with permanent injury. These injuries had usually been caused by collision with other swimmers or the side or bottom of the pool rather than by the catapult effect described.

The cases described by Dr Jónasson emphasise the seriousness of injuries which may be associated with the use of this popular type of goggle which incorporates a strong elastic band. In the light of these reports the society is continuing to discourage their use during teaching sessions and proposes to seek the opinion of other organisations responsible for other aquatic activities.

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Immunisation and brain damage

SIR,—In view of the statement of Dr G Schoenewald (30 April, p 1159) that "we have no large-scale experience with either pertussis only or with diphtheria-tetanus only vaccinations" so far as vaccinal brain damage is concerned I should like to recall our data from Hamburg for the period 1961-70. Among 146 480 children immunised with diphtheria and tetanus toxoids we found only two cases of convulsions (1 per 73 445 vaccinees), while among 41 250 children vaccinated with diphtheria-pertussis-tetanus vaccine there were 19 cases of fits (1 per 2200 vaccinees).¹ The difference in the frequency of convulsions after the two types of immunisation is statistically significant (χ^2 test: $P < 0.001$). There is no doubt that figures for permanent damage due to pertussis immunisation vary from country to country: Hansen found one such event among 25 000 vaccinees in Düsseldorf² and we ourselves one among 20 600 vaccinees.¹

It is well known that neural complications following tetanus toxoid administration are extremely rare, and in a review of the literature, including our own cases, we collected only a few cases of neural complications following diphtheria toxoid immunisation.³

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¹ Ehrengut, W, *Deutsche medizinische Wochenschrift*, 1974, **99**, 2273.

² Hansen, F, in *Kolloquium über Impffragen*, Deutsche Gesellschaft für Sozialpädiatrie, Berlin, 1970, p 75. Marburg, Deutsches Grünes Kreuz, 1971.

³ Ehrengut, W, *Monatsschrift für Kinderheilkunde*, 1964, **112**, 331.

Hormonal pregnancy tests and congenital malformations

SIR,—I have read with interest Dr D T Janerich's article (23 April, p 1058) confirming the teratological effect of hormonal pregnancy tests and other exogenous sex hormone preparations in relation to congenital heart diseases.

The discovery of the teratological effect of hormonal pregnancy tests emerged from my studies into central nervous system malformations in 1967.¹ In this and in further publications on this topic²⁻⁵ the teratogenic potential of hormonal pregnancy tests has always been

referred to "congenital malformations," without specifying the type but mentioning that the observation was made on spina bifida cases as my study then included only this particular malformation. The analogous effect between hormonal pregnancy tests and the use of other exogenous sex hormone preparations in early pregnancy has been emphasised in all the above communications.

I am pleased that subsequent studies have confirmed my observation in different types of birth defects.⁶⁻¹⁰ The large variety of malformations reported by the above workers seems to be a clear indication that the teratogenic effect of hormonal pregnancy tests and other exogenous sex hormones is not specific but rather depends on the stage of fetal development when the insult occurs—probably a similar mode of action to that of many other powerful teratogens.

Therefore it would be more prudent to adhere to the above conventional teratological principle instead of using acronyms such as the VACTREL syndrome (after Nora and Nora¹¹) which might lead to confusion.

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¹ Gal, I, Kirman, B, and Stern, I, *Nature*, 1967, **218**, 83.

² Gal, I, *Nature*, 1972, **240**, 242.

³ Gal, I, et al, *Advances in Teratology*, 1972, **5**, 144.

⁴ Gal, I, *British Medical Journal*, 1975, **2**, 749.

⁵ Gal, I, Parkinson, C, and Craft, I, *British Medical Journal*, 1971, **2**, 436.

⁶ Janerich, D T, Piper, J M, and Glebatis, D M, *New England Journal of Medicine*, 1974, **291**, 697.

⁷ Levy, E P, Cohen, A, and Fraser, F C, *Lancet*, 1973, **1**, 611.

⁸ Nora, J J, and Nora, A H, *Lancet*, 1973, **1**, 941.

⁹ Harlap, S, Prywes, R, and Davies, A M, *Lancet*, 1975, **2**, 191.

¹⁰ Greenberg, G, et al, *British Medical Journal*, 1975, **2**, 191.

Quality control for drug monitoring

SIR,—Your leading article on quality control of laboratories (7 May, p 1180) highlighted the necessity for external quality control in analytical work in pathology laboratories and mentioned the national schemes for clinical chemistry, haematology, and microbiology. The lack of schemes for histopathology and immunology was pointed out, but no mention was made of an analytical field which is becoming increasingly important—namely, that of drug monitoring. There is now increasing evidence that the measurement of serum levels is invaluable in the rational use of various drugs, including the antiepileptic drugs, lithium, digoxin, antidiarrhythmics, theophylline, antibiotics, and tricyclic antidepressants. Many clinical chemistry and clinical pharmacology departments now offer a service for measuring these compounds, particularly the first three.

In general, the current techniques used for measuring drug levels are less reliable than those used in clinical chemistry, and there is the added problem of interference from other drugs or metabolites. Furthermore, there is no "normal range" of serum levels to alert the analyst to an erroneous result because levels from zero to toxic may be encountered in patients for whom standard doses of drugs are prescribed. As a result the reliability of drug analyses is poor, as has been clearly shown for antiepileptic drugs.¹ External quality control is therefore essential if the clinician is not to be misled by inaccurate results.

In 1972 I started the St Bartholomew's

Hospital quality control scheme for anti-epileptic drugs, and this has gradually expanded to include 162 laboratories in the UK, most Western European countries, and several countries outside Europe. Although it so far lacks the support of the Department of Health and Social Security, negotiations are proceeding with the Bureau de Référence, Commission des Communautés Européennes, to develop primary reference standards which can be adopted in analytical work. At a recent meeting at the University of Surrey 150 of the participants came together to discuss ways in which the scheme could be improved, and valuable guidance was given by Professor T P Whitehead, who was responsible for initiating the Birmingham scheme for clinical chemistry. In North America a similar scheme for antiepileptic drugs has been set up by Dr Charles Pippenger at Columbia University, New York.

In the future it is intended to expand the St Bartholomew's Hospital scheme to include other drugs which are being increasingly measured. Anyone interested in taking part in the scheme is invited to contact the undersigned.

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¹ Pippenger, C E, et al, *Archives of Neurology*, 1976, **33**, 351.

Lithium as a drug of abuse

SIR,—As a psychiatrist practising in various areas and subspecialties within psychiatry over the past few years it has been brought to my attention by my patients that the spectrum of drugs involved in "drug abuse," particularly by adolescents and young adults, has extended in such a way as to include drugs which doctors would generally not consider to be of much interest to drug abusers. There seems to be an increasing abuse of benzhexol (which, I am given to understand, when taken in fairly large amounts provides a short-lived experience of euphoria) while in addition to the well-known abuse of sedatives and hypnotics, particularly methaqualone/diphenhydramine (Mandrax) and barbiturates, abuse of chlorpromazine, thioridazine, and similar drugs is not at all uncommon.

Of more serious import, however, is the fairly recent (over the past two years or so) abuse of lithium preparations, both as the normal lithium carbonate tablet and also as the slow-release preparations. I have not yet been able to establish why these drugs are being used—indeed abused—by poly-drug abusers. However, in view of the fact that lithium preparations are indeed being abused in this way it is well worth alerting casualty officers and the like to the very serious consequences of the ingestion of large amounts of lithium in any form whatsoever and reminding all doctors that in a case of lithium intoxication a sodium-depleting diuretic is contraindicated—indeed, the administration of such a diuretic will make the situation considerably worse. The treatment of choice so far as I understand it at the present time is to induce an osmotic diuresis by an intravenous infusion of one-sixth molar lactate solution, though when the serum lithium level is in excess of 2.5 mmol/l peritoneal dialysis or haemodialysis may be indicated (depending on the severity of the symptoms).

The use of one-sixth molar lactate, as suggested by Gaind and Saran,¹ paradoxically does not seem to be associated with an increased excretion of lithium, as administration of such therapy causes a cessation of toxic "fits" before the lithium excretion rate increases. It may be that the administration of lactate increases the epileptic threshold or that it accelerates the movement of lithium into the extracellular compartment.

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¹ Gaind, R, and Saran, B M, *Postgraduate Medical Journal*, 1970, 46, 629.

Reducing doctors' errors

SIR,—Your leading article on this subject (7 May, p 1178) comments that students and junior doctors are "fact gatherers" and suggests ways in which this deficiency should be tackled.

We in Glasgow have developed a series of computer models which become progressively more statistical and give the student an insight into how the clinician uses information to make clinical decisions. This method of instruction has been used widely by over 400 medical students and over 50 general practitioner trainees.^{1 2} They enjoy this method of instruction and feel that it should be made more freely available. The students' decision-making improves and approximates to that of the "experts"; they retain a significant amount of the content.³ With this instruction they become more aware of all levels of action⁴ and learn what they should do and what not to do in any given situation. Conventional teaching tends to stress the former and students are, in general, not aware of inappropriate actions.

We would argue that this learning experience will enable the student to make better use of the clinical information available to him and will alert him to its misuse. Studies in computer-aided diagnosis^{5 6} had suggested that decision-making by clinicians appeared to improve to a marked extent with practice. This was thought to be due to the doctor gaining an insight into his diagnostic mechanisms. Computer-assisted learning seems to have an important potential in helping the student to learn about decision-making.

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¹ Murray, T S, *et al*, *Lancet*, 1976, 1, 474.

² Murray, T S, *et al*, *Update*, 1976, 13, 523.

³ Murray, T S, *et al*, *Medical Education*. In press.

⁴ Murray, T S, *et al*, *Journal of the Royal College of Physicians of London*. In press.

⁵ Taylor, T R, Aitchison, J, and McGirr, E M, *British Medical Journal*, 1971, 3, 35.

⁶ De Dombal, F T, *et al*, *British Medical Journal*, 1972, 2, 9.

SIR,—Your leading article on this subject (7 May, p 1178) rightly states that doctors may easily be overloaded with information. Computers or other automatic devices might help to alleviate this problem, but they can also make it worse.

In this hospital, as in many others, one cannot request an analysis of blood urea only. The automated testing equipment dictates that nine or more other estimations are performed on each sample for which the blood urea is

being measured. As a consequence more data are presented to the clinician than he may want. Where a computer is being used to print the reports from multiple analysers it would seem sensible to suppress all the results that were not specifically requested.

Perhaps results which were not requested should be reported if they lie outside the reference range, but even this can be misleading. As Flynn *et al*¹ have shown, most chemical pathology values are independent of each other and it only needs 14 such randomly varying tests reported against a 95% range for there to be a better than 50% chance that one or more will be out of range. Care is, however, needed in choosing an appropriate range for the specialities of paediatrics, geriatrics, and obstetrics.

One used to be able to leaf through a set of biochemistry reports and have a good idea which systems were being investigated. Good computer systems could bring these days back.

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¹ Flynn, F V, *et al*, *Clinica Chimica Acta*, 1976, 70, 179.

Planning treatment for rheumatoid arthritis

SIR,—Is it possible that a useful contribution to the treatment of rheumatoid arthritis was omitted from your excellent article on this subject (30 April, p 1120)?

In the early stages of this disorder the need for physical education is often overlooked, and yet the inclusion of postural and relaxation training, with carefully directed movements, is very beneficial; these help to lessen pain and to give the patient confidence to move. This aspect of treatment seems to be passed over in most medical papers; perhaps it is often the reason for delayed rehabilitation.

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Polymyalgia arteritica

SIR,—We write in support of your leading article (23 April, p 1046) which draws attention to the risk of development of sudden and permanent blindness in patients with giant-cell (cranial) arteritis. Visual complications occur in 25-30% of untreated cases¹ and although they may certainly be the result of obliteration of the central artery of the retina, as you describe, they are more commonly due to involvement of the ciliary arteries supplying the optic nerve and disc.²

We regard giant-cell arteritis as an emergency and support your plea for immediate treatment with prednisolone or a similar corticosteroid preparation, as a delay of even a few hours may result in irreversible visual failure. We would also endorse your advice that all patients with polymyalgia arteritica already on a low dose of steroids should be warned that any exacerbation of symptoms, particularly any changes in vision, demands that the dose of steroids be instantly increased. We feel that details of this procedure should be given to the patient as well as to the general practitioner to avoid possible delay.

We take issue with your assumption that an initial dose of 40-50 mg of prednisolone a day is sufficient to prevent the onset of these serious visual complications. In our experience patients with giant-cell arteritis may occasionally suddenly lose their vision on this dosage in one or both eyes. We would strongly recommend that a dose of at least 80 mg of prednisolone a day should be given immediately the diagnosis has been made on clinical grounds. A daily dose of this order should be continued until the systemic manifestations of this disease, such as headache and pain in the face and jaw, have completely resolved and until there has also been a significant fall in the erythrocyte sedimentation rate. Only then can gradual dose reduction be carried out.

On such a high initial dose of steroids toxic effects may occur, but this is a small price to pay compared with the greater danger of permanent loss of vision in one or both eyes.

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¹ Jennings, G H, *British Medical Journal*, 1948, 1, 443.

² Crompton, M R, *Brain*, 1959, 82, 377.

"Music has charms . . ."

SIR,—Dr R A Henson's paper (30 April, p 1121) covering many aspects of the neurology of music made interesting reading and for me, with little technical knowledge of the subject, the theme which was most evident was that when considering music the brain is involved in a wonderfully complex and absorbing fashion and therefore has to concentrate to the exclusion of most other distractions.

My particular interest in the subject relates to Dr Henson's conclusion, in which is mentioned the wishes of famous people to die with the sounds of their favourite music as an exit accompaniment. If asked, I think that this would be a common wish of many contemplating death in theory or practice and indicates the tranquillising effect most people experience in listening to music acceptable to them. I think this tranquillising effect of music may be a valuable aid to the sick long before they are dying.

Admission to hospital for investigation and treatment is a frightening experience for the majority of patients in all age groups. Judging from articles recently published by qualified medical men describing their own experience in hospital, our profession is not immune to these fears. The possibility of using music to allay such fears has been in my mind and this letter was prompted by Dr Henson's article and by hearing from a patient, during discussion at consultation, that the patient's dentist did use music as an anxiety-relieving agent. In this dentist's surgery the patients lay back in the dental chair listening to music of their choice through headphones, which gave the added advantage of isolating the patient from surgery noises. This particular individual had found the musical background very comforting. The practice of using music through headphones to distract the patients, to calm them, and to isolate them from frightening noises during the performance of investigations and treatment may be already