with tritiated thymidine. Thrombosed vessels were occasionally seen in the bases of the oesophageal ulcers, with gross epithelial hyperplasia and numerous mitotic figures which were distinguishable from carcinomas only by the absence of muscular invasion of the disorganised epithelial overgrowth. Most of these lesions cleared with parenteral riboflavin.[1]

Despite these widespread and severe changes in the squamous epithelium, ocular and respiratory abnormalities such as are found in vitamin A deficiency were not seen.

There were considerable resemblances between these lesions and those produced in the skin of mice by painting with carcinogens.[3] Wynder[4] and Warburg[5] commented on the similarities between the oesophageal lesions in riboflavin-deficient mice and the precancerous oral and oesophageal changes in the Plummer-Vincent syndrome.

In all the $B_2$-deprived baboons there was intense adrenal cortical fibrosis and changes in 11- and 17-hydroxycorticosteroids and 17-oxosteroids before and after corticotrophin stimulation[6] as well as changes in the serum protein pattern and tryptophan metabolism. There were no significant changes in liver histology such as occurs in pyridoxine-deprived baboons.[2] There is some evidence that analogues of vitamin $B_2$, like galactoflavine, produce side effects over and above those associated with deficiency of vitamin $B_2$ only, and these effects should be considered in any experiments involving the use of vitamin analogues.

We think then that riboflavin deficiency has an important place in the development of squamous epithelial derangements.

HENRY FOY
ATHENA KONDI

National Public Health Laboratory Service,
Nairobi, Kenya

[1] Foy, H, Gillman, T, and Kondi A, *Medical Primatology*, Proceedings of the 3rd Conference on the Experimental Medicine and Surgery of Primates, part 2, pp 159-168. Basel, Karger, 1972.
[2] Foy, H, *et al*, *Journal of the National Cancer Institute*, 1974, **53**, 1295.
[3] Wynder, E L, and Klein, U E, *Cancer*, 1965, **18**, 167.
[4] Wynder, E L, *et al*, *Cancer*, 1957, **10**, 470.
[5] Wartburg O, Nobel Laureate's Lecture, 1931.
[6] Foy, H, Kondi, A, and Verjee, Z, *Journal of Nutrition*, 1972, **102**, 571.

## Skin testing in hospital

SIR,—Skin testing is a useful tool in incriminating a possible "allergic" cause for symptoms of hay fever and asthma. Prick tests using standard, commercially available allergens are now employed in a widespread way. The number of allergens tested varies considerably, however, and recent reports[1-3] have shown that testing with a limited number of allergens would identify over 98% of those asthmatic individuals who react to at least one allergen. We have been able to find only one report[4] in which the limited form of skin testing has been assessed in "normal volunteers." We have therefore analysed the results of prick tests carried out in a general hospital over an 18-month period to see if a change in policy to include only a limited range of allergens would be equally effective.

A total of 582 patients with suspected nasal or pulmonary allergy were referred for skin testing from various departments in the hospital. Tests were carried out with a control and 12 common allergens (house dust mite, house dust, mixed grass pollens, mixed tree pollens, mixed flower pollens, mixed shrubs, mixed feathers, mixed animal danders and feathers, mixed hair and furs, *Aspergillus fumigatus*, mixed moulds, and tobacco) provided by Bencard Ltd and Dome Laboratories.

Altogether 303 patients were positive to at least one allergen and 279 negative to all allergens. A result was regarded as positive if a weal greater than 1 mm in diameter was found in the presence of a normal control. The numbers of positive reactions are shown below; 247 subjects (82%) reacted to more than one allergen.

| | | | |
|---|---|---|---|
| House dust mite | 192 | Mixed feathers | 78 |
| House dust | 169 | Mixed tree pollens | 43 |
| Mixed grass pollens | 187 | Mixed flower pollens | 43 |
| Mixed animal dander and feathers | 166 | Mixed moulds | 14 |
| Mixed hair and furs | 101 | Tobacco | 14 |
| Mixed shrubs | 81 | *Aspergillus fumigatus* | 4 |

If only house dust mite, mixed grass pollens, and mixed animal danders and feathers had been used 97·4% of the individuals reacting to at least one of the 12 allergens would have been identified. Of the eight patients who would have been missed, six were positive to one allergen only. We suggest that, as a screening procedure, it is necessary to use only these three allergens plus a control. Further testing could be performed on the positive individuals at the physician's discretion and other allergens added to the screen should the patient's history indicate them.

Limited skin testing would not, of course, be appropriate to a specialist allergy unit but would provide a useful service in the general hospital, saving both time and expense.

R M DU BOIS
C A POULTON
Y SMITHERS
D T D HUGHES

The London Hospital (Whitechapel),
London E1

[1] Russell, G, and Jones, S P, *British Journal of Diseases of the Chest*, 1976, **70**, 104.
[2] McCarthy, O R, *British Journal of Diseases of the Chest*, 1973, **67**, 238.
[3] Hendrick, D J, *et al*, *Thorax*, 1975, **30**, 2.
[4] D'Souza, M P, and Davies, R J, *Lancet*, 1973, **2**, 325.

## Klinefelter's syndrome with hypogonadotrophic hypogonadism

SIR,—We were very interested in the short report by Dr J N Carter and others (22 January, p 212) of a patient with Klinefelter's syndrome and low serum gonadotrophin levels). In 1975 Rabinowitz *et al*[1] described a similar patient with undetectable serum follicle stimulating hormone (FSH) levels. We have had the opportunity to study a third patient with this unique combination of findings.

A 38-year-old man was referred to the endocrine clinic for evaluation of his defective sexual intercourse. On physical examination he was eunuchoid (height 177 cm, span 186 cm) with a high-pitched voice, scarce beard growth, gynaecomastia, and a female escutcheon. The testes measured 1 × 1 cm and were of firm consistency. The phallus was small (3 cm). Radiographs of the sella turcica were normal. A clinical diagnosis of Klinefelter's syndrome was confirmed by a positive buccal smear and a karyotype of 47XXY from peripheral blood. The growth hormone response to insulin-induced hypoglycaemia and thyroid and adrenal gland function were normal. However, the thyroid stimulating hormone (TSH) response to thyrotrophin releasing hormone (TRH) (△TSH maximum 4·6 mU/l, normal range 7·5-18·5 mU/l) was diminished. The serum testosterone level was 2·91 nmol/l (0·82 ng/ml), normal range 11·3-47·8 nmol (3·14-13·37 ng/ml). The serum luteinising hormone (LH) level was low normal (7·6 IU/l, normal range 7-16 IU/l) and serum FSH was undetectable.

Urinary gonadotrophin excretion was low (< 10 mouse units/24 h). A luteinising hormone-releasing hormone (LHRH) test showed a subnormal LH response (ΔLH maximum 14 IU/l, normal range 27-160 IU/l) and a normal FSH response (3·6 IU/l, normal range 0·3-5·9 IU/l).

Thus, in contrast to the findings of Dr Carter and his colleagues, our patient with Klinefelter's syndrome showed the combination of defective pituitary LH and TSH reserve, whereas basal levels of FSH were undetectable with intact pituitary FSH reserve, indicated by the response to LHRH. This patient was the first case of hypogonadotrophic hypogonadism with Klinefelter's syndrome in our similarly documented series of 40 patients with hypergonadotrophic Klinefelter's syndrome.

A G H SMALS
P W C KLOPPENBORG

Department of Medicine,
Division of Endocrinology,
Radboud University Hospital,
Nijmegen, Netherlands

[1] Rabinowitz, D, *et al*, *American Journal of Medicine*, 1975, **59**, 584.

## ROSE system for treatment of cholera dehydration

SIR,—Cholera remains endemic in Indonesia and sometimes occurs in epidemics. Mortality rates in childhood cholera remain high in some reported series although improvements have occurred recently with the introduction of successful forms of oral therapy.[1 2] We have recently found a form of simultaneous oral and intravenous rehydration to be very effective.

Ninety-five children aged 6 months to 13 years with severe dehydration and shock presented over a 9-day period in February 1976 after severe floods in Jakarta. The clinical diagnosis of cholera was supported by the passage of copious rice-water stools. Stools from 25 out of 31 patients examined microbiologically contained *Vibrio cholerae* El Tor Inaba type. A similar epidemic involving 70 patients aged 8 months to 13 years occurred over a six-day period in May 1976. *V cholerae* type Ogawa was grown from 23 out of 32 stool specimens examined. Of the total of 165 patients, 15 were less than 12 months of age, 73 were aged 1-6 years, and the other 77 were aged 6-13 years. Patients were rehydrated by simultaneous oral and intravenous fluid administration. Ringer's lactate was given intravenously at 30 ml/kg body weight for the first hour and at 10 ml/kg/h for the next seven hours. An isotonic glucose-electrolyte mixture was given orally ad libitum; this mixture contains 85 mmol $Na^+$/l, 70 mmol $Cl^-$/l, 30 mmol $HCO_3^-$/l, 15 mmol $K^+$/l and 120 mmol glucose/l. Breast-fed children remained on breast-feeding throughout the period of treatment. Most children were discharged at the end of the eight hours' treatment; all were checked clinically three days after discharge. There were no deaths and no significant complications.

This indicates that childhood cholera can be successfully managed in a busy, inadequate, and understaffed hospital ward using a standard method of simultaneous oral and intravenous rehydration. In Indonesia this is known as the "ROSE" method, the explanation