Letters to the Editor

Increased erythrocyte rigidity in chlorate poisoning

Methaemoglobin formation is a prominent feature of chlorate poisoning; available evidence suggests that this condition is neither relieved by methylene blue treatment nor does it determine the often fatal outcome of this intoxication. We recently observed a case of severe sodium chlorate poisoning¹ with methaemoglobinemia unresponsive to methylene blue and ascorbic acid. We could also demonstrate that the red cell defect induced by methaemoglobin forming agents varied greatly in its responsiveness to methylene blue. After a short in vitro incubation with chlorate, the red cell defect was no longer reversed by the addition of methylene blue.

We have demonstrated that the incubation of red cells with chlorate induces not only the oxidation of haemoglobin, but also an increase in the membrane rigidity. Human red cells were incubated in chlorate buffer (110 mmol/l NaCl, 30 mmol/l NaClO₃, 10 mmol/l glucose, 10 mmol/l Tris, pH 7.4) at 37°C for two hours, and the passage time through a polycarbonate membrane with 5 µm pores measured, using a modification of the technique described by Reid *et al.*² Filtration times for 0.5 ml of a 15% suspension of erythrocytes rose from 2.5 ± 0.26 s before incubation (mean $\pm$ SD) to approximately 100 s after two hours' incubation.

This dramatic increase in rigidity will lead to impairment of microcirculation and to the destruction of the red cells in the spleen. Both factors will contribute to the life-threatening sequelae of chlorate poisoning—that is, disseminated intravascular coagulation and renal failure. As these complications cannot be prevented by methylene blue treatment, an exchange transfusion should be performed very early in all cases of chlorate poisoning.

References

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- Reid HL, Barnes AJ, Lock PJ, Dormandy JA, Dormandy TL. A simple method for measuring erythrocyte deformability. *J Clin Pathol* 1976;29:855–8.

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Is guinea-pig inoculation ever justified for the diagnosis of tuberculosis?

Tests involving animals are costly and undesirable. Fortunately improved culture methods for *Mycobacterium tuberculosis* as well as the eradication of *Brucella abortus* from cattle have very greatly reduced the need for guinea-pig inoculation in medical laboratory practice in the United Kingdom. Routine guinea-pig tests are no longer recommended in the British Isles¹ but published data show that the same advice would be inappropriate in the Federal Republic of Germany² and, by implication, in a number of other countries in the world, usually because less satisfactory culture methods are used.

To see if guinea-pig inoculation continues to play any useful role we have made a sample study of the records of two laboratories, one in a rural area (Shropshire) and the other in an urban area (South Yorkshire). In the rural laboratory the number of guinea-pig inoculations

(GPI) has declined from 408 in 1971 to only 29 in 1982 and a comparable decline has been experienced in the urban laboratory. To identify which specimens remain most appropriately examined by animal inoculation as well as culture, the results have been recorded in Table 1 and further details of the materials giving positive results are shown in Table 2. In this series 56 (4%) of 1258 of samples showed evidence of tuberculosis. Approximately one in five of the positive samples was identified by GPI alone. A similar proportion were found positive by culture alone. There seems little doubt that in some instances splitting of the sample may have reduced the inoculum to a level too small to produce a positive result by one test or the other, but this can not be presumed to be the sole explanation especially as the guinea-pig test is well established as one of very high sensitivity.³

Animal inoculation is very seldom justified, particularly so when multiple specimens can readily be obtained, as for

Table 1 Comparison of culture with guinea-pig inoculation

	Test result				Positive tests	Total tests
	N	+	N	+		
Culture:	N	+	N	+		
GPI	N	+	+	N		
Rural (1972–1982)	993	22	5	3	30	1023
Urban (1976–1979)	210	13	6	7	26	236
	1203	35	11	10	56	1259

N = negative result

+ = test for *M tuberculosis* positive.

Table 2 Type of specimen giving positive culture or animal test result

Origin of specimen	Culture + Animal +	Culture + Animal N/V	Culture N/V Animal +
Pulmonary	3	3	3
Urine	7	0	0
Pus/abscess	5	1	1
Lymph node	2	0	1
Pleural fluid	0	1	0
Synovial fluid	3	0	0
Pericardial effusion	1	0	0
Cerebrospinal fluid	5	1	1
Spinal/vertebral aspirate	2	0	1
Tissue	1	0	0
Peritoneal biopsy	0	0	2
Liver biopsy	0	1	1
Endometrium	1	0	1
Mycobacterial culture	2	0	0
Other/unidentified	3	3	0
Total	35	10	11

+ = positive for *M tuberculosis*.

N/V = negative or void for *M tuberculosis*.

V = void (cultures contaminated or premature death of guinea-pig before completion of test).