Platelet adhesiveness in gout

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Summary
Platelet adhesiveness studies were performed by two
techniques in twenty-two gout patients and closely
matched controls under carefully standardized condi-
tions. No significant difference in platelet adhesiveness
was found between the groups.

A range of plasma lipid levels was recently investi-
gated in twenty-two adult British gout patients and
in twenty-two very closely-matched controls, who
were hospital patients suffering from a wide variety
of conditions. The results of this study have been
presented (Darlington, Shaw & Scott, 1971; Darling-
ton & Scott, 1972). Summarized, they showed no
significant difference between plasma cholesterol
levels, but significantly higher levels of plasma gly-
cerides and phospholipids (0-01 > P > 0-001) and
very significantly higher levels of plasma unesterified
fatty acids in the gout patients (P << 0-001)
(Table 1).

<table>
<thead>
<tr>
<th>Lipid Fraction</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol—gout vs controls</td>
<td>1-260</td>
<td>&gt; 0-2,</td>
</tr>
<tr>
<td>Glycerides—gout vs controls</td>
<td>3-15</td>
<td>&gt; 0-001,</td>
</tr>
<tr>
<td>Phospholipids—gout vs controls</td>
<td>2-966</td>
<td>&gt; 0-001,</td>
</tr>
<tr>
<td>UFA—gout vs controls</td>
<td>4-530</td>
<td>&lt;&lt; 0-001</td>
</tr>
</tbody>
</table>

Kerr et al. (1965) found that certain phospho-
lipid fractions and free fatty acids caused platelet
aggregation; a result confirmed with regard to fatty
acids by Hoak, Warner & Connor (1967).

Because of increased levels of phospholipids and
unesterified fatty acids in gout patients, and because
it has been suggested that there is a high incidence
of cardiovascular disease in gout (Weiss & Segaloff,
1959; Hall, 1965), platelet adhesiveness studies have
been performed in the gout patients and controls
from the study of Darlington et al. (1971), and
the results are now presented.

Patients, methods and related factors
Two techniques were performed in parallel,
using whole blood and platelet-rich plasma, by the
method of Shaw, Pegrum & Wolff (1970). In this
method, blood and platelet-rich plasma were passed
through a standard column of glass microspheres
at a constant rate. Adenosine diphosphate was
added to the platelet-rich plasma before passage
through the column. Platelet adhesiveness was
obtained by taking the difference between the plate-
et count before and after passage through the column
and expressing it as a percentage of the initial count.
Factors affecting the test conditions, blood sample
and the state of the patient were carefully stand-
ardized as follows: (1) All subjects had fasted for
at least 10 hr before the test, to give a result in the
fasting state and to reduce variables of intestinal
absorption. Ingestion of glucose and fat increase
platelet adhesiveness (Bridges et al., 1965;
McDonald & Edgill, 1958). (2) Adhesiveness was
determined within 1–2 hr of taking blood, since the
time interval after venepuncture is important (Fyfe
& Hamilton, 1967). (3) Patients were asked not to
smoke for at least 9½ hr before the test since smoking
has variable effects which may cause platelet ade-
siveness to be affected by fatty acids and glucose in
the plasma (Murchison & Fyfe, 1966). (4) No
patient or control was receiving aspirin therapy and
all subjects were asked to avoid this drug before the
test. Aspirin may affect several tests of platelet
activity (O’Brien, 1968a) and it appears that, in
most circumstances, ADP is not released from plate-
lets exposed to aspirin (O’Brien, 1968b). (5) No
patient or control was on any drug known to affect
plasma lipids or platelet adhesiveness. (6) Patients
were seen early in the morning when exercise had
been minimal but accurate assessment of the amount
of exercise was nevertheless difficult. Acute, exhaus-
tive exercise increases platelet adhesiveness (Ikka,
Myllylä & Sarajas, 1966) but severe, prolonged
exercise caused a fall in platelet adhesiveness
(Pegrum et al., 1967).
Platelet adhesiveness in gout

Following the initial work of Wright (1942), many workers have recorded variations in platelet adhesiveness after surgery and, hence, no abnormal platelet adhesiveness result was accepted until three months or more had elapsed after any trauma or surgery.

Since the work was carried out under the standardized conditions laid down by Shaw et al. (1970) in the same laboratory, their normal values for healthy blood donors were used to give the ranges of normal platelet adhesiveness for whole blood and platelet-rich plasma, i.e. 35–72% and 19–65% respectively.

**Results**

The platelet adhesiveness values obtained are summarized in Table 2. A regression analysis was performed to determine the significance of these results and is summarized in Table 3. This analysis showed no significant difference in platelet adhesiveness between gout patients and controls by either technique ($P > 0.1$).

### Table 2. Comparison of platelet adhesiveness between gout patients and controls

<table>
<thead>
<tr>
<th></th>
<th>Whole blood (%)</th>
<th>Plasma (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gout patients</td>
<td>52.2±12.8</td>
<td>30.3±12.7</td>
</tr>
<tr>
<td>Controls</td>
<td>51.8±13.6</td>
<td>25.4±8.0</td>
</tr>
</tbody>
</table>

### Table 3. Regression analysis

<table>
<thead>
<tr>
<th></th>
<th>Coefficient of correlation ($r$)</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gout patients vs controls by whole blood technique</td>
<td>−0.177</td>
<td>$&gt; 0.1$</td>
</tr>
<tr>
<td>Gout patients vs controls by plasma technique</td>
<td>−0.181</td>
<td>$&gt; 0.1$</td>
</tr>
</tbody>
</table>

Significant correlation between the two techniques was found for both the gout patients and the controls with $r = 0.354$ and $0.407$ respectively and $0.02 > P > 0.01$ (Table 4). This agrees reasonably with the results of Shaw et al. (1970) who found a coefficient of correlation, $r$ of 0.46 between the results from the two methods with $P = 0.001$.

### Table 4. Significance of correlation between the two techniques

<table>
<thead>
<tr>
<th></th>
<th>$r$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>−0.407</td>
<td>$&gt; 0.01$, $&lt; 0.02$</td>
</tr>
<tr>
<td>Gout</td>
<td>−0.354</td>
<td>$&gt; 0.01$, $&lt; 0.02$</td>
</tr>
</tbody>
</table>

Since exercise affects platelet adhesiveness it was necessary to ensure that mobility was not having a significant effect on the results obtained by either technique. The gout and control subjects were divided into two groups—those who were mobile and had been bled as out-patients and those who were immobile in-patients.

The results are summarized in Tables 5 and 6, and show that mobility did not significantly affect the results. There was, however, a very significant difference between platelet adhesiveness measurements by the whole blood and the plasma techniques, in both mobile and immobile subjects.

### Discussion

This study has demonstrated that the hyperlipidaemia present in many patients with gout is not associated with increased platelet adhesiveness, since this did not differ between groups of gout patients and control subjects, as measured by two different methods. Some of the gout patients were taking treatment which was lowering the plasma concentration of uric acid (uricosuric agents or allopurinol),

### Table 5. Statistics to assess the effect of mobility on platelet adhesiveness

<table>
<thead>
<tr>
<th></th>
<th>Mobile patient</th>
<th>Immobile patient</th>
<th>Combined SD</th>
<th>t</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>51.7</td>
<td>51.5</td>
<td>51.5</td>
<td>13.2</td>
<td>$0.0011$</td>
</tr>
<tr>
<td>Variance</td>
<td>165.8</td>
<td>146.5</td>
<td>195</td>
<td>10.89</td>
<td>$1.56$</td>
</tr>
</tbody>
</table>

### Table 6.

<table>
<thead>
<tr>
<th></th>
<th>Whole blood</th>
<th>Plasma</th>
<th>Combined SD</th>
<th>t</th>
<th>$P$</th>
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<td>187</td>
<td>195</td>
<td>195</td>
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</table>

Mean             | 51.5        | 51.5   | 51.5        | 13.2  | $0.0011$ |
| Variance         | 187         | 195    | 195         | 10.89 | $1.56$ |

Combined SD      | 13.2        | 10.89  | 10.89       | 13.2  | $0.0011$ |
| t                | $0.0011$    | $1.56$ | $1.56$      | $0.0011$ |
| $P$              | $< 0.001$   | $< 0.02$ | $< 0.2$    | $< 0.001$ |
but Bluestone, Lewis & Mervant (1971) and Darlington et al. (1971) have shown that such therapy does not produce any significant overall fall in lipid levels.

The relationship if any between gout and cardiovascular disease remains obscure, but does not appear to be related to pathological platelet adhesiveness.

Acknowledgments

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References


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