effect. Curtes and Develay³ reported on a patient who claimed to have taken 50 cimetidine tablets with several phenobarbitone and Peritrate tablets but who developed no symptoms or signs of toxicity. In neither case, however, was the plasma cimetidine concentration measured to confirm what had been taken.

During treatment with cimetidine bradycardia may occur occasionally, possibly due to blockade of H₂-receptors in the heart.⁴ Coma has also been described after therapeutic doses of cimetidine⁵ but not after overdose. In animal studies extremely high doses of cimetidine caused tachycardia, convulsions, and respiratory depression, and the oral LD₅₀ in dogs was about 2600 mg/kg (Amos, personal communication). Many drugs cause serious toxic effects in overdose, but from experience gained so far self-poisoning with cimetidine does not seem to be dangerous.

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¹ Randolph, W C, *et al*, *Journal of Pharmaceutical Sciences*, 1977, **66**, 1148.

² Gill, G V, *Lancet*, 1978, **1**, 99.

³ Curtes, J P, and Develay, P, *Bulletin de Médecine Légale, Urgence Médicale, Centre Anti-Poisons*, 1977, **20**, 137.

⁴ Jefferys, D B, and Vale, J A, *Lancet*, 1978, **1**, 828.

⁵ McMillen, M A, Ambis, D, and Siegel, J H, *New England Journal of Medicine*, 1978, **298**, 284.

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Tap water instead of electrode jelly for electrocardiographic recording

Pleas for replacing expensive and messy electrode jelly with simple lubricants^{1 2} or even water² have largely been ignored, and it is common practice to use one of the commercial electrode jellies for hospital and domiciliary electrocardiographic (ECG) recording. The purpose of this paper is to show that using water instead of jelly does not detract from the quality of the ECG.

Patients, methods, and results

One hundred patients referred to the ECG department were randomly selected for study; the criterion for selection was the time available to the technician for recording and mounting the extra tracings. We have used water rather than jelly for some time, so the first or service ECG was recorded using water without any other skin preparation, and the second tracing was then taken using one of the commercial electrode jellies. Both traces were mounted separately and when the study was completed two physicians each examined 100 mixed tracings which did not indicate whether water or jelly had been used. These traces were carefully examined for quality and were assessed for alternating current interference (50 cycles per second), a wandering baseline (+ or - 5 mm), and other artefacts. One technician recorded all ECGs with a Siemens Cardiostat 3T (input resistance, standard leads: 2 × 5 MOhm (between R-L, L-F, F-R with aV and V leads: 600 KOhm); frequency response: 0-100 Hz, 5 dB; 50-Hz filter on mains only; battery power used for traces in this study) or Cambridge VS4 (input impedance: > 500 kOhms between any patient lead and ground under any conditions; frequency response: 0.08 to 40 Hz + 0.5 dB, - 3 dB; this machine did not have a Hertz notch filter). Electrode size was 3.8 × 5 cm for the Siemens machine, and 3.8 × 6.2 cm for the Cambridge. Tracings were taken in the ECG department, which is not specially shielded against AC interference.

All tracings—that is, 100 with jelly and 100 with water—were regarded as satisfactory for routine interpretation. The amplitude of the QRS complexes was not changed by using water, nor were there any significant differences in the S-T/T segments between the two techniques. Two tracings (one water, one jelly) were deemed "satisfactory but not a good tracing" due to the presence of alternating current interference. Slight alternating current interference was present in a further 10 ECGs (4 jelly, 6 water) but did not affect the overall quality of the tracing. A wandering baseline was present in one lead of six tracings (3 water, 3 jelly), but again the overall quality was

good and interpretation was not affected. There was no evidence of the equivalent of a "jelly short" occurring with water. There was no significant difference in the quantity of discarded paper between the two methods.

Comment

With the early string galvanometer machines there was a low input impedance, and electrolyte pastes and jellies were necessary to overcome skin resistance. With the high input impedance of modern instruments, however, any liquid that moistens the skin will give a satisfactory recording—water, toothpaste, french mustard, and even marrons glacés have all been shown to be as effective as jelly.¹

The main advantage in using tap water rather than jelly is economy. The cost of jelly is about £2 per 100 ECGs. Swabs used to apply and remove the jelly at a rate of at least two per ECG cost some 42 p per 100 ECGs, whereas with water (which does not have to be dried) 20 swabs will suffice for at least 100 ECGs, or a damp sponge or towel may be used repeatedly, thus removing this expense entirely. By using the tap water there is, therefore, a saving of about £3.50 per 100 ECGs, which in a 300-bedded general hospital would amount to about £100 annually. The technician's time is also spared: it is easier and quicker to dampen a swab than to squeeze jelly from a tube (which may not be available in an emergency), and there is no need to clean the skin after recording. Furthermore, straps and electrodes do not need cleansing, and the electrodes do not erode with water.

Because of these advantages, we recommend that electrode jelly be replaced by tap water in the routine recording of ECGs.

We are grateful to Dr J Fielding who kindly helped to analyse the ECGs.

¹ Lewes, D, *British Heart Journal*, 1965, **27**, 105.

² *Lancet*, 1965, **1**, 975.

³ Maxwell, J, *British Medical Journal*, 1957, **2**, 942.

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Movelat in the prophylaxis of infusion thrombophlebitis

The incidence of infusion thrombophlebitis is reduced when very small doses of heparin and hydrocortisone are added to the bottles of infusion fluid.¹ It was therefore decided to test the prophylactic effect of these drugs as a skin cream.

Patients, methods, and results

One hundred identical tubes were prepared and numbered consecutively. Half contained active cream and half an inert placebo cream, allocated randomly according to a code held by the statistician. The active cream, Movelat, contained 1% adrenocortical extract (equivalent to 20 mg of corticosteroid), 0.2% organoheparinoid, and 2% salicylic acid. Patients were asked to join the trial if they needed an intravenous infusion that was likely to last for 48 hours or more. Those receiving intravenous feeding or whose drips were used to administer uncommon drugs were excluded. A Medicut cannula and Baxter giving-set were used for every patient. Each patient entering the trial was allotted the next numbered tube of cream and when the infusion was completed that tube was discarded. The cream was applied three times daily to the skin over the drip vein from the puncture site proximally for about 20 cm. The skin was examined daily for signs of thrombophlebitis; only when there was thrombosis of at least 25 mm was this considered a positive finding. The drip was discontinued when clinically indicated or when thrombophlebitis supervened. When 100 patients had entered the trial the code was broken and the results analysed.

Three patients were eliminated, two because the conditions of the protocol were not fulfilled and one because he died before the infusion was completed. Ninety-seven results were analysed. Forty-eight patients were found to be in the treatment group and 49 in the control group; the distribution of patients by sex, age, and diagnosis between the two groups was closely similar.

The infusions were all of commonly used clear fluids and blood and there was no significant difference between the two groups. The added drugs were also evenly distributed. There were eight (17%) cases of thrombophlebitis in the treatment group and 15 (31%) among controls ($P=0.05$). Patients in the treatment group took 40% longer to develop thrombophlebitis than the controls: 66.4 hours compared with 47.4 hours. The average duration of the infusions in the treatment group (54.7 ± 14.1 hours) was longer than in the control group (46.7 ± 13.5 hours), but this reflected the greater number and earlier onset of cases of thrombophlebitis in the control group. When positive cases were excluded the averages were closer (controls 46.3 hours, treatment group 52.1 hours). There were no infective complications.

Comment

Thrombophlebitis complicates about 30% of infusions.² Many factors contribute to its development, which makes prevention more difficult. In most cases such prevention saves the patient from a minor but rather painful condition; but when few veins are available prolonging the life of each drip becomes more important. Several regimens have been suggested for prophylaxis but they have tended to be complicated and to demand frequent changes of puncture site. The condition is not infective so local antibiotics are not helpful,³ and it should not be confused with the rare and potentially lethal condition of suppurative thrombophlebitis.⁴

This trial has shown that the application of Movelat cream to the skin over the drip vein three times daily reduces the incidence of thrombophlebitis by nearly half. When the condition does occur the onset is delayed. Its routine use with intravenous infusions is recommended.

I thank Dr M B Clyne of Luitpold-Werk (Munich) Ltd for preparing the creams used in the trial and for the statistical analysis.

¹ Schafermeyer, R W, *Journal of the American Medical Association*, 1974, **228**, 695.

² Thomas, E T, Evers, W, and Racz, G B, *Current Researches in Anaesthesia and Analgesia*, 1970, **49**, 50.

³ Ghildyal, S K, Pande, R C, and Misra, T R, *International Surgery*, 1975, **60**, 341.

⁴ Stein, J M, *New England Journal of Medicine*, 1970, **282**, 1452.

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Maternal serum alpha-fetoprotein in relation to zygosity

In 102 twin pregnancies maternal serum α -fetoprotein (AFP) concentrations were negatively associated with birth weight.¹ This report presents the results of an investigation into the relationship of AFP concentrations with zygosity in the same group of twin pregnancies.

Methods and results

Since 1972 serum samples from all pregnant women attending the antenatal clinics of the John Radcliffe Hospital, Oxford, have been routinely stored at -40°C . Samples relating to 102 twin pregnancies collected from 11 to 24 weeks of gestation were retrieved and tested.¹ AFP concentrations were expressed as multiples of the median value for singleton pregnancies without neural-tube defects at the relevant week of gestation, and mean AFP concentrations were calculated using logarithms. Thirty-three of the 102 pairs of twins were of different sexes and therefore dizygous. The zygosity of the 69 like-sexed pairs was sought in late 1977 by asking their family doctors or mothers whether they were physically identical. The physical appearance of twins is an accurate method of determining zygosity;² identical twins were taken as being monozygous and non-identical twins as being dizygous. We classified all but nine of the twin pairs in this way; in eight cases one or more of the pair of twins had died, and in one case neither the family doctor nor the parents could be traced. For these nine we examined the number of placentas and chorionic sacs.³ Like-sexed twins who share a single placenta have a 70% chance of being monozygotic, and if they have separate placentas

there is an 85% chance of their being dizygotic.⁴ Dizygous twins rarely have a single chorion, and only about 20% of monozygous twins have two chorions.⁴ Each of the nine like-sexed twin pairs was therefore taken to be monozygous if there was one placenta and dizygous if there were two. In four pairs the number of chorionic membranes was known and corroborated the classification based on the number of placentas.

Mean maternal serum AFP concentrations for monozygous and dizygous twin pregnancies according to the mean birth weight of each pair of twins and according to their sex

	Mean AFP* (and No of pregnancies)	
	Monozygous	Dizygous
Mean birth weight of each twin pair (g):		
<1500	3.73 (6)	2.44 (4)
1500–	3.02 (9)	1.95 (5)
2000–	2.02 (8)	1.97 (19)
2500–	2.26 (10)	2.07 (26)
>3500	2.22 (3)	2.10 (12)
Sex:		
Female-female	2.81 (12)	2.15 (18)
Male-male	2.46 (24)	2.02 (15)
Male-female		2.03 (33)
Total	2.57 (36)	2.06 (66)

*Mean AFP in multiples of the median for singleton pregnancies of the same gestational age.

The table shows the mean AFP concentration for monozygous and dizygous twin pregnancies according to sex and the mean birth weight of each pair of twins. Overall the mean AFP concentration in the monozygous twin pregnancies was 25% greater than that in the dizygous twin pregnancies ($t=2.22$; $P<0.05$). The higher concentration among the monozygous twins was found in each of the five categories of birth weight ($P<0.05$) and in both female-female and male-male pairs.

Comment

The results indicate that monozygous twin pregnancies are associated with higher maternal serum AFP concentrations than dizygous twin pregnancies. Since dizygous twins are on average heavier than monozygous twins (2600 g and 2210 g respectively in our data) the noted¹ negative association between AFP concentration and birth weight among twin pregnancies might to some extent be accounted for by differences in zygosity. Since the negative association between AFP concentration and birth weight has been shown in singleton as well as twin pregnancies,⁵ however, it is unlikely that the similar finding in twin pregnancies is completely explained by zygosity.

We thank all the general practitioners we contacted, who, without exception, responded to our inquiry about whether the twins in our study were identical or not. We also thank Mr Jeremy Wyatt, who helped with the statistical analysis of the results and Dr Mary Seller for her helpful advice.

¹ Wald, N J, *et al*, *British Journal of Obstetrics and Gynaecology*, 1978, **85**, 582.

² Cederlöf, R, *et al*, *Acta Genetica*, 1961, **11**, 338.

³ Bulmer, M G, *The Biology of Twinning in Man*. Oxford, Clarendon Press, 1970.

⁴ Corney, G, Robson, E B, and Strong, S J, *Annals of Human Genetics*, 1972, **36**, 45.

⁵ Wald, N, J, *et al*, *Lancet*, 1977, **2**, 268.

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