Short Report

Cytofluorometric Analysis of Nuclear DNA and Cell Protein in Pancreatic Carcinoma

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YAMAUCHI, H., ICHINOHASAMA, R., KAKIZAKI, K., YAMADA, Y. and TANAKA, N. Cytofluorometric Analysis of Nuclear DNA and Cell Protein in Pancreatic Carcinoma. Tohoku J. Exp. Med., 1989, 159 (3), 245-246—Cytofluorometric analysis of pancreatic carcinoma was performed in six patients, using a method for simultaneous one-step staining of nuclear DNA and cell protein. All carcinoma cells demonstrated ploidy abnormalities in DNA histogram; polyploid with or without aneuploidization. The carcinoma cells of two patients who died within one year after resection showed significantly higher polyploidization of DNA and bigger amount of cell protein than those of four patients who survived longer than one year after surgical managements. pancreatic carcinoma; DNA ploidy pattern; cell protein; prognosis

In the past three years, we have been involved in surgical treatment of 28 patients with pancreatic carcinoma at the Department of Surgery, Sendai National Hospital. Among them, carcinoma cells of 6 patients were served for cytofluorometric study to examine the difference in nuclear DNA ploidy pattern and cell protein between the two groups; 4 patients who survived longer than one year (group A), and 2 patients who died within one year (group B). Fifty μm thick sections of carcinoma tissue were deparaffinized, minced and treated with trypsin. Then, the cell suspension was smeared after staining with 4', 6-diamidino-2 phenylindole (DAPI) and hematoporphyrin (HP) for nuclear DNA and cell protein, respectively (Takahama and Kagaya 1988). Fluorescence intensity of 20 lymphocytes as a control and 200 carcinoma cells of each case was measured by the use of an Olympus spectrophotometric microscope (OSP-1®) with an on-line computer system. A statistical test was made by one way ANOVA.

A significant increase in the amount of DNA (F = 10.12, p < 0.05) and cell protein (F = 17.49, p < 0.05) in group B was indicated as compared to group A (Table 1). Fig. 1 illustrated an increase in the number of higher DNA polyploid cells with higher protein amount in patient No. 6 (group B) than in patient No. 1 (group A) (Fig. 2).

In a large samples of preoperative biopsies of gastric carcinoma, an increase in the incidence of polyploid pattern with cancer spread was reported (Kudoh et al. 1989).

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Table 1. Cytofluorometric analyses of nuclear DNA content (c) and cell protein amount (p) in carcinoma of the pancreas (relative values)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (years)</th>
<th>Sex</th>
<th>Stage</th>
<th>Operation</th>
<th>Prognosis (MOS)</th>
<th>DNA (c) analysis Mean ± S.D.</th>
<th>Peak Mean ± S.D.</th>
<th>Protein (p) analysis Mean ± S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>72</td>
<td>F</td>
<td>2</td>
<td>PD</td>
<td>27 (alive)</td>
<td>2.8 ± 0.9</td>
<td>2.2</td>
<td>9.5 ± 5.7</td>
</tr>
<tr>
<td>2</td>
<td>71</td>
<td>F</td>
<td>3</td>
<td>DP</td>
<td>18 (dead)</td>
<td>2.9 ± 1.1</td>
<td>2.2</td>
<td>6.3 ± 3.8</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>M</td>
<td>4</td>
<td>DP*</td>
<td>22 (dead)</td>
<td>3.8 ± 1.5</td>
<td>4.2</td>
<td>13.0 ± 6.6</td>
</tr>
<tr>
<td>4</td>
<td>66</td>
<td>M</td>
<td>4</td>
<td>TAC</td>
<td>12 (alive)</td>
<td>3.2 ± 1.3</td>
<td>2.2</td>
<td>6.4 ± 3.1</td>
</tr>
<tr>
<td>5</td>
<td>66</td>
<td>M</td>
<td>4</td>
<td>DP*</td>
<td>5 (dead)</td>
<td>4.7 ± 2.0</td>
<td>3.2</td>
<td>15.3 ± 9.1</td>
</tr>
<tr>
<td>6</td>
<td>73</td>
<td>M</td>
<td>4</td>
<td>DP*</td>
<td>2 (dead)</td>
<td>5.5 ± 2.3</td>
<td>4.0</td>
<td>20.5 ± 11.4</td>
</tr>
</tbody>
</table>

PD, pancreatoduodenectomy; DP, distal pancreatectomy; TAC, transarterial chemotherapy; *non-curative resection.

Fig. 1. Three dimensional distribution of nuclear DNA and cell protein in patient No. 6.

Fig. 2. Similar display to Fig. 1 but for patient No. 1.

However, few reports were available on the relationship between the simultaneously assessed DNA and protein amount. A recent report of Takahama and Kagaya (1988) referred to the concomitant increase in protein with the polyploidization of DNA in carcinoma of the lung appeared in the sputum.

Simultaneous analyses of nuclear DNA and cell protein may be a reliable tool to evaluate the biological aggressiveness of carcinoma of the pancreas.

References