

phenylketonuria sometimes discloses hitherto unrecognized hyperphenylalaninaemia.<sup>8,9</sup> In the absence of any authoritative answer to the question of treatment, it seems reasonable to treat all infants, whose serum levels exceed 15 mg/100 ml when fasting, or after a normal feed, or after loading, and who excrete the characteristic metabolites in the urine when their serum level exceeds 15 mg/100 ml.

- <sup>1</sup> Yu, J. S., and O'Halloran, M. T., *Lancet*, 1970, 1, 210.  
<sup>2</sup> Avery, M. E., et al., *Pediatrics*, 1967, 39, 378.  
<sup>3</sup> Berman, J. L., Cunningham, G. C., Day, R. W., Ford, R., and Hsia, D. Y. Y., *American Journal of Diseases of Children*, 1969, 117, 54.  
<sup>4</sup> Szeinberg, A., et al., *American Journal of Diseases of Children*, 1969, 118, 559.  
<sup>5</sup> Yu, J. S., Stuckey, S. J., and O'Halloran, M. T., *Archives of Disease in Childhood*, 1970, 45, 561.  
<sup>6</sup> Hackney, I. M., Hanley, W. B., Davidson, W., and Lindsay, L., *Journal of Pediatrics*, 1968, 72, 646.  
<sup>7</sup> Levy, H. L., et al., *New England Journal of Medicine*, 1971, 285, 424.  
<sup>8</sup> Cahalane, S. F., *Archives of Disease in Childhood*, 1968, 43, 141.  
<sup>9</sup> Allen, R. J., Fleming, L., and Spirito, R., in *Amino Acid Metabolism and Genetic Variation*, ed. W. L. Nyhan, p. 69. New York, McGraw-Hill, 1967.

## Mineral Metabolism of Astronauts

The metabolism of astronauts is influenced both by weightlessness and by living in the unusual environment of a spacecraft. Changes in mineral metabolism are of particular interest since minerals have functions in bone metabolism and oxygen carriage which are of special importance in the aerospace environment. During the early days of spaceflight the mineral content of bone was studied by densitometry<sup>1,2</sup> and reductions of up to 23.2% in the x-ray absorbency of the os calcis and phalanges were claimed. These findings, however, received little support from theoretical considerations or from a metabolic study<sup>3</sup> carried out during the fourteen-day flight of Gemini VII.

The metabolic study<sup>3</sup> was complicated by inaccuracies in sample collection, but it was assumed that renal clearance remained constant throughout and inflight urinary specimens were adjusted using creatinine data. In both astronauts urinary calcium excretion was unchanged during the first seven days but an increase occurred during the second seven days and persisted in one astronaut for several days after the flight. The urinary excretion of calcium during the mission was much less than would have been expected during an equivalent period of bed rest. Bone resorption may have been inhibited by a low protein intake<sup>4</sup> and by the hypobaric environment of the capsule,<sup>5</sup> and also supplemental calcium was taken and exercises carried out in flight.

J. R. Cameron and his colleagues<sup>6</sup> consider radiographic estimation of bone minerals to be inaccurate and capable of an accuracy approaching only 10%. They have proposed instead photon absorptiometry, which they claim is accurate to within 2 to 3%. The technique has been used in the recent Apollo missions, and the results show little evidence of any serious degree of bone demineralization.<sup>7</sup>

R. L. Brodzinski and his colleagues have described the faecal excretion of minerals during the 7th to 11th (Apollo) missions, using neutron activation analysis. Many elements may be estimated by this technique, including what must surely be the envy of all metabolic physicians—faecal tin. The average daily loss of calcium (assuming 80% faecal excretion) was estimated to be 635 mg, but it was much less during the 10th and 11th missions than during the

seventh, eighth and ninth. Indeed, if the loss of calcium (220 mg per day) during the 10th and 11th missions was maintained during a long mission it would take many years for significant osteoporosis to develop. It would seem that calcium loss is not of overriding importance in the spaceflights envisaged for the rest of this century.

The average daily loss of iron (100% faecal excretion) during the five Apollo missions exceeded 6 mg—about six times normal—and on average 1% of total body iron was excreted every six days. This finding may be of much greater significance. Unlike calcium, there was no differential excretion between the earlier and later flights. The finding is somewhat of a mystery because, though the astronauts were exposed to high concentrations of oxygen, there was little evidence of excessive red blood cell loss except during the ninth mission when pure oxygen was breathed for many days.

Clearly negative mineral balances are unimportant in missions of a few weeks. Nevertheless, in prolonged flights to planets beyond the moon lasting several years changes in iron metabolism must receive careful attention. Such missions must define not only the metabolic response of spacecrews but also untangle the influences of weightlessness and of living in an unusual environment.

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<sup>2</sup> Mack, P. B., LaChance, P. L., Vose, G. P., and Vogt, F. B., *American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, 1967, 100, 503.  
<sup>3</sup> Lutwak, L., Whedon, G. D., LaChance, P. L., Reid, J. M., and Lipscombe, H. S., *The Journal of Clinical Endocrinology and Metabolism*, 1969, 29, 1140.  
<sup>4</sup> Margen, S., and Calloway, D. H., *Federation Proceedings*, 1968, 27, 726.  
<sup>5</sup> Lynch, T. N., Jensen, R. L., Stevens, P. M., Johnson, R. L., and Lamb, L. E., *Aerospace Medicine*, 1967, 38, 10.  
<sup>6</sup> Cameron, J. R., Jurist, J. M., Sorenson, J. A., and Mazzeo, R. B., *Aerospace Medicine*, 1969, 40, 1119.  
<sup>7</sup> Berry, C. A., *Preprint for the Fourth International Symposium on Basic Environmental Problems of Man in Space*, Yerevan, U.S.S.R., 1971.  
<sup>8</sup> Brodzinski, R. L., Rancitelli, L. A., Haller, W. S., and Dewey, L. S., *Aerospace Medicine*, 1971, 42, 621.

## Antibiotic-resistant Gonococci

There has been a world-wide increase in the incidence of gonorrhoea in recent years. Over 50,000 new patients with gonorrhoea attended clinics in England and Wales in 1969. In the United States 573,200 cases were reported in 1970, but J. B. Lucas<sup>1</sup> cites a figure of two million as a conservative estimate of the true incidence.

One factor which has contributed to what may truly be called the present epidemic is the emergence of strains of gonococci with diminished sensitivity to antibiotics. Up to 1955 almost all strains were sensitive to 0.03 unit penicillin per ml in vitro, and a single injection of 300,000 units gave satisfactory cure rates. Recent surveys, such as that by R. Lynn and his colleagues,<sup>2</sup> have shown that about 35% of strains isolated in London require 0.06 µg/ml or more for inhibition (0.6 µg=1 unit of penicillin). Even higher incidences have been reported from other countries, especially in south-east Asia. O. P. Arya and I. Phillips,<sup>3</sup> working in Uganda, found 80% of strains to be insensitive to penicillin. J. B. Lucas<sup>1</sup> has reviewed American experience. By 1968-9 the majority of unselected strains showed diminished sensitivity to penicillin, ranging as high as 3.5 units/ml. The

incidence is higher along the western seaboard than on the east coast, and in San Francisco in 1969 27% of strains required 0.5 unit/ml or more for inhibition.

Many of the strains which are insensitive to penicillin also show diminished sensitivity to other antibiotics. This was first seen with streptomycin, and led to its abandonment. The same situation appears to be developing with tetracycline, at present widely used as an alternative to penicillin. O. P. Arya and I. Phillips<sup>3</sup> found only two of their Ugandan strains which were insensitive to penicillin to be sensitive to 0.5 µg/ml tetracycline. J. B. Lucas<sup>1</sup> classed 42% of 627 American strains as resistant to tetracycline, including 85 out of 88 which were insensitive to penicillin.

Though the incidence of antibiotic resistance among gonococci seems to have remained static here for some years, experience from elsewhere suggests that the reprieve may be only temporary and that the wider dissemination of strains of multiple resistance may be expected. Can we do anything to prevent or delay this? Given in a large enough dose, penicillin is still very effective. A single injection of 4 to 5 megaunits with 2 g probenecid to delay excretion gave only 1% failures in trials reported by G. A. Olsen and G. Lomholt<sup>4</sup> and by R. C. F. Gray and his colleagues.<sup>5</sup> The former trial was in Greenland, a relatively closed community, and the authors noted a diminution in the proportion of strains insensitive to penicillin from 54% to 19% during the latter half of their study. This suggests that effective treatment, if widely used, may reverse the trend towards resistance. But the dosage of penicillin used in these trials is about the maximum possible for a single injection.

Favourable results with ampicillin given by mouth have been reported by G. Eriksson<sup>6</sup> in trials on over 3,800 patients in Sweden. Two doses of 1 g given five hours apart or a single dose of 2 g given with 2 g probenecid gave only about 2 to 3% failures, a rate comparable to that with a single dose of 2.2 megaunits penicillin. A single dose of 2 g ampicillin alone was less effective. About a quarter of the gonococci isolated during these trials had reduced sensitivity to penicillin. G. W. Csonka and G. J. Knight<sup>7</sup> and B. R. T. Carroll and C. S. Nicol<sup>8</sup> have had encouraging results with trimethoprim-sulphonamide mixtures given over five days. Of more recent antibiotics doxycycline and rifampicin have been found effective against the gonococcus. The latter has the advantage of lacking treponemocidal activity, but in view of its potential value in tuberculosis its use for gonorrhoea seems inadvisable.

Effective means of treatment of gonorrhoea are available, but they must be proved to have been effective in the individual patient. The importance of the proper clinical and bacteriological control of the results of treatment must be emphasized. Here sensitivity tests to antibiotics have an important place. Failure in the male is usually obvious, but in a few cases the signs of persistence may be minimal and are detected only by careful examination.<sup>9</sup> In the female the disease is more often than not asymptomatic, and repeated clinical and bacteriological tests are essential to establish that cure has been achieved. The management of gonorrhoea is not just "a shot of penicillin." It should be undertaken only where adequate facilities for investigation are available.

<sup>1</sup> Lucas, J. B., *Southern Medical Bulletin*, 1971, 59, No. 2, 22.

<sup>2</sup> Lynn, R., *et al.*, *British Journal of Venereal Diseases*, 1970, 46, 404.

<sup>3</sup> Arya, O. P., and Phillips, I., *British Journal of Venereal Diseases*, 1970, 46, 149.

<sup>4</sup> Olsen, G. A., and Lomholt, G., *British Journal of Venereal Diseases*, 1969, 45, 144.

<sup>5</sup> Gray, R. C. F., Phillips, I., and Nicol, C. S., *British Journal of Venereal Diseases*, 1970, 46, 401.

<sup>6</sup> Eriksson, G., *Acta dermato-venereologica*, 1970, 50, 451, 461.

<sup>7</sup> Csonka, G. W., and Knight, G. J., *British Journal of Venereal Diseases*, 1967, 43, 161.

<sup>8</sup> Carroll, B. R. T., and Nicol, C. S., *British Journal of Venereal Diseases*, 1970, 46, 31.

<sup>9</sup> Oates, J. K., *British Medical Journal*, 1971, 3, 580.

## Transport to the Surgery

Home visits take more time than surgery consultations, so that bringing patients to the surgery makes sense. A few G.P.'s already run private transport and one report in 1968 from an urban practice<sup>1</sup> suggested that providing a car service for patients benefited them by giving earlier consultation and treatment. The chronic sick and convalescent patients were helped to quicker recovery, the doctors saved time and effort and were more available for consultation, the report claimed. Could transport arrangements be generally introduced and would they be acceptable to patients?

The Institute for Social Studies in Medical Care, financed by the Department of Health and Social Security and the Scottish Home and Health Department, mounted an experiment to answer these questions in four general practices.<sup>2</sup> All had appointment systems but were otherwise different. One with four doctors and three part-time assistants was in greater London, a single-handed practice and a group of six in a health centre were in a Welsh industrial valley, and the fourth was a single-handed practice in a widespread Scottish rural area. Visiting patterns were analysed before the service started and after it had been running for six months. The changes were compared with those in four control practices, which would reflect the current reduction in home visiting, and with that in a three-partner London practice which had run its own transport service for two years.

The changes reflected both the geographical area and the attitudes of doctors and staff. The Scottish rural practice offered transport only to one tenth of those asking for home visits and nearly all accepted it, while the other three offered the service to half, of which accepted it. Home visits decreased in both experimental and control practices but much more in those with transport, where there was a reduction in the ratio of home visits to surgery consultations. This saved time in three of them but in the single-handed Welsh practice the proportion of time spent travelling went up though fewer patients were visited.

Most patients liked the idea of trying a transport service and its introduction allayed the fears of the few who had had reservations. It enhanced their liking for their doctor as a person and for his conscientiousness. The survey revealed unmet medical needs in elderly people. Many admitted to such symptoms as difficulties in hearing, seeing, or reading, breathlessness, stiffness, or dizziness which they had not mentioned to their doctor even when they had recently consulted him about something else. This suggests that old people might benefit from regular medical examinations. Many did not know about existing chiropody services and old people's clubs and only half of those who had help at home got it through the home help service.

The main disadvantage of the service was its cost. Capital outlay was about £1,000, with an extra £350 to £450 for radio telephone equipment, and running costs varied from £700 per annum for a part-time to £1,600 for a full-time service, enough to cause two of the practices to stop it when