F. Tumor Diagnosis

ON THE ACCUMULATION OF STABLE ISOTOPE ^{15}N-GLYCINE INTO HUMAN CANCER TISSUE

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The use of radioactive isotopes for medical, physiological and pharmacological investigation in human beings has a long history. Although many clinical tests have been developed with radioactive isotopes, their use in reasonably healthy subject, pregnant woman and children will probably remain limited because of the radioactivity. The stable isotopes will find broad application in studies of human beings, particularly in investigation of metabolic disorders, drug metabolism and nutritional disorders and deficiencies.

Method: ^{15}N-glycine test was performed on 11 patients with a variety of lung, stomach and intestine cancer. The patients took 500mg of ^{15}N-glycine(95.5 atom %) by oral administration 24 or 48 hours before operation. The normal and cancer tissue were removed 24 or 48 hours after oral administration. The urine was collected at each interval of 2, 4, 8, 24, 48 and 72 hours after the administration. The nitrogen compoun in cancer tissue, normal tissue and urin to be analysed is converted according to Kjeldahl's method to an ammonium compound and oxidised to molecular nitrogen by the interaction with NaOBr and the sample chemistry provides the nitrogen sample in the discharge tube under the pressure required for excitation using Kumazawa's apparatus. Then the concentration of ^{15}N was measured with ^{15}N-analyzer NOI-5.

Conclusion: The uptake of ^{15}N into cancer tissue was obviously larger than in normal tissue, however, the excretion amount of ^{15}N in urine was largely variational.

UPTAKE AND EXCRETION OF ^{67}Ga, ^{201}Tl IN CULTURE CELLS

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In previous studies, we reported that the delay in the excretion of ^{67}Ga from tumor cells seemed to play an important role as one of the factors involved in the ^{67}Ga-tumor accumlation. Further studies were undertaken to assess the accretion mechanisms as follows:

1) comparison of the kinetics of ^{67}Ga with those of ^{201}Tl using culture cells
2) the effects of Ouavain on ^{67}Ga and ^{201}Tl uptake by tumor cells
3) the change of ^{67}Ga and ^{201}Tl uptake by heat-damaged nonviable tumor cells
4) the effect of stable Ga on uptake and excretion of ^{67}Ga

^{67}Ga uptake with time by Yoshida sarcoma was not marked up to the period between 30 min. to 3 hours of contact time, but from 3 hours onto 24 hours as the contact time increased, the uptake increased linearly, showing a biphasic tendency. On the other hand, accretion of ^{201}Tl was very rapid and the activity of the cells were nearly constant from 30 min. after administration. The excretion of ^{67}Ga from Yoshida sarcoma and HeLa S3 tended to decrease with prolongation of the contact time and about 90% of activity remained in the cell with contact time of 24 hours. The excretion of ^{201}Tl was very rapid regardless the contact time and the residual activity was 4 to 6 % one hour after change of medium. With the administration of Ouavain the tumor uptake of ^{67}Ga was not inhibited, but that of ^{201}Tl showed remarkable inhibition with 0.5 mM/ml-medium. ^{67}Ga uptake by nonviable tumor cells seemed unchanged or slightly increased compared with viable tumor cells, while there was an apparent decrease with ^{201}Tl. After the administration of stable Ga there was tendencies to show a delay of incorporation and an acceleration of excretion of ^{67}Ga in tumor cells as well as in normal cells.

From the above results, it seemed that the kinetics of ^{67}Ga and ^{201}Tl in the cells differed each other and the mechanisms were not identical. Also, as far as ^{201}Tl-accretion was concerned, active transport mechanism seemed to play an important role.