THE DEPENDENCE OF PROTECTION AGAINST A TRANSPLANTABLE MOUSE LEUKEMIA UPON THE GENETIC CONSTITUTION OF THE IMMUNIZING TISSUE*

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Populations of leukemic cells, as other malignant growths, can be maintained indefinitely by successive transfers from host to host of a susceptible strain, and these hosts can be rendered resistant by prophylactic treatment with sublethal doses of leukemic cells as well as with normal tissue. The extensive studies of L. Loeb and associates on normal tissue transplantation indicate that the nature of the host response varies with the constitution of the graft. Their studies, based on direct microscopic observations, might lead one to expect a similar dependence upon the constitution of the graft when the host response is tested physiologically by a subsequent inoculation with malignant cells. However, in no such case has the induced resistance to malignant growth been shown to depend significantly upon the constitution of the immunizing tissue. Schöne stated that normal tissue from the same strain as the host gave a stronger immunity to a transplantable mouse carcinoma than tissue from another strain. Donaghy and Hyde found immunity to Walker’s rat sarcoma induced by tissue of the host strain was possibly less strong (17:3) than that induced by tissue of another strain (20:0). But in these cases, although the strains may have been “inbred,” the possibility remains that the individuals from the same strain were not genetically alike. With impure biological materials, as with impure chemicals, significant relationships may be hidden.

By the use of mouse strains whose genetic homogeneity is indicated by the many years of exclusively brother by sister matings and demonstrated by numerous experimental tests, it is found that every mouse in a strain that is 100% susceptible can be protected against a given line of transplantable leukemia by treatment with tissue of a certain genetic constitution, while under the same conditions tissue of another genetic constitution does not protect a single mouse.
This report is limited to resistance induced by normal embryo tissue against leukemia of line I in hosts of strain C58. These hosts are 100% susceptible to standard dose of leukemic cells of line I in over 3000 tested in the last four years, as well as to $1/64$th of the standard dose (97 tested). The treatment with embryo tissue consisted of a single intraperitoneal injection of a saline suspension of minced skin and/or viscera of embryos shortly before term; 0.5 cc. saline was used for skin or viscera of each embryo; 0.5 cc. of the suspension was given to each mouse. The test inoculation of leukemic cells was administered 6–9 days after the embryo tissue, in doses $1/64$th of the standard. The untreated controls and the unsuccessfully treated test animals died 5$1/2$ to 6$1/2$ days after leukemic inoculation; the remainder were observed for at least thirty days.

**TABLE 1**

<table>
<thead>
<tr>
<th>STRAIN OF EMBRYOS</th>
<th>NO. OF EXPTS.</th>
<th>NUMBER OF MICE SURVIVED</th>
<th>DIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>—</td>
<td>24</td>
<td>0</td>
<td>104</td>
</tr>
<tr>
<td>StoLi</td>
<td>10</td>
<td>93</td>
<td>0</td>
</tr>
<tr>
<td>C58</td>
<td>9</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>$F_1$(C58 × StoLi)</td>
<td>7</td>
<td>80</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1 indicates that the embryos from strain StoLi have successfully induced resistance in all cases; that embryos from the same strain as the hosts (C58) have completely failed to induce resistance; that hybrid embryos (C58 mother by StoLi father) are as successful as those from strain StoLi. The uniformity of these results bespeaks the successful control of technique and of the biological variables of the embryos, the hosts and the leukemic cells. The major basis for judging significance lies in the number of experiments, each of which is an independent repetition; these cover a period of eight months.

Natural susceptibility as hosts and failure to induce resistance as embryos are associated in strain C58, but the connection is not causal, for the hybrid embryos induce resistance and yet are naturally susceptible (100%) when used as hosts.

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