Cancer-driven isotopic fractionation

Vincent Balter[1]

[1]Lyon Lab of Geology, Ecole Normale Supérieure de Lyon, 46, Allée d'Italie, 69342 Lyon Cedex 07 FRANCE

Abstract

In cancer, copper concentrations increase in the blood and in tumor cells, leading to deleterious side effects. The mechanisms of this copper accumulation and the source of extra copper burden are still poorly understood. In hepatocellular carcinoma (HCC) patients, blood copper is enriched in ^{63}Cu compared to control subjects and this isotopic signature is not compatible with a dietary origin. It rather reflects the massive reallocation in the body of copper immobilized within cysteine-rich proteins such as metallothioneins. I will also show that the blood of HCC patients is enriched in ^{32}S compared to control subjects, an enrichment compatible with the notion that some proportion of blood sulfur originates from tumor-derived sulphides. I will emphasize on the hypoxic conditions of the tumor microenvironment, how they can impair the metabolism of copper and sulfur, notably by changing their redox state and, as a consequence, their ability to bind specific molecules. Finally, isotopic ratios of zinc, carbon and nitrogen, in tumors, in vitro cancer cells and in blood will be discuss.