Comparison of Sizes and Shapes of Tumor Cells in Plasma Cell Leukemia and Plasma Cell Myeloma

By Takashi Isobe, Yasushi Ikeda, and Hiroshi Ohta

Thirteen cases of plasma cell leukemia and 13 cases of nonleukemic plasma cell myeloma were compared with respect to the sizes and shapes of tumor cells in marrow smears. It was demonstrated that the leukemia cells were elongated or ovoid and significantly smaller in size, whereas the myeloma cells were generally more nearly round and larger.

Plasma cell leukemia is relatively rare and is characterized clinically by a rapidly fatal course. In the present study we compared the characteristics of size and shape of the tumor cells in plasma cell leukemia with those of the cells in plasma cell myeloma.

MATERIALS AND METHODS

All cases were collected from 1965 to 1976 in our institutions. All sera and concentrated urines were examined by cellulose acetate electrophoresis and agarose immunoelectrophoresis. Patients 1 to 13 had plasma cell leukemia. In this group there were 8 patients with IgG monoclonal proteins (M-p), 1 patient with IgD, and 4 patients with Bence Jones protein (BJ-p) only. Patients 14 to 26 had multiple myeloma, with no evidence of leukemia. These cases were randomly chosen from among 202 cases in our myeloma file.

Giemsa-stained films of bone marrow aspirates were used for the present study. One hundred plasma cells were measured by ocular micrometer with oil immersion under light microscopy. The long and short diameters of each cell were determined along two axes at right angles. The size of each cell was expressed as the mean of the long and short diameters; the shape of each cell was expressed as the ratio of the long and short diameters. A Student’s t test was used to determine the significance of differences between groups.

RESULTS

The clinical, protein, and marrow features of all 26 patients are summarized in Table 1. Thirteen patients with plasma cell leukemia (12 males and 1 female) ranged in age from 28 to 74 yr (mean 52.8 yr). The leukemia group was divided into two subgroups: those with peripheral plasma cells above 20% and more than 2000/cu mm and those with readings below these levels. Of the 13 patients with multiple myeloma there were 9 males and 4 females, with an age distribution from 35 to 64 yr (mean 53.5 yr).

Table 2 shows the mean values and standard deviations of the sizes (mean of the diameters) and shapes (ratio of long diameter to short diameter) of 100 cells in
TABLE 1. Clinical, Protein, and Marrow Features of 26 Patients

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Initials</th>
<th>Age</th>
<th>Sex</th>
<th>M-p</th>
<th>B-J-p</th>
<th>Serum (g/dl)</th>
<th>Peripheral Plasma Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T-p</td>
<td>M-p (%) Absolute Numbers/cu mm</td>
</tr>
<tr>
<td>1</td>
<td>S.S</td>
<td>71</td>
<td>M</td>
<td>BJ</td>
<td>λ</td>
<td>4.9</td>
<td>0.4</td>
</tr>
<tr>
<td>2</td>
<td>I.I</td>
<td>58</td>
<td>M</td>
<td>G(λ)</td>
<td>—</td>
<td>12.2</td>
<td>4.6</td>
</tr>
<tr>
<td>3</td>
<td>S.I.</td>
<td>42</td>
<td>M</td>
<td>BJ</td>
<td>λ</td>
<td>7.0</td>
<td>0.1</td>
</tr>
<tr>
<td>4</td>
<td>S.Y.</td>
<td>53</td>
<td>M</td>
<td>G(λ)</td>
<td>λ</td>
<td>7.3</td>
<td>1.7</td>
</tr>
<tr>
<td>5</td>
<td>M.K.</td>
<td>60</td>
<td>M</td>
<td>BJ</td>
<td>λ</td>
<td>6.0</td>
<td>0.5</td>
</tr>
<tr>
<td>6</td>
<td>H.A.</td>
<td>58</td>
<td>F</td>
<td>G(λ)</td>
<td>x</td>
<td>9.4</td>
<td>4.5</td>
</tr>
<tr>
<td>7</td>
<td>K.Y.</td>
<td>28</td>
<td>M</td>
<td>G(x)</td>
<td>—</td>
<td>10.1</td>
<td>5.6</td>
</tr>
<tr>
<td>8</td>
<td>T.K.</td>
<td>74</td>
<td>M</td>
<td>BJ</td>
<td>λ</td>
<td>7.0</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Plasma cells above 20% and more than 2000/cu mm

9. T.W.  65  M  D(λ) λ  9.0  3.5  28.0  1,932
10. T.H. 34  M  G(x)  —  12.6  8.1  21.0  1,388
11. K.A. 59  M  G(x)  —  12.0  8.5  14.0  2,296
12. I.F.  36  M  G(x)  —  12.0  5.0  12.0  2,184
13. H.U.  68  M  G(λ) λ  9.2  4.8  10.0  1,463

Plasma cells below 20% or less than 2000/cu mm

14. T.K.  38  M  G(x)  —  9.7  4.1  0    0    0
15. S.S.  55  M  G(x)  —  9.0  2.0  0    0    0
16. K.T.  46  F  G(λ)  —  11.4  5.3  0    0    0
17. K.O.  55  M  G(λ)  —  11.1  5.8  0    0    0
18. S.S.  56  M  G(λ)  —  11.0  4.5  0    0    0
19. R.M.  53  M  A(x)  —  10.7  5.4  0    0    0
20. S.K.  58  F  A(x)  —  10.6  6.7  0    0    0
21. J.M.  59  M  A(x) x  8.4  4.0  0    0    0
22. C.H.  63  M  A(x)  —  10.2  5.8  0    0    0
23. F.A.  59  F  A(λ) λ  11.2  6.6  0    0    0
24. T.T.  35  M  D(λ) λ  8.6  2.4  0    0    0
25. S.T.  64  M  BJ x x  6.5  0.2  0    0    0
26. J.O.  63  F  BJ λ λ  4.9  1.1  0    0    0

*T-p = total protein.

Each case. The mean size values were 13.3 ± 1.7 μ and 13.4 ± 1.6 μ respectively, in the two leukemia subgroups, in contrast with 20.3 ± 2.1 μ for the myeloma group. These differences between leukemia group and myeloma group are statistically significant at the 0.5% level. The mean values for shape were 1.31 ± 0.10 and 1.25 ± 0.08 in the leukemia group, in contrast with 1.10 ± 0.00 for the myeloma group. These differences between the two groups are also statistically significant at the 0.5% level.

DISCUSSION

In cases of plasma cell leukemia, plasma cells are repeatedly found in the blood, and generally there is moderate to marked leukocytosis as well as anemia. Leukocyte counts in the present series ranged from 5000 to 90,000/cu mm, with 10%–77% plasma cells.

The results of the present study indicate that the plasma cells in the leukemic cases are rather elongated or oval in shape and smaller in size, as compared with the
myeloma cells. It will now be of interest to determine if these parameters are correlated with the expression of specific cell markers such as surface and cytoplasmic immunoglobulins and the Ia antigen.

REFERENCES

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