

Property of ^{18}F -FDG uptake in tumor cells and inflammatory cells

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Abstract

This study was performed to investigate an in vitro property of glucose uptake in tumor cells and inflammatory cells. Cell lines including YAC-1 (derived from murine lymphoma), Fet-J (derived from feline lymphocyte), AH109A (derived from Donryu rat ascites hepatoma), and macrophage ($M\phi$), neutrophils (Neu) of Donryu rat were used to evaluate their kinetic parameters of glucose uptake in the presence and absence of steroid (dexamethasone). Rats were prepared in three groups that includes negative controls, 5 % casein treated (intraperitoneal injected), and tumor (AH109A) inoculated subcutaneously. $M\phi$ and inflammatory cells were obtained from intraperitoneal washing after casein injection. The glucose uptake was monitored by using ^3H -fluorodeoxyglucose (FDG). In tumor (AH109A) inoculated rats, significant increase in V_{max} and decrease in K_m of glucose uptake was observed in $M\phi$, which was about 3.2 times in V_{max} and one third in K_m as to controls. This result suggested significant increase in specific glucose transporters or incorporating system of $M\phi$ when AH109A was inoculated. On the other hand, casein injected rat showed lower values in both V_{max} and K_m . The significant differences observed in the kinetic parameters in both groups indicated different activity of glucose consumption of $M\phi$. In casein injected rat, Neu had only 13 % of glucose consumption of $M\phi$ as to V_{max} . YAC-1 and Fet-J had about 50-70% of V_{max} and 20-60% of K_m of controls $M\phi$, respectively in cellular basis. AH109A had 70% of V_{max} of $M\phi$ from tumor inoculated rat. No significant effects of steroids were observed. However, the inflammatory cells obtained after casein injection is thought to be pre-activated status, further study is needed to elucidate the mechanisms of activation of glucose uptake that may be related to the status of glucose transporters and/or hexokinase activities which are affected by a number of factors.