ORIGINAL ARTICLE

Annals of Nuclear Medicine Vol. 11, No. 3, 183–188, 1997

Effects of antitumor agents on ^{3}H-2-deoxyglucose uptake in tumor cells and their relationship with the main targets of the antitumor agents

Atsuo WAKI, Yasuhisa FUJIBAYASHI, Norihiro SADATO, Tatsuro TSUCHIDA, Yasushi ISHII, Akira YOKOYAMA and Yoshiharu YONEKURA

Biomedical Imaging Research Center, Fukui Medical School

To investigate the effects of antitumor drugs on ^{3}H-2-deoxyglucose (DG) uptake in tumor cells, we performed DG uptake studies of the short-term treatment of four kinds of antitumor drugs in a cell culture system. The antitumor drugs adriamycin (ADM) and cisplatin (cDDP), which affect on DNA synthesis, did not greatly affect DG uptake, but DG uptake was lowered by antitumor drugs, actinomycin D (AcD) and cycloheximide (CHX), which target the gene expression system. To investigate the mechanism of DG uptake changes, we also tested the effects of some glucose metabolic inhibitors on DG uptake. An inhibitor of glycolytic flow (iodoacetate) lowered DG uptake whereas mitochondrial inhibition increased DG uptake. These results on the inhibition of glucose metabolism indicated that there were two types of factors affecting DG uptake directly; one affects glycolysis and the other affects oxidative phosphorylation. The two antitumor drugs with effects on gene expression were thought to act by the former. The effects of the drug treatments for tumors on DG uptake could be divided into three groups; glycolysis inhibition, mitochondrial inhibition and no relation to glucose metabolism. With the further observations of FDG uptake changes based on this prediction, the biochemical relationship between treatment effects and FDG uptake changes will be clarified.

Key words: FDG, tumor cells-cultured, antitumor-drugs, glucose metabolism