Analytical Studies on Cell Proliferation and Growth of Human Carcinoma in Digestive Tract — in Vivo

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We have reported that the growth pattern of human gastric carcinomas can be divided into three types. This idea was proved to be valid by *in vivo* ^{3}H-Thymidine autoradigraphic analysis of human gastric and rectal carcinomas, and by roentgenographic growth analysis of astric carcinomas.

Using "local commulatic labeling method", the ^{3}H-Thymidine 25 μCi was injected every 24 hour during 3 or 10 days into skin or lymphnode in 4 cases of metastatic tumor of human gastric carcinomas and one case of metastatic tumor of human rectal carcinoma, and into a primary tumor mass of rectal carcinoma. Within 24 hours after the final injection, tumor extirpation or rectal amputation was done, and immediately the materials injected with the label were fixed in formalin or Carnoy's fluid and the paraffin sections were prepared. Autoradiography was carried out by dipping into Sakura NR-M2 emulsion. After about 30 days of exposure, these sections were developed using FD 111 developer and stained with H.E.

It is demonstrated that the generation time (t_G) of metastatic tumors of human gastric carcinomas in the skin or lymphnode was 11-14.7 days, and the DNA synthesizing time (t_S) was 22-40 hours. It is also demonstrated that t_G of rectal carcinoma and its metastatic tumor in the lymphnode was 12.4 and 15.4 days, respectively, and that t_S of them was 30 and 43 hours, respectively. Namely, in human digestive tract, t_G and t_S of carcinomas, either they were primary ones in the digestive tract or metastatic ones from the tract, were ascertained to be almost equal.

We analysed the growth of human gastric carcinomas at the early spreading and the advanced stages, using roentgenographic mensuration. The doubling time of the early spreading carcinomas of the stomach in 8 patients varied from 2 to 6 years, and those of the advanced carcinomas of 3 patients varied from 3, 9 months. In the 2 cases of metastatic skin tumor of gastric carcinomas, the tumors were regarded as an ellipsoid and two diameters were measured on their extirpation. By assuming that the original volume of them, on the stomach resection, was 1 mm^3, the growth rate and the doubling time of the tumors was calculated to be $>$0.036-0.056, $<$19-60 days, respectively.

In spite of the similar generation time, it was proved that the doubling time of metastatic skin tumor of gastric carcinomas differed from that of original gastric carcinomas. This reason can be explained by the assumption that the cells of limited life span in the latter is larger than in the former. The reason why the doubling time of the early spreading gastric carcinoma was larger than that of the advanced one, can be explained assuming that the cell loss in the former is more than in the latter. Present study confirmed our previous statement that the differences in the growth patterns of human cancer can be explained by the balance between the cell proliferation and the cell loss of the tumor.