Letters to the Editors

in the blood of the goat took place under the aegis of the Commission for the Investigation of Mediterranean Fever.

Happily, this old laboratory has now been restored (25 June 1980) by the expert and devoted work of the eminent Maltese medical historian, Dr Paul Cassar, who would appreciate very much the views and suggestions of your readers as to what could possibly be the nature and uses of this ancient? DIY item of laboratory equipment.

ETHELWALD E VELLA
Colonel,
Royal Army Medical College,
Millbank,
London SW1P 4RJ

Stability of heparin in intravenous fluids

Administration of heparin by continuous intravenous infusions has been shown to be as effective as intermittent intravenous injection in the treatment of thromboembolism, but major bleeding is a more frequent complication with intermittent injection of heparin than with continuous infusion. Nevertheless, reports that heparin may be unstable in intravenous fluids continue to cast doubt on continuous infusion being the optimal method of administration. Jacobs et al. and Okuno and Nelson, using different assays of heparin, reported a loss of its potency in commonly used intravenous fluids, even within a few hours, and measurements with anti-Xa assay apparently showed erratic behaviour. These observations require confirmation since they carry significant implications regarding heparin administration in the management of venous thromboembolism.

The stability of heparin in intravenous fluids has been re-examined using four assays which measure most known aspects of heparin activity. The activated partial thromboplastin time method, the protamine sulphate titration technique, the metachromatic assay, and an anti-Xa assay were used, and details of these methods have been reported previously. Heparin (mucous) from Allen and Hanbury’s (Gloxo Australia) batch No. 251324 (5000 units/ml) was used in these studies; 5 ml of heparin was added to 1 litre glass bottles of saline, 5% dextrose (Abbott Laboratories), and Hartmann’s solution (Travenol Laboratories). It was found that the initial volume of fluid in these bottles ranged from 1001 to 1069 ml (± 1 ml). Thus the final concentration of heparin was 24 ± 1 units/ml. The bottles were stored at room temperature (22 ± 2°C), and samples were removed with a syringe as required.

As can be seen from the Table, no loss was detected in the potency of heparin in intravenous fluids for up to 24 hours by either the chemical or biological assays. Contrary to the suggestion of Okuno and Nelson, sensitivity of the method of assay was found to have no relation to the stability of heparin. In a separate series of experiments, the pH was monitored continuously with a strip-chart recorder connected to a Radiometer PHM61 pH meter.

Potency of heparin in intravenous fluids with time as a percentage of the initial potency

<table>
<thead>
<tr>
<th>Intravenous fluid</th>
<th>pH after heparin addition</th>
<th>Time after heparin addition (hours)</th>
<th>Anti-Xa assay</th>
<th>Protamine sulphate titration</th>
<th>Metachromatic assay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hartmann’s solution</td>
<td>5-92</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>5% Dextrose</td>
<td>5-95</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Saline</td>
<td>5-40</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Results are the mean of six measurements. The pH of the final mixture did not show a change with time.
Historic laboratory apparatus

Ethelwald E Vella

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