Autoradiographic Analysis of Growth and Proliferation in Human Breast Cancers Using Tritium Thymidine in Vivo

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We have studied kinetics of cellular proliferation in human neoplasm in vivo, using tritiated thymidine local labeling technique. In this paper we report the result of analysis of growth and cell proliferation of two breast cancer cases.

Two cases with carcinoma simplex were used for this experiment, case I being a 49-year-old woman and case II a 38-38-year-old one. We assumed that the growth pattern in human cancer was exponential growth and the volumes of tumor were measured during the clinical course of these cases. The following doubling time $t_d$ and growth rate $\delta$ of cases were estimated with the use of the formula, $V=V_0 e^{\delta t}$, $V=V_0 e^{\delta t} = V_0 e^{\delta t}$. Case I; $t_d$ is equal to 169 days and equal to 0.0041.

Case II; $t_d$ is equal to 34.3 days and equal to 0.0202.

For kinetic analysis of cell proliferation, we repeated injections of tritiated thymidine into the tumor in vivo (in vivo local cumulative labeling method). This method was applied to these two cases. Results obtained in this experiment were as follows.

Case I; labeling index (LI) counted in flash label autoradiographs was 19%, at 4 days continuous labeling 53%, at 6 days 83%, and at 8 days 93%. In the same way, case II; LI at flash labeling was 18%, at the 5 days 59%, and at the 7 days 70%.

From these data a proliferation curve was drawn, from which generation time $t_g$ of case I was equal to 10.2 days and DNA synthetic time $t_s$ 2 days. These values were very similar to those of human squamous cell cancer (Ashihara 1967).

Suppose $p$ is the probability for a cell to become the generative cell after the cell division and be $q$ the probability for a cell to flow from the generative cell to CLLS. i.e. cells of limited life span, $p$ and $q$ can be calculated by $p=2^{t_d} e^{-1}$ and $q=1-p$.

The pattern of the cancer cell proliferation is quantatively expressed as the decrease of $q$ or increase of $p$. Thus, case I; $p=0.52$ and $q=0.48$, case II; $p=0.63$ and $q=0.57$.

Autoradiographic Studies on Cytokinetics of Human Uterine Cancers in Solid form and in Ascitic Form Using $^3$H-Thymidine

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The generation time and the DNA synthetic time of the cell population of human uterine cancers, grown both in solid form and ascitic form, was studied by $^3$H-thymidine autoradiography in vivo. Materials we studied for kinetic analysis of cellular proliferation were three cases of uterine cancers. Case 1 is a 63-year-old woman, Case 2 is a 70-year-old woman, both bearing cervical cancers in the solid form. For the kinetic analysis of cell...