Letters to the Editor

Quality control in haemoglobin determination using the Coulter Counter S: a preliminary note

In a recent letter to the Editor, Prangnell and Johnson (1976)1 pointed out that, using a Coulter Counter S with calibration of the haemoglobin levels against three cyanmethaemoglobin standards, the results averaged 0·5 g/dl higher than in laboratories using Coulter 4C to calibrate their machines. In the same way, Lewis (1976), in a comment on this letter, says that in the national quality control trials it has been found that participants using Coulter S produce a lower mean value for haemoglobin than when using other systems, although the difference is in the order of 0·2-0·3 g/dl; 0·5 g/dl is just within 2SD. It seems likely that these differences are due to the use of 4C as a calibrating material.

In our laboratory we use a Coulter Counter S with calibration 4C under a daily programme control described previously (Paz et al., 1977). In the proficiency test service organised by the Institute for Clinical Science, Philadelphia, in December 1976, the determination requested was the evaluation of two levels of haemoglobin. Our results were very concordant, even slightly higher than the ones shown by the two samples from the organising Institute, the mean values of the reference laboratories, and the median of the participating laboratories (percentiles 10-90), as is shown in the Table.

When we checked a Technicon Multiple Haematology Reference III in our Coulter S the range found for the haemoglobin level (14·3-14·4 g/dl) showed good correspondence with the value assigned by the manufacturer (14·4 g/dl). It is interesting to note that the use of Isoton II as a diluent does not affect the results of haemoglobin estimation provided by the instrument (Barnard et al., 1976).

We hope very soon to finish a full study of the accuracy reached in the determination of haemoglobin with the Coulter S, using 4C as a calibrator.

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References


Humidity and sterilisation by steam and formaldehyde

G. L. Gibson (1977), in his interesting article, states that it may be important that formaldehyde should reach the organism in conditions of comparatively low humidity. He quotes Nordgren (1939) in support of this statement. However, on checking Nordgren’s monograph I find that he comes to the opposite conclusion, namely, that bactericidal efficacy increases with the partial pressure of water vapour (page 81). On page 74 he does mention that in the 1890s ‘dry formaldehyde gas’ appeared to have been regarded as being ‘the most powerful’, but about the turn of the century opinion wheeled round in favour of moist gaseous formaldehyde. Of course, in the presence of actual water the effect becomes that of formaldehyde in solution.

The question whether dry formaldehyde works as well as moist is rather academic in the case of a low temperature steam and formaldehyde autoclave. The heating effect of steam in an autoclave is due mainly to the condensation of saturated steam, thereby giving up the latent heat of condensation of steam to the object concerned. This creates a local vacuum which draws in further steam and accounts for the good penetration of steam in an autoclave. It follows, therefore, that moisture must be present on the objects to be sterilised.

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References


The author comments as follows:

Dr Edmunds’ letter is very valuable in helping to elucidate one of the problems at present exercising those interested in low temperature steam and formaldehyde. Nordgren (1939) was, of course, dealing with gaseous formaldehyde and various proportions of water vapour introduced with it, and not with steam or with temperatures above 70°C. He does certainly state that disinfection is most effective in the presence of moisture.

Table

<table>
<thead>
<tr>
<th>Sample</th>
<th>PTS Assigned value</th>
<th>Reference lab. Mean</th>
<th>Range</th>
<th>Participating lab. Median</th>
<th>Range</th>
<th>This lab. Result</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb A</td>
<td>13-7</td>
<td>13-8</td>
<td>13-5-13-9</td>
<td>13-8</td>
<td>13-4-14-2</td>
<td>13-9</td>
<td>60</td>
</tr>
<tr>
<td>g/dl</td>
<td>17-8</td>
<td>17-9</td>
<td>17-6-18-1</td>
<td>17-9</td>
<td>17-3-18-3</td>
<td>18-0</td>
<td>60</td>
</tr>
</tbody>
</table>

1See also: Prangnell and Johnson (1977). Journal of Clinical Pathology, 30, 487-491.

2 haemoglobin level (14·3-14·4 g/dl) showed good correspondence with the value assigned by the manufacturer (14·4 g/dl). It is interesting to note that the use of Isoton II as a diluent does not affect the results of haemoglobin estimation provided by the instrument (Barnard et al., 1976).

3 We hope very soon to finish a full study of the accuracy reached in the determination of haemoglobin with the Coulter S, using 4C as a calibrating material.
The point I wished to make in what was clearly speculation on the most favourable conditions for application of formaldehyde gas and low temperature steam to microorganisms was that relatively dry gaseous formaldehyde was in fact effective. Nordgren states on page 79, "Secondly the results show that relatively dry gaseous formaldehyde in low concentration, at least at a higher temperature, is capable of killing spores which are considerably dry. These results already argue against the popular opinion that formaldehyde gas can only kill bacteria on moist disinfection or sterilisation objects".

Nordgren then goes on to show, on page 81, that with increase in percentage of water vapour there is a rise in bactericidal efficacy up to 50%, but little thereafter. Topley and Wilson (1975) consider 60-90% relative humidity to be the range in which formaldehyde acts best. These conditions are met by drawing a vacuum without steam pulsing, injecting formaldehyde gas first, and then injecting steam (Alder, 1977).

In modern low temperature steam and formaldehyde autoclaves a serious cause of failure to kill test microorganisms seems to be the problem of condensation. Unless steam can always be guaranteed to be dry, if necessary possibly by slight superheating by a relatively hotter jacket, condensation will occur in paper, fabric, and narrow lumina, and sterilisation may not be achieved as the formaldehyde will be obstructed (Nordgren, 1939, p. 152,) or will be absorbed, and polymerisation encouraged (Walker, 1964). This is, I think, the real problem.

The whole matter of the best cycle for low temperature steam and formaldehyde is at present under investigation here and at other centres, and it is hoped that questions such as that raised by Dr Edmunds may soon be answered.

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References


Cytological urine screening

We were interested to read the article by Freni et al. (1977) on erythrocyturia, recently published in this Journal, because at an early stage of an industrial cytological urine screening programme we also encountered higher than expected red and white cell counts.

Using a modified millipore filtration method, of the first 185 urines examined, 37% contained 5-6 red blood cells per high-power field, and in a further 16% the red cell content was higher and occasional clumps of white cells were found.

Because of the sinister significance usually attached to the presence of blood and to exclude the possibility of occult infections, a small pilot study was carried out on a group of 32 workers from a particular factory. These were people who at one time had handled carcinogens and they were compared with 32 people from the same factory who did not work with chemicals. A careful history was taken from all and the urine was examined cytologically and by conventional routine analytical methods including dip spoon culture.

On cytological examination red and white cells were found in 40% of cases in both groups and they were present in somewhat higher concentrations in the chemical handlers than in the controls. Cells were not found by conventional methods and all cultures were negative. In no case was hypertension found and no urological symptoms were present. In a follow-up after six months 60% showed no change in their previous cytological status.

Cytological methods of examination are obviously much more sensitive than the conventional ones used up to now, and it may be that a base line for 'physiological' levels of excretion of red and white cells will be found, but large-scale surveys will be necessary to assess the significance of this microhaematuria. It does become apparent, however, that standardisation of methods of preparation, at least within a laboratory, will be essential.

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