

## LETTERS TO THE EDITOR

### Risk of tuberculosis in immigrant Asians: culturally acquired immunodeficiency

I was interested to see that in the paper by Dr PJ Finch and colleagues (January 1991;46:1-5) the theory that vitamin D deficiency causes immunosuppression and increased host susceptibility to tuberculosis was put forward as a possible cause of the increased incidence of tuberculosis, particularly glandular tuberculosis, in Hindu immigrants.<sup>1</sup> Perhaps because of the authors' gastroenterological interests they see dietary factors as a major cause of vitamin deficiency and therefore susceptibility to disease. Dietary patterns, however, probably do not differ greatly between Britain and their country of origin, and are therefore unlikely to make much contribution to the cause of this apparent "acquired immunodeficiency of immigration." A Hindu Vegan in Wandsworth was probably a Hindu Vegan in India. Vitamin D reduction due to decreased exposure to sunlight on immigration to Britain, however, may well be a major factor. Mean serum vitamin D concentrations (25(OH)D<sub>3</sub>) have been shown to drop four-fold, or more, on emigration from Asia to Britain.<sup>1</sup>

Asian individuals with tuberculous infection who are able to contain the infection because of satisfactory host immunity while in their sunny country of origin suffer a dramatic fall in the storage form of vitamin D 25(OH)D<sub>3</sub> on emigrating to the United Kingdom. In some individuals this may affect local production of the active hormone 1,25(OH)<sub>2</sub>D<sub>3</sub>, resulting in a relative decline of lymphocyte and macrophage activation.<sup>2</sup> The previously contained infection then causes overt disease. This would explain why most individuals present within a relatively short time (five years) of arrival in Britain.

The fact that the pattern of tuberculosis in HIV positive patients seems to resemble the pattern of disease in Asian individuals in Britain has been pointed out before.<sup>1</sup> The sequence of events is probably similar in these patients. An individual with tuberculosis infection becomes immunocompromised (either from HIV infection or from vitamin D reduction) and the extrapulmonary and glandular pattern of disease emerges.

Much more detailed work on the immunology of both tuberculosis and HIV infection is needed; it may even be that vitamin D has a role in the treatment of AIDS.

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- 1 Rashid A, Mohammed T, Stephens WP, Warrington S, Berry JL, Mauren EB. Vitamin D state of Asians living in Pakistan. *BMJ* 1983;286:182-4.
- 2 Rook GAW. The role of vitamin D in tuberculosis. *Am Rev Respir Dis* 1988;138:768-70.
- 3 Davies PDO. Vitamin D and tuberculosis. *Am Rev Respir Dis* 1989;139:1571.

**AUTHORS' REPLY** We are grateful to Dr Davies for his letter and support for our suggestion that vitamin D lack and resultant decline in monocyte activation may be important in explaining the pronounced differences in risk of tuberculosis among Asian immigrants in the United Kingdom. We accept that Asian dietary practices are unlikely to change with emigration, but it has been shown that where exposure to the sun is limited the risk of metabolic bone disease is determined by dietary factors.<sup>1</sup> In a prospective study of Asians presenting to a general medical outpatient clinic in Wandsworth we have found that osteomalacia is almost exclusively a disease of vegetarian Hindu Asians, and we believe that this may help to explain why it is the Hindus who are at particular risk of developing tuberculosis rather than the Muslims, who have very similar exposure to the sun.

The mechanism by which vegetarianism may produce vitamin D deficiency is not clear as the contribution of ingested ergocalciferol to the physiological economy of vitamin D is thought to be negligible. It has been suggested that calcium depletion caused by binding to fibre and phytate may lead to secondary hyperparathyroidism and accelerated catabolism of 25-hydroxy vitamin D.<sup>2</sup> Another possibility is that the absence of the normal dietary inducers of hepatic mixed function oxidases found in meat, eggs, and cheese may constrain the hydroxylation of cholecalciferol.<sup>3</sup>

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- 1 Henderson JB, Dunnigan MG, McIntosh WB, Abdul-Motaal AA, Hole D. Asian osteomalacia is determined by dietary factors when exposure to ultra-violet radiation is restricted—a risk factor model. *Q J Med* 1990;281:923-33.
- 2 Clements MR, Johnson L, Fraser DR. A new mechanism for induced vitamin D deficiency in calcium deprivation. *Nature* 1987;325:62-5.
- 3 Dollery CT, Fraser HS, Davies D, Macintyre I. Vitamin D status in different subgroups of British Asians. *Br Med J* 1977;i:104.

### Measures of reversibility in response to bronchodilators in chronic airflow obstruction

Drs DC Weir and PS Burge (January 1991; 46:43-5) have looked at various indices of reversibility in response to bronchodilators in chronic airflow obstruction and correlated these indices with the prebronchodilator forced expiratory volume in one second (FEV<sub>1</sub>). They showed that two out of the four indices of reversibility they used correlated with prebronchodilator FEV<sub>1</sub>. It is, however, doubtful whether their analysis and conclusions are valid.

The difficulty in interpreting this type of data is that the indices of reversibility all include prebronchodilator FEV<sub>1</sub>. This value therefore influences both of the variables being correlated. A significant association is thus likely to arise because of this mathematical association alone. This is not to deny that there may be a true biological association between prebronchodilator FEV<sub>1</sub> and one or more of the indices of reversibility, but it is likely to be masked by the mathematical association.

The vexed subject of examining the relation between a measurement and its change after a therapeutic intervention is one that regularly surfaces.<sup>1,2</sup>

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- 1 Oldham PD. A note on the analysis of repeated measurements of the same subject. *J Chronic Dis* 1963;15:969-77.
- 2 Gill JS, Zezulka AV, Beevers DG, Davies P. Relation between initial blood pressure and its fall with treatment. *Lancet* 1985;i:567-9.

**AUTHORS' REPLY** I thank Dr Packe for raising this point, but believe that our conclusions are still valid. The inclusion of prebronchodilator FEV<sub>1</sub> in each index may well cause a correlation to be present because of mathematical rather than biological association. Hence it is difficult to know if the statistically significant correlations seen between prebronchodilator FEV<sub>1</sub> and reversibility, expressed as a percentage of the initial FEV<sub>1</sub> or as a percentage of the "possible" reversibility, reflect true biological association. But as reversibility expressed as the absolute change in FEV<sub>1</sub> and reversibility as a percentage of the individual's predicted FEV<sub>1</sub> show no significant correlation it would appear preferable to use either of these indices if a measure independent of FEV<sub>1</sub> is needed.

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## NOTICE

### Thoracic surgery review course

The second biennial thoracic surgery review course will be held in Birmingham on 12 and 13 October 1991. Details and application forms may be obtained from Universal Conference Consultants, 145-147 Alcester Road, Birmingham B13 8JP (021 442 4307).

## CORRECTION

### Hut lung: a domestically acquired pneumoconiosis of mixed aetiology

### Silicosis in a Himalayan village population: role of environmental dust

We regret that "silicon" is misspelt as "silicone" in these two papers—in the first paper, by Drs JP Grobbelaar and ED Bateman (May 1991;46:334-40), on page 339, column 1, line 5; and in the second paper, by Dr T Norboo and others (May 1991;46:341-3), on page 341, lines 28 and 29 of the abstract, and on page 343, lines 9 and 17 of "Results."