borderline-positive or even negative, after 15 days of storage or more, when the titre in serum was $1/100$ (Figs. 1 and 2). Storage at $+4\,^\circ C$ or at $-20\,^\circ C$ did not significantly improve results when compared with those stored at room temperature. In patients with the highest antibody titres, the slight loss in activity after 30, 60, and 180 days was, for all three periods of storage, in the range of one dilution in respect to serum levels. In patients with low titres, storage at $+4\,^\circ C$ or at $-20\,^\circ C$ did not prevent the test becoming negative.

**Discussion**

It seems apparent from our results that HBV markers are stable in a dried condition and that the technique for their determination on eluates from dried specimens is simple, reliable and reproducible.

As far as specificity is concerned, we have never encountered false-positive results although the eluates contained whole blood instead of serum. Sensitivity is not a problem for HBsAg determination. The failure of the method to give positive results when antibody titre in serum was less than $1/100$ is probably related to the dilution of the small quantity of blood (about $50\,\mu l$) contained in a spot of 8 mm, once this is eluted. Elution with the minimal amount necessary to perform the assay, 250 or $150\,\mu l$, depending on the test, causes a three- to fivefold dilution of the antibody in comparison with serum so that antibody activity becomes too weak to be detected. This could probably be obviated by increasing the size of the spot eluted, therefore obtaining a more concentrated solution.

This method seems suitable for epidemiological surveys or large-scale screenings, especially in mailing of specimens is required.

**References**


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**Letters to the Editor**

**Plasma electrolytes in dangerous infectious diseases**

Most of the common laboratory investigations necessary for the diagnosis and management of patients with hazardous infectious diseases can be done in a suitable safety cabinet. However, plasma sodium and potassium present difficulties as their estimation requires the use of either ion-specific electrodes or a flame photometer.

Potentiometric assay appears to be simpler than flame photometry but we did not consider it appropriate in this case for two reasons: first, the necessary equipment is not generally available and second, flame photometers are rather simpler and more likely to function reliably at very short notice after long periods without attention or maintenance, a situation especially liable to occur if an instrument is reserved for the relatively infrequent dangerous specimen. On the other hand, flame photometers should not be enclosed in a safety cabinet as they produce much heat and operate on gas and air under pressure.

A solution to this problem is to dilute the plasma or serum sample inside the safety cabinet using formalin as the diluent instead of water. After leaving the bottle of diluted sample in the dunk tank for at least 1½ h (ensuring that the outside is also sterilised) the contents can be analysed in an unenclosed bench flame photometer. We find that very little formaldehyde gets past the flame; even after 15 samples the smell of formaldehyde is minimal. Although the diluted sample comes into contact with only plastic and stainless steel, distilled water should be run through it after use to clear the instrument of residual formaldehyde. Plasma diluted in formalin in this way yields a faintly turbid suspension of precipitated protein. To check that microorganisms trapped within such protein floccules are inactivated, we diluted our sample in formalin (1/100), fresh human plasma to which *Bacillus globigii* spores had been added giving a final concentration of $10^{5}$/ml of plasma. At 10, 20, 45, and 90 min after dilution the precipitates from 1 ml volumes of the diluted plasma were washed and one loopful was added to 5 ml of nutrient broth and another plated on nutrient agar. Growth was obtained only
Letters to the Editor

on the 10 min samples. Since 1% formalin (0.4% formaldehyde final concentration) kills Marburg2 and Ebola (ETB Bowen, personal communication, 1980) viruses in one hour or less, we consider 100% formalin for at least 1 h to be an effective sterilising procedure. Undiluted formalin (BDH) contains about 0.13 mEq (mmol)/l Na+ and less than 0.002 mEq (mmol)/l K+. Interference from these is compensated for by using formalin in place of water when preparing the standards and the blank solution used to calibrate the flame photometer.

To determine whether or not the use of formalin influenced the results, we diluted ten human sera in triplicate in formalin or distilled water and analysed them for sodium and potassium. Using Fisher’s paired t test to compare the results, we found that for sodium and potassium there was no difference between the two diluents at the 95% level of significance. The use of formalin as a diluent should not, therefore, introduce additional uncertainty into a laboratory’s own estimate of the precision and accuracy of their flame photometry.

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Carriage of group B streptococci in the upper respiratory tract

Recent reports1 2 from the USA have suggested that the throat may be a significant source of group B streptococci (GBS), and that these organisms may play an important role in the aetiology of sore throat. However, our findings amongst a population of schoolchildren in Edinburgh indicate that this is not necessarily the case in the UK.

Beta-haemolytic streptococci were isolated from the upper respiratory tract of 78 (19%) of 416 children aged 5-18 yr. Identification of the streptococcal isolates showed that only nine children were carriers of GBS, a carrier rate of 2%. Carrier rates of groups A, C, and G streptococci were 11%, 2% and 4% respectively. A significantly greater number of children aged 5-12 yr were streptococcal carriers in comparison with the older children (p < 0.001).

This study was performed during the winter when peak streptococcal carrier rates are expected,2 and a subsequent reduction in carriers during the summer is likely. These results do not, therefore, show that the upper respiratory tract is a significant source of GBS in children.

Evaluation of various sampling and identification techniques for streptococci throughout the study confirmed some of our earlier findings. Storage of swabs in Amies’ transport medium before laboratory processing did not increase recovery of streptococci; selective growth media previously described1 did not increase numbers of streptococci isolated; and the CAMP test and Streptosec coagglutination test6 (Organon UK Ltd) proved to be entirely reliable in identification of isolates.

We await with interest any forthcoming reports which may confirm the difference in GBS carrier rates in the upper respiratory tract between children in the USA and the UK.

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Chronic eosinophilic pneumonia and rheumatoid arthritis—incidental?

We were interested in the paper by Dr Cooney (February 1981)3 in which a possible relationship between chronic eosinophilic pneumonia (CEP), bronchiolitis obliterans and rheumatoid arthritis was postulated. We recently described three cases of CEP and reviewed the published reports of 60 cases in which histology of the lung was described.2 None of these cases was there any evidence of arthritis. In the two of our three cases who had open lung biopsies there was bronchiolitis obliterans of the polyposid variety similar to that described by Cooney. Although we did not see any fibrotic bronchial lesions, in all three cases there was evidence of functional small airways disease after remission of the acute disease. This suggests that the healing of the bronchiolitis had resulted in irreversible changes.

Bronchiolitis obliterans was also a feature of one third of the biopsies of CEP reported by Gaensler and Carrington.1 The evidence as we see it is that bronchiolitis obliterans is an integral part of the disease of CEP and because of the severe damage to the bronchioles healing bronchiolitis may result in permanent damage to the small airways. The relationship of CEP with rheumatoid arthritis is an intriguing one; however in view of the absence of this association in previously reported cases of CEP we think it is likely to be coincidental.

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