutamine also assists atp production and refills mitochondrial tricarboxylic acid cycle (tca) carbon pool to support citrate and fatty acid synthesis. in addition, glutamine provides glutamate that is a precursor for master antioxidant glutathione in cancer cells. to prevent apoptosis in malignant cells, glutamine facilitates the import of essential amino acids to maintain activation of mammalian target of rapamycin complex 1 (mtorc1) which regulates cell growth and survival. more interestingly, glutamine may be a source for 2 hydroxyglutarate that causes histone methylations and finally induces expression of stem cell markers in cancer cells.

Conclusion

Since human cancer cells have shown sensitivity to glutamine starvation, such as lung and pancreas carcinoma, glioblastoma and leukemia cells, various anticancer approaches have been recommended to target glutamine metabolism, for instance suppression of its uptake and inhibition of tca and mtorc1, to name a few. all together, there is a great hope that metabolomics lead us to new targets for therapeutic intervention.

Keywords

Glutamine, metabolic alterations, cancer therapy.