baby girl was delivered (650 g; small for date: Apgar 4). Examination of the placenta disclosed focal decidual infarctions. The mother progressed well after birth, but although the baby was intensively treated, she died within a month owing to complications associated with rupture of the intestine.

Anticardiolipin antibody (IgG) was retrospectively determined by ELISA with or without the addition of β2-GPI to the ELISA system. The concentration of ACA with or without β2-GPI increased from the 20th week of gestation when retardation of placental growth was noticed and the TAT concentration showed an extraordinary increase, whereas the level of ACA without β2-GPI remained within the normal range (figure). Furthermore, the level of thrombomodulin, which has been reported as a marker for endothelial cell injury, was increased from the 24th week of gestation. There were no remarkable changes in other serological data, except circulating immune complexes, which increased transiently during the 20th week of gestation.

Thus ACA cannot be determined with the addition of β2-GPI. Furthermore, serial examination of TAT or thrombomodulin concentrations, or both, will provide additional information as to whether subclinical thrombotic conditions exist or not because ACA is not always associated with a pathological role and nor does a marked increase of ACA always induce thrombosis.20

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Sulphoxidation status in rheumatoid arthritis

Str: In a recent issue of this journal Emery et al1 found an increased prevalence of poor sulphoxidation in patients with rheumatoid arthritis (RA). Using the same methods as Emery’s group, we have found similar results. Sulphoxidation status was assessed in 116 of 200 patients enrolled in a comparative study of sulphasalazine and d-penicillamine as second line drugs in RA (table). Follow up data are available on these patients for between 5 to 7 years from entry into the trial. Surprisingly, no increase in toxicity from either drug was observed in the poor sulphoxidisers group (figure).

Previous studies have suggested that toxicity from intramuscular gold2 and d-penicillamine3 is related to sulphoxidation status. In contrast, with gold and d-penicillamine, however, sulphasalazine is metabolised predominantly by acetylation rather than sulphoxidation, and one would therefore have predicted that toxicity from sulphasalazine would not be influenced by sulphoxidation status. In this study we failed to find any association between toxicity from d-penicillamine and sulphoxidation status. Although the period of follow up in this study was longer than in previous studies, this finding cannot be explained by an excess of late toxicity in the good sulphoxidisers group.

A second possible explanation is that the group in whom sulphoxidation status was measured was not representative of the group as a whole. To consider this point we noted toxicity in those patients in whom sulphoxidation status was not assessed. Of the patients receiving sulphasalazine in whom sulphoxidation status was known, 35% developed toxicity compared with 30% of those in whom sulphoxidation status was not known. In those receiving d-penicillamine the figures were 34% and 38% respectively. Thus although there was a small excess in toxicity in those receiving d-penicillamine who did not have sulphoxidation status assayed, this was not statistically significant (χ2). We cannot rule out the possibility that the ratio of good and poor sulphoxidisers might have been different in those who were not assayed. There were 12 deaths (five sulphasalazine, seven d-penicillamine) in the group where sulphoxidation status could not be evaluated compared with two in the group where sulphoxidation status was assayed (one sulphasalazine, one d-penicillamine). None of these deaths was directly attributable to drug toxicity.

The consistent finding that poor sulphoxidisers are overrepresented in RA compared with the normal population is of great interest, and the effect of sulphoxidation status on susceptibility to RA or disease expression, or both, merits further study.


Numbers (percentages) of patients receiving sulphasalazine or d-penicillamine who were good or poor sulphoxidisers

<table>
<thead>
<tr>
<th></th>
<th>Poor</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphasalazine (n=63)</td>
<td>49 (78)</td>
<td>14 (22)</td>
</tr>
<tr>
<td>d-Penicillamine (n=53)</td>
<td>36 (68)</td>
<td>17 (32)</td>
</tr>
</tbody>
</table>

Expected

(26 (22) 90 (78))

**Numbers (percentages) of patients receiving sulphasalazine or d-penicillamine who were good or poor sulphoxidisers**

**Sulphasalazine**

<table>
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<tbody>
<tr>
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<td>36%</td>
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<tr>
<td>d-Penicillamine</td>
<td>35%</td>
<td>65%</td>
</tr>
</tbody>
</table>

**d-Penicillamine**

<table>
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</tr>
</tbody>
</table>

**Toxicity due to sulphasalazine or d-penicillamine in the good and poor sulphoxidisers groups.**
Sulphoxidation status in rheumatoid arthritis.

E A Murphy, R Madhok, H A Capell, R Waring and J A Hunter

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