Cell cycle dependency of ^{18}F-Choline and ^{18}FDG uptake during proliferation of cultured human cancer cells

M. Shozushima, J. Yamamoto, Y. Hara[1], K. Terasaki[2], S. Goto[3] and R. Iwata[4]

Department of Dental Radiology, School of Dentistry, Iwate Medical University
19-1 Uchimaru, Morioka 020-8505, Japan

[1]Department of Oral Surgery, School of Dentistry, Iwate Medical University
19-1 Uchimaru, Morioka 020-8505, Japan

[2]Cyclotron Research Center, Iwate Medical University
348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan

[3]Nishina Memorial Cyclotron Center, Takizawa Institute, Japan Radioisotope Association
348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan

[4]CYRIC Tohoku University
Aramaki, Aoba-ku, Sendai 980-8579, Japan

Abstract

In this study, the relationship between ^{18}F-Choline uptake and the cell cycle phase in cultured human cancer cells (HeLa S3), as well as how they compare to the conventional tracer ^{18}FDG with PET was assessed.

Flow cytometry findings confirmed that the cells were well synchronized. ^{18}F-Choline uptake was 77% of the peak level in the early S-phase immediately after release, gradually increased, and peaked in the early G2/M phase. Subsequently, ^{18}F-Choline uptake steeply declined over the late G2/M phase to 58% in the G1 phase. However, ^{18}FDG was significantly higher in the early S phase compared to the G1 phase.

The results suggest that the uptake of ^{18}F-Choline and ^{18}FDG are cell cycle dependent, are associated with the proliferative activity of the tumor seen during PET imaging.