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Application of stable nitrogen isotopes in human colorectal cancer research

Application of stable isotopes, especially carbon and nitrogen, are becoming a powerful tool in medical science. A novel application of the natural abundances of nitrogen isotopes, ^{14}N and ^{15}N in the understanding of amino acid metabolism in human colorectal cancer cells was carried out. Nitrogen isotope ratios are of particular advantage to understand the metabolic state of cancer cells, since most biochemical reactions involve transfer of nitrogen. In this study nitrogen isotopes of individual amino acids from human colorectal cancer cell lines were analyzed. Significant effects were noticed in the case of glutamic acid, alanine, aspartic acid and proline between cancer and healthy cells. The data suggest that glutamic acid is a nitrogen acceptor while alanine, aspartic acid and proline are nitrogen donors in cancerous cells. One plausible explanation is the transamination of the three acids to produce glutamic acid in cancerous cells. The findings are significant since glutamic acid and alanine make up more than 60 per cent of the total amino acids in the human body. Glutamine is a significant source of energy for cells and also a prime donor of nitrogen in the biosynthesis of many amino acids. Several studies have advocated the role of glutamic acid in cancer therapy. Identification of metabolic signatures in cancer cells will be crucial for advancement of cancer therapies based on the cell's metabolic state.

Biography

R V Krishnamurthy obtained his PhD from the Physical Research Laboratory, Ahmedabad, India and worked as a Fellow of Geochemistry at the California Institute of Technology for seven years. In 1991, he moved to the Western Michigan University to set up a program in Stable Isotope Geochemistry. He is currently a Professor in the College of Arts and Sciences. He has published more than 60 papers in high impact journals such as *Science*, *Nature*, *Geochimica et Cosmochimica Acta*, *Geophysical Research Letters*, *Applied Geochemistry*, *Geobiology* and *Scientific Reports*. His research spans Biochemistry, Geochemistry, Hydrology, Atmospheric Sciences and Cosmochemistry. He is featured in Who's Who in North American science.

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