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Glucose analogues and cancer

More than 80 years ago, it was discovered that cancer cells rely on increased glucose consumption, and this opened a new window for cancer diagnosis. Now, a radioactively labelled fluorinated analogue of glucose, 2-fluoro-deoxy-D-glucose (FDG), is the most common contrast agent used in positron emission tomography for the diagnosis of cancer. Although, glucose analogues have been used to study glucose metabolism in the cells, it is becoming clear that cellular effects of such glucose analogues is not limited to glucose metabolism, and some important potential applications of these drugs might have been overlooked.

In this work we have investigated potential effects of two glucose analogues, 2-deoxy-D-glucose and 2-fluoro-deoxy-D-glucose in cancer cells. Our data have revealed that these drugs change cellular lipid metabolism, as well as intracellular trafficking. Importantly, we have discovered that both 2-deoxy-D-glucose and 2-fluoro-deoxy-D-glucose decrease cellular levels of the glycosphingolipid Gb3, which is related to multiple metastatic cancers. Thus, our data suggest that glucose analogues should be explored for their potential use in cancer treatment.