THE COMMON CAUSES OF LYMPHOPENIA

BY

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(RECEIVED FOR PUBLICATION MARCH 22, 1950)

Since differential blood counts are now reported in absolute numbers as well as in percentages, lymphopenia is frequently found and its significance questioned. Whitby and Britton (1946) say that the lymphocytes in the peripheral blood may be diminished in the acute stages of an infection, in conditions of exhaustion, after excessive x-ray irradiation, with vitamin deficiency, and in the terminal phase of uraemia. Wintrobe (1946) says:

“Rarely, leucopaenia may be due to a reduction in the lymphocytes. This has been described in miliary tuberculosis and in instances of excessive exposure to irradiation. The action of certain chemical agents is much more pronounced on lymphocytes than granulocytes.”

Wintrobe also regards a marked absolute reduction of lymphocytes as an unfavourable prognostic sign. These authors refer to the lymphopenia which is found in such haematological disorders as Banti's syndrome and agranulocytosis. To obtain a clearer picture of the common causes of lymphopenia differential leucocyte counts performed in one laboratory over a year were analysed. This laboratory serves a general hospital admitting all types of cases (babies and adults) except accidents, infectious fevers, and maternity cases. A few out-patients are also investigated at the laboratory. The children's department is small in relation to the rest of the hospital.

The blood counts were performed with the usual care and precautions taken in a hospital laboratory.

The lower limit of normal for a lymphocytic count is usually stated to be 1,500 per c.mm. (Wintrobe, 1939). However, it was decided to study only those cases in which the reduction was marked, so that, for the purpose of this paper, only lymphocyte counts of 1,000 per c.mm. or less have been classed as lymphopenic. The lowest count of all was one of 270 in a patient treated with x rays. Some patients with lymphopenia also had eosinopenia, but this finding was not constant.

A total of 647 patients had differential leucocyte counts performed on one or more occasions. Of this number 87 patients showed a lymphopenia at some time or other. The youngest was a boy of 8 years, an epileptic on tridione therapy, and the eldest a woman of 83 who was said to be suffering from periclitis. The laboratory findings, diagnoses, and clinical notes of the 87 cases with a lymphopenia of 1,000 c.mm. or less at any point in the illness are set out in Tables I–VIII. The cases are grouped according to diagnosis.
### TABLE I

**Group I: Twenty Cases of Cardiac Disease**

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g.%.)</th>
<th>Total W.B.C. (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Plasmocytes (c.mm.)</th>
<th>Diagnosis</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>46</td>
<td>F</td>
<td>11.0</td>
<td>8,000</td>
<td>960</td>
<td>6,640</td>
<td>80</td>
<td>320</td>
<td>—</td>
<td>—</td>
<td>Hypertensive cardiac failure</td>
<td>Discharged ambulant; hypochromic anaemia</td>
</tr>
<tr>
<td>2</td>
<td>70</td>
<td>M</td>
<td>15.3</td>
<td>8,000</td>
<td>640</td>
<td>7,120</td>
<td>160</td>
<td>80</td>
<td>—</td>
<td>—</td>
<td>Died</td>
<td>''</td>
</tr>
<tr>
<td>3</td>
<td>64</td>
<td>M</td>
<td>—</td>
<td>8,000</td>
<td>960</td>
<td>6,800</td>
<td>80</td>
<td>160</td>
<td>—</td>
<td>—</td>
<td>Bedridden; hypochromic anaemia</td>
<td>''</td>
</tr>
<tr>
<td>4</td>
<td>75</td>
<td>F</td>
<td>14.5</td>
<td>14,000</td>
<td>980</td>
<td>13,020</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Bedridden</td>
<td>''</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
<td>F</td>
<td>8.6</td>
<td>8,000</td>
<td>560</td>
<td>7,280</td>
<td>160</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Died</td>
<td>''</td>
</tr>
<tr>
<td>6</td>
<td>73</td>
<td>F</td>
<td>8.0</td>
<td>4,000</td>
<td>760</td>
<td>2,960</td>
<td>160</td>
<td>120</td>
<td>—</td>
<td>—</td>
<td>Bedridden; hypochromic anaemia</td>
<td>''</td>
</tr>
<tr>
<td>7</td>
<td>72</td>
<td>F</td>
<td>5.0</td>
<td>6,000</td>
<td>900</td>
<td>4,800</td>
<td>180</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Died</td>
<td>''</td>
</tr>
<tr>
<td>8</td>
<td>66</td>
<td>F</td>
<td>12.6</td>
<td>5,000</td>
<td>950</td>
<td>3,800</td>
<td>150</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>Fibrillating; died</td>
<td>''</td>
</tr>
<tr>
<td>9</td>
<td>57</td>
<td>M</td>
<td>—</td>
<td>12,000</td>
<td>840</td>
<td>10,920</td>
<td>—</td>
<td>240</td>
<td>—</td>
<td>—</td>
<td>Died</td>
<td>''</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
<td>M</td>
<td>8.6</td>
<td>5,000</td>
<td>1,000</td>
<td>3,450</td>
<td>100</td>
<td>450</td>
<td>—</td>
<td>—</td>
<td>Died; hypochromic anaemia</td>
<td>''</td>
</tr>
<tr>
<td>11</td>
<td>67</td>
<td>M</td>
<td>12.9</td>
<td>11,000</td>
<td>770</td>
<td>9,680</td>
<td>100</td>
<td>550</td>
<td>—</td>
<td>—</td>
<td>Died</td>
<td>''</td>
</tr>
<tr>
<td>12</td>
<td>56</td>
<td>M</td>
<td>—</td>
<td>7,000</td>
<td>980</td>
<td>5,810</td>
<td>140</td>
<td>70</td>
<td>—</td>
<td>—</td>
<td>Discharged ambulant</td>
<td>''</td>
</tr>
<tr>
<td>13</td>
<td>79</td>
<td>M</td>
<td>14.5</td>
<td>10,000</td>
<td>1,000</td>
<td>8,600</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>—</td>
<td>Atherosclerotic non-hypertensive cardiac failure</td>
<td>Died; hypochromic anaemia</td>
</tr>
<tr>
<td>14</td>
<td>64</td>
<td>F</td>
<td>8.5</td>
<td>6,000</td>
<td>420</td>
<td>5,460</td>
<td>—</td>
<td>120</td>
<td>—</td>
<td>—</td>
<td>Died; heart block; hypochromic anaemia</td>
<td>''</td>
</tr>
<tr>
<td>15</td>
<td>63</td>
<td>M</td>
<td>13.2</td>
<td>7,000</td>
<td>980</td>
<td>5,530</td>
<td>280</td>
<td>140</td>
<td>70</td>
<td>—</td>
<td>Died; heart block</td>
<td>''</td>
</tr>
<tr>
<td>16</td>
<td>75</td>
<td>M</td>
<td>14.5</td>
<td>6,000</td>
<td>780</td>
<td>4,500</td>
<td>360</td>
<td>360</td>
<td>—</td>
<td>—</td>
<td>Died; heart block</td>
<td>''</td>
</tr>
<tr>
<td>17</td>
<td>64</td>
<td>F</td>
<td>14.8</td>
<td>6,000</td>
<td>900</td>
<td>4,740</td>
<td>60</td>
<td>300</td>
<td>—</td>
<td>—</td>
<td>Congestive failure; bedridden</td>
<td>''</td>
</tr>
<tr>
<td>18</td>
<td>38</td>
<td>F</td>
<td>13.0</td>
<td>4,000</td>
<td>480</td>
<td>3,120</td>
<td>40</td>
<td>400</td>
<td>—</td>
<td>—</td>
<td>Congestive failure; digitalis therapy; recovered</td>
<td>''</td>
</tr>
<tr>
<td>19</td>
<td>56</td>
<td>F</td>
<td>—</td>
<td>10,000</td>
<td>1,000</td>
<td>8,800</td>
<td>—</td>
<td>200</td>
<td>—</td>
<td>—</td>
<td>Mitral stenosis</td>
<td>''</td>
</tr>
<tr>
<td>20</td>
<td>23</td>
<td>M</td>
<td>4.15</td>
<td>7,000</td>
<td>560</td>
<td>6,370</td>
<td>—</td>
<td>70</td>
<td>—</td>
<td>—</td>
<td>Coarctation of aorta</td>
<td>Bacterial endocarditis; responded to penicillin; discharged ambulant</td>
</tr>
</tbody>
</table>

A.J. SHILLITOE
## TABLE II

### Group II: Twelve Cases of Gastric or Intestinal Disease

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g. %)</th>
<th>Total W.B.C. (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Plasmocytes (c.mm.)</th>
<th>Diagnosis</th>
<th>Notes</th>
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<tbody>
<tr>
<td>21</td>
<td>52</td>
<td>F</td>
<td>7.4</td>
<td>5,000</td>
<td>950</td>
<td>3,650</td>
<td>100</td>
<td>250</td>
<td>50</td>
<td></td>
<td>Anastomotic ulcer</td>
<td>Profuse vomiting; hypochromic anaemia; recovered</td>
</tr>
<tr>
<td>22</td>
<td>40</td>
<td>M</td>
<td>10.6</td>
<td>7,000</td>
<td>840</td>
<td>6,020</td>
<td>—</td>
<td>140</td>
<td>—</td>
<td></td>
<td>Carcinoma of stomach</td>
<td>Profuse vomiting; hypochromic anaemia; inoperable</td>
</tr>
<tr>
<td>23</td>
<td>57</td>
<td>F</td>
<td>13.0</td>
<td>7,000</td>
<td>770</td>
<td>5,950</td>
<td>—</td>
<td>280</td>
<td>—</td>
<td></td>
<td>Gastro-enteritis</td>
<td>Profuse vomiting and diarrhoea; recovered; cause not found</td>
</tr>
<tr>
<td>24</td>
<td>35</td>
<td>M</td>
<td>16.0</td>
<td>5,000</td>
<td>800</td>
<td>3,150</td>
<td>450</td>
<td>350</td>
<td>—</td>
<td></td>
<td>Malignant malaria</td>
<td>Presented as a case of profuse vomiting; recovered</td>
</tr>
<tr>
<td>25</td>
<td>61</td>
<td>M</td>
<td>6.5</td>
<td>6,000</td>
<td>960</td>
<td>4,980</td>
<td>—</td>
<td>120</td>
<td>—</td>
<td></td>
<td>Pyloric stenosis</td>
<td>Profuse vomiting; hypochromic anaemia; alkalosis; died</td>
</tr>
<tr>
<td>26</td>
<td>74</td>
<td>F</td>
<td>15.2</td>
<td>10,000</td>
<td>900</td>
<td>8,400</td>
<td>—</td>
<td>700</td>
<td>—</td>
<td></td>
<td>Gastric ulcer</td>
<td>Profuse vomiting; subsequently haematemesis; recovered</td>
</tr>
<tr>
<td>27</td>
<td>51</td>
<td>M</td>
<td>10.4</td>
<td>3,650</td>
<td>730</td>
<td>2,555</td>
<td>182</td>
<td>110</td>
<td>73</td>
<td></td>
<td>Duodenal ulcer</td>
<td>Severe melena; recovered (count done after transfusion)</td>
</tr>
<tr>
<td>28</td>
<td>39</td>
<td>F</td>
<td>5.35</td>
<td>7,000</td>
<td>910</td>
<td>5,810</td>
<td>140</td>
<td>140</td>
<td>—</td>
<td></td>
<td>Peptic ulcer</td>
<td>Haematemesis and melena; recovered</td>
</tr>
<tr>
<td>29</td>
<td>72</td>
<td>F</td>
<td>6.5</td>
<td>6,000</td>
<td>840</td>
<td>4,920</td>
<td>120</td>
<td>120</td>
<td>—</td>
<td></td>
<td>Carcinoma rectum</td>
<td>Severe diarrhoea; died</td>
</tr>
<tr>
<td>30</td>
<td>31</td>
<td>F</td>
<td>13.5</td>
<td>7,000</td>
<td>910</td>
<td>5,390</td>
<td>490</td>
<td>140</td>
<td>70</td>
<td>—</td>
<td>Ulcerative colitis</td>
<td>Condition not severe; recovered</td>
</tr>
<tr>
<td>31</td>
<td>?</td>
<td>F</td>
<td>8.0</td>
<td>5,000</td>
<td>750</td>
<td>4,000</td>
<td>—</td>
<td>250</td>
<td>—</td>
<td>—</td>
<td>Small intestine resected previously (? reason)</td>
<td>Hypochromic anaemia; out-patient; details untraceable</td>
</tr>
<tr>
<td>32</td>
<td>35</td>
<td>F</td>
<td>10.0</td>
<td>7,000</td>
<td>910</td>
<td>5,600</td>
<td>70</td>
<td>420</td>
<td>—</td>
<td>—</td>
<td>Tubal abortion</td>
<td>Post-operative tympanites of abdomen; recovered</td>
</tr>
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</table>

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### TABLE III

**GROUP III: TWELVE CASES OF RESPIRATORY DISEASE (EXCLUDING TUBERCULOSIS)**

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g/l)</th>
<th>Total R.B.C. (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Erythrocytes (c.mm.)</th>
<th>Plasma cells (c.mm.)</th>
<th>Diagnosis</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>48</td>
<td>F</td>
<td>14.0</td>
<td>22,000</td>
<td>880</td>
<td>20,240</td>
<td>880</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lobar pneumonia</td>
<td>Subsequent empyema; recovered Died</td>
</tr>
<tr>
<td>34</td>
<td>73</td>
<td>F</td>
<td>13.0</td>
<td>10,000</td>
<td>800</td>
<td>8,600</td>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bronchopneumonia</td>
<td>Recovered; profuse growth of pneumococci in sputum</td>
</tr>
<tr>
<td>35</td>
<td>62</td>
<td>M</td>
<td>15.2</td>
<td>6,000</td>
<td>480</td>
<td>5,280</td>
<td>240</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lobar pneumonia</td>
<td>Not severely ill; recovered Recovered</td>
</tr>
<tr>
<td>36</td>
<td>28</td>
<td>F</td>
<td>12.2</td>
<td>7,000</td>
<td>700</td>
<td>5,950</td>
<td>70</td>
<td>280</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>34</td>
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<td>14.8</td>
<td>8,000</td>
<td>960</td>
<td>6,240</td>
<td>160</td>
<td>480</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>38</td>
<td>78</td>
<td>M</td>
<td>15.6</td>
<td>10,000</td>
<td>900</td>
<td>8,900</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>77</td>
<td>F</td>
<td>16.0</td>
<td>9,000</td>
<td>800</td>
<td>14,880</td>
<td>320</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>56</td>
<td>M</td>
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<td>990</td>
<td>7,470</td>
<td>540</td>
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<td></td>
<td></td>
<td></td>
<td>Chronic bronchitis and emphysema</td>
<td>Admitted with exacerbation; recovered</td>
</tr>
<tr>
<td>41</td>
<td>46</td>
<td>M</td>
<td>10.6</td>
<td>6,000</td>
<td>960</td>
<td>4,800</td>
<td>120</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>62</td>
<td>M</td>
<td>13.0</td>
<td>10,000</td>
<td>600</td>
<td>8,900</td>
<td>400</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>43</td>
<td>17</td>
<td>F</td>
<td>8.6</td>
<td>5,000</td>
<td>900</td>
<td>3,450</td>
<td></td>
<td>650</td>
<td></td>
<td></td>
<td></td>
<td>Pleural effusion</td>
<td>Recovered. (May have been tuberculous, although included in this group) Pleural effusion; hypochromic anaemia</td>
</tr>
<tr>
<td>44</td>
<td>80</td>
<td>M</td>
<td>8.6</td>
<td>11,000</td>
<td>880</td>
<td>9,020</td>
<td>110</td>
<td>990</td>
<td></td>
<td></td>
<td></td>
<td>Carcinoma bronchus</td>
<td></td>
</tr>
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THE COMMON CAUSES OF LYMPHOPENIA

<table>
<thead>
<tr>
<th>Notes</th>
<th>Diagnosis</th>
<th>Group IV: Ten Cases of Iatrogenic and Occupational Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen mustard therapy; pre-treatment lymphocytes normal; hypochromic anaemia</td>
<td>Carcinoma bronchus</td>
<td>[Plasmocytes (c.mm)] 420</td>
</tr>
<tr>
<td>Nitrogen mustard therapy; out-patient treated with melphalan 9 years previously</td>
<td>Lymphosarcoma</td>
<td>Basophils (c.mm)</td>
</tr>
<tr>
<td>Nitrogen mustard therapy; out-patient following x-ray therapy (13,230 normoblasts included in total W.B.C.)</td>
<td>Carcinoma ovary</td>
<td>Monocytes (c.mm)</td>
</tr>
<tr>
<td></td>
<td>Carcinoma cervix</td>
<td>Eosinophils (c.mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neutrophils (c.mm)</td>
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<td></td>
<td></td>
<td>Lymphocytes (c.mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total W.B.C.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hb (% )</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age</td>
</tr>
</tbody>
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### TABLE V

**GROUP V: NINE CASES OF BLOOD DISEASE**

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g%)</th>
<th>Total W.B.C (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Plasmocytes (c.mm.)</th>
<th>Diagnosis</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>69</td>
<td>M</td>
<td>6.4</td>
<td>14,000</td>
<td>700</td>
<td>4,960</td>
<td>(2,240 of these myelocytes)</td>
<td>495</td>
<td>280</td>
<td></td>
<td>Chronic myeloid leukaemia (untreated)</td>
<td>(3,720 myeloblasts and 4,340 normoblasts included in total W.B.C.)</td>
</tr>
<tr>
<td>56</td>
<td>46</td>
<td>M</td>
<td>9.8</td>
<td>1,500</td>
<td>900</td>
<td>490</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
<td>Aleukaemic myeloid leukaemia (untreated)</td>
<td>Myeloblastic crisis and died after 8 months in aleukaemic phase</td>
</tr>
<tr>
<td>57</td>
<td>48</td>
<td>M</td>
<td>5.45</td>
<td>8,000</td>
<td>960</td>
<td>6,400</td>
<td>400</td>
<td>240</td>
<td></td>
<td></td>
<td>Pernicious anaemia (untreated)</td>
<td>Complicated by pneumonia and cardiac failure; responded to liver with complete recovery</td>
</tr>
<tr>
<td>58</td>
<td>46</td>
<td>M</td>
<td>9.2</td>
<td>5,000</td>
<td>950</td>
<td>3,450</td>
<td>500</td>
<td>100</td>
<td></td>
<td></td>
<td>Hypochromic anaemia (untreated)</td>
<td>Responded uneventfully to liver</td>
</tr>
</tbody>
</table>
| 59   | 76  | M   | 4.0     | 2,700              | 810                 | 1,782               | 27                  | 81               |                  |                  | " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " 

A. J. SHILLITOE
### TABLE VI

**Groups VI and VII: Five Cases Each of Tuberculosis and Liver Disease**

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g%)</th>
<th>Total W.B.C. (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Plasmaocytes (c.mm.)</th>
<th>Diagnosis</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>59</td>
<td>M</td>
<td>13.3</td>
<td>6,000</td>
<td>300</td>
<td>5,640</td>
<td>—</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Tuberculous broncho-pneumonia</td>
<td>Died 12 days later</td>
</tr>
<tr>
<td>65</td>
<td>52</td>
<td>M</td>
<td>4.75</td>
<td>5,000</td>
<td>800</td>
<td>4,100</td>
<td>—</td>
<td>100</td>
<td>—</td>
<td>—</td>
<td>Pulmonary tuberculosis</td>
<td>Numerous haemoptyses; died 20 days later</td>
</tr>
<tr>
<td>66</td>
<td>45</td>
<td>M</td>
<td>—</td>
<td>13,000</td>
<td>910</td>
<td>11,700</td>
<td>—</td>
<td>390</td>
<td>—</td>
<td>—</td>
<td>Severe sacro-iliac tuberculosis</td>
<td>Went home against advice and lost sight of</td>
</tr>
<tr>
<td>67</td>
<td>52</td>
<td>M</td>
<td>9.2</td>
<td>3,000</td>
<td>510</td>
<td>2,460</td>
<td>—</td>
<td>30</td>
<td>—</td>
<td>—</td>
<td>Pulmonary tuberculosis</td>
<td>Died 5 days later</td>
</tr>
<tr>
<td>68</td>
<td>25</td>
<td>M</td>
<td>—</td>
<td>6,000</td>
<td>600</td>
<td>5,220</td>
<td>60</td>
<td>60</td>
<td>—</td>
<td>—</td>
<td>Miliary tuberculosis</td>
<td>Died 2 months later</td>
</tr>
<tr>
<td>69</td>
<td>52</td>
<td>F</td>
<td>12.2</td>
<td>3,000</td>
<td>870</td>
<td>1,680</td>
<td>150</td>
<td>210</td>
<td>60</td>
<td>30</td>
<td>Infective hepatitis</td>
<td>Lymphopenia subsided as condition recovered</td>
</tr>
<tr>
<td>70</td>
<td>50</td>
<td>F</td>
<td>14.8</td>
<td>7,000</td>
<td>910</td>
<td>5,950</td>
<td>—</td>
<td>140</td>
<td>—</td>
<td>—</td>
<td>Obstructive jaundice; gallstones</td>
<td>Recovered spontaneously; refused operation</td>
</tr>
<tr>
<td>71</td>
<td>69</td>
<td>F</td>
<td>14.5</td>
<td>9,000</td>
<td>630</td>
<td>8,100</td>
<td>90</td>
<td>180</td>
<td>—</td>
<td>—</td>
<td>Metastatic carcinoma of liver</td>
<td>Radical mastectomy 4 years previously, admitted with ascites; necropsy showed liver extensively invaded with metastases</td>
</tr>
<tr>
<td>72</td>
<td>68</td>
<td>M</td>
<td>4.75</td>
<td>3,000</td>
<td>660</td>
<td>2,100</td>
<td>60</td>
<td>180</td>
<td>—</td>
<td>—</td>
<td>Cirrhosis of liver</td>
<td>Haematemesis; recovered temporarily, but died 1 year later</td>
</tr>
<tr>
<td>73</td>
<td>14</td>
<td>M</td>
<td>11.8</td>
<td>2,850</td>
<td>740</td>
<td>2,024</td>
<td>—</td>
<td>86</td>
<td>—</td>
<td>—</td>
<td>&quot;</td>
<td>Ascites for some weeks. Died 1 month later</td>
</tr>
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</table>

**The Common Causes of Lymphopenia**

327
<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g.%)</th>
<th>Total W.B.C. (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Plasmaocytes (c.mm.)</th>
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<tbody>
<tr>
<td>74</td>
<td>66</td>
<td>F</td>
<td>14.7</td>
<td>16,000</td>
<td>960</td>
<td>14,720</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>75</td>
<td>68</td>
<td>M</td>
<td>12.1</td>
<td>13,000</td>
<td>650</td>
<td>11,960</td>
<td>130</td>
<td>260</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>76</td>
<td>45</td>
<td>M</td>
<td>—</td>
<td>7,000</td>
<td>980</td>
<td>5,390</td>
<td>210</td>
<td>350</td>
<td>70</td>
<td>—</td>
</tr>
<tr>
<td>77</td>
<td>23</td>
<td>F</td>
<td>14.8</td>
<td>4,000</td>
<td>1,000</td>
<td>2,840</td>
<td>—</td>
<td>80</td>
<td>—</td>
<td>80</td>
</tr>
<tr>
<td>78</td>
<td>16</td>
<td>M</td>
<td>15.8</td>
<td>6,000</td>
<td>540</td>
<td>5,400</td>
<td>—</td>
<td>60</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>79</td>
<td>52</td>
<td>F</td>
<td>8.9</td>
<td>11,000</td>
<td>660</td>
<td>9,900</td>
<td>110</td>
<td>330</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>80</td>
<td>43</td>
<td>M</td>
<td>12.2</td>
<td>2,800</td>
<td>560</td>
<td>2,072</td>
<td>—</td>
<td>168</td>
<td>—</td>
<td>—</td>
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</table>

**TABLE VII**

**GROUPS VIII, IX, AND X: THREE CASES OF RETENTION OF URINE; TWO PSYCHOGENIC CASES; TWO CASES OF LYMPHADENOPATHY**

- **Diagnosis**: Cerebral thrombosis, Prostatic hypertrophy, Disseminated sclerosis, Hysterical amnesia, Anxiety state, Histiocytic medullary reticulosis (untreated), Hodgkin's disease (untreated).
- **Notes**: Retention of urine; blood urea 68 mg.%; recovered; Retention of urine; blood urea 285 mg.%; discharged with a permanent suprapubic drainage; Transient retention of urine with cystitis; subsided after treatment and discharged ambulant; No organic disease found; Extensive investigation, but no organic disease found; Died within 7 days; Died after a few months.
### TABLE VIII
**SEVEN MISCELLANEOUS CASES**

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Hb (g.)</th>
<th>Total W.B.C. (c.mm.)</th>
<th>Lymphocytes (c.mm.)</th>
<th>Neutrophils (c.mm.)</th>
<th>Eosinophils (c.mm.)</th>
<th>Monocytes (c.mm.)</th>
<th>Basophils (c.mm.)</th>
<th>Plasmocytes (c.mm.)</th>
<th>Diagnosis</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>17</td>
<td>F</td>
<td>5.0</td>
<td>500</td>
<td>455</td>
<td>10</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>15</td>
<td>Necrotic ileitis with <em>Bact. coli</em> septicaemia</td>
<td>Died on the day following admission. Cause of ileitis not found. 20 normoblasts included in total W.B.C.</td>
</tr>
<tr>
<td>82</td>
<td>23</td>
<td>M</td>
<td>—</td>
<td>20,000</td>
<td>1,000</td>
<td>18,000</td>
<td>—</td>
<td>1,000</td>
<td>—</td>
<td>—</td>
<td>Submaxillary abscess</td>
<td>Not severely ill; complete recovery with incision and sulphonamides Bedridden with hemiplegia for 3 weeks, slowly deteriorating</td>
</tr>
<tr>
<td>83</td>
<td>70</td>
<td>F</td>
<td>13.2</td>
<td>4,000</td>
<td>960</td>
<td>2,880</td>
<td>80</td>
<td>80</td>
<td>—</td>
<td>—</td>
<td>Cerebral thrombosis</td>
<td>Hypochromic anaemia, further clinical details not available (out-patient)</td>
</tr>
<tr>
<td>84</td>
<td>62</td>
<td>F</td>
<td>5.9</td>
<td>2,250</td>
<td>540</td>
<td>1,620</td>
<td>—</td>
<td>90</td>
<td>—</td>
<td>—</td>
<td>Sore tongue</td>
<td>Further clinical details not available (out-patient)</td>
</tr>
<tr>
<td>85</td>
<td>83</td>
<td>F</td>
<td>—</td>
<td>11,000</td>
<td>770</td>
<td>9,570</td>
<td>—</td>
<td>660</td>
<td>—</td>
<td>—</td>
<td>? Pericoltis</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>86</td>
<td>53</td>
<td>F</td>
<td>14.2</td>
<td>2,900</td>
<td>841</td>
<td>1,972</td>
<td>29</td>
<td>58</td>
<td>—</td>
<td>—</td>
<td>Ulcerous stomatitis</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>87</td>
<td>64</td>
<td>F</td>
<td>13.3</td>
<td>4,000</td>
<td>920</td>
<td>2,960</td>
<td>40</td>
<td>80</td>
<td>—</td>
<td>—</td>
<td>&quot;Diarrhoea&quot;</td>
<td>&quot;&quot;</td>
</tr>
</tbody>
</table>

**THE COMMON CAUSES OF LYMPHOPENIA**

329
Discussion

It appears that, although lymphopenia is sometimes associated with a poor prognosis, it is by no means invariably so. The commonest condition in which it occurred was cardiac failure, but this may be due partly to the high proportion of elderly patients with cardiac disease among the admissions to this hospital. Altana and Pulino (1947) have described the leucocyte picture in cases of heart disease, excluding as far as possible those cases complicated by chest or other infections. They express their counts as percentages only, but from their data the absolute values can be calculated, and it is then found that of 20 patients with well-compensated heart disease none showed lymphocyte counts of 1,000 or less; of 30 patients with a slight degree of congestion there were five with lymphopenia (17%); of 55 patients with severe congestion there were 17 with lymphopenia (31%); of 38 patients with left-sided cardiac failure and minimal venous congestion there were six with lymphopenia (16%); and of seven congenital malformations of the heart there were three with lymphopenia. In cases in the present series with pleural effusion repeated counts did seem to suggest that lymphopenia fluctuated with the presence of fluid in the chest, but in cases with cirrhosis of the liver it did not parallel the clinical condition. Case 72 had a normal lymphocyte count when almost moribund. In most of the cases in Groups II and III the prognosis was good, and in fact the only cases where lymphopenia gave a pointer to an ominous prognosis were those in Group VI. In other groups the prognosis depended on the primary disease.

The occurrence of lymphopenia in the lymphadenopathies has been noted by Robb-Smith (1947). The mechanism in these and in the blood diseases is presumably linked with the metabolic abnormalities of these disorders. The mechanism of its appearance in other conditions is more obscure and may be due to lymph stasis or the diminished production of lymphocytes. Wada (1940), having studied the lymphopenia of patients with uraemia and cholaemia, produced the condition experimentally in rabbits by inducing uraemia or cholaemia and related the blood findings to histological changes in the lymph nodes. He also found that removal of the rabbits' spleens exaggerated the lymphocyte depression. Another approach to some of the cases is provided by Selye's alarm reaction (1946) in which, during the phase of counter-shock, there is hypertrophy of the adrenal cortex and involution of lymphoid tissue. Reinhardt and Li (1945) have shown that administration of pituitary adrenotrophic hormone leads to a diminution of the lymphocytes entering the blood from the thoracic duct. Yoffey, Reiss, and Baxter (1946) have made further observations along the same lines.

Summary

Of 647 patients on whom routine blood counts were performed, 87 showed a lymphopenia of 1,000 per c.mm. or less at one time or another. The conditions with which this was associated have been analysed and the findings tabulated.

My thanks are due to my colleagues for making their case histories freely available to me, to Dr. C. Groves for valuable advice, and to Mrs. I. Gledhill for help in the collection of the records.
THE COMMON CAUSES OF LYMPHOPENIA

REFERENCES
The Common Causes of Lymphopenia

A. J. Shillitoe

doi: 10.1136/jcp.3.4.321

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