LETTERS TO THE EDITOR

Prevalence of fragile X syndrome

In view of the findings of Sutherland and Baker¹ of a non-pathological fragile site at Xq27.2 (the common fragile site FRAXD), which may be confused with the mental retardation fragile site at Xq27.3 (FRAXA), we have reanalysed our data, presented in this Journal in 1986,² which had given an overall prevalence of the fragile X mental retardation syndrome of 1 in 952 schoolchildren.

This prevalence was based on 29 positive results out of 347 children who were tested, and allowance was made for the 122 children whose parents withheld permission for the study. We reviewed the levels of fragile X expression in these 29 patients, together with results in any affected relatives, and considered that the diagnosis of the fragile X syndrome was unequivocal in 19 children. Slides of seven patients were adequate for review and we considered that the original diagnosis was firm in five of them, but that two had the common fragile site (FRAXD). We felt that further blood samples were required from three children, but in only one instance could this be obtained; in this boy the diagnosis of the fragile X syndrome was substantiated by further examination.

The two who were definitely not FRAXA were 'AW' and 'JO' from the series of Thake *et al.*³ The two doubtful cases were 'SH' from the series of Bunday *et al.*⁴ and 'MJ' from the series of Thake *et al.*³ All four children had IQs over 50; two fell into the 11 to 16 age range which we had used for our most accurate prevalence figures. Two were males and two were females. We have therefore recalculated the prevalence of the fragile X syndrome by removing from our results these four children. We now amend our conclusions from the Coventry prevalence study.

Firstly, the numbers of ESN(M) children with the fragile X syndrome still exceed the numbers of ESN(S) children, as there were 17 of the former

and eight of the latter. Considering males alone there were nine ESN(M) boys and five ESN(S) boys. Secondly, the prevalence in schoolchildren aged from 11 to 16 years becomes 1 in 1039 (range 1 in 840 to 1 in 1178) and is approximately the same for both sexes. This is not very different from our previous prevalence figure of 1 in 952.

We have been interested to see whether the publicity given to the fragile X syndrome has resulted in any increase in diagnosis of the condition in the West Midlands. We considered children born in 1980 to 1984 inclusive, who will now be aged 6 to 10, and took as our base population those children in the West Midlands Regional Health Authority who were aged 0 to 5 in 1984 (Population and Vital Statistics 1984). There were 334 200 children in this age range, of whom 322 would be expected to suffer from the fragile X syndrome. As two-thirds of these would probably be only mildly mentally retarded, we would not expect complete ascertainment by 10 years. However, only 10 children (nine males and one female) with the fragile X syndrome, born in the years 1980 to 1984, are known to the two cytogenetics departments of the WMRHA! Has the incidence of the condition fallen, or is more education of hospital and community paediatricians required?

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T WEBB
SARAH BUNDEY

Department of Clinical Genetics,
Birmingham Maternity Hospital,
Edgbaston,
Birmingham B15 2TG.

HLA markers, hormones, and disease

In 1972, Ivanyi *et al.*¹ reported that a genetic factor identical to or closely linked to the H-2 system in the mouse is involved in the control of sex hormone metabolism. On the basis of this finding, they made a remarkable prediction: "If the situation in histocompatibility genetics in man is analogous to that in the mouse, a great number of physiological characters and disorders may be expected to display a statistically significant association with HL-A types. On the basis of the mouse model, continuous (rather than discontinuous) variation may be expected to be found in the HL-A traits . . .".

Over the intervening years, both parts of this prediction have been confirmed. In 1973, ankylosing spondylitis and Reiter's disease were both shown to be closely associated with HLA-B27²; other conditions (multiple sclerosis, lupus erythematosus, and various categories of arthritis) have since been shown to be less closely associated with HLA markers. And in all these illnesses, continuous variation is apparent, as predicted.

In general, the mechanisms responsible for the associations of HLA with disease are not established, and workers have assumed that either (1) the HLA antigen plays no immediate role, its locus being close to disease susceptibility genes, or (2) the HLA antigen on the cell membrane interacts with other factors (for example, infectious agents) to produce disease, or (3) molecular mimicry has a role in disease development.³

It is interesting to consider another alternative suggested by the prediction of Ivanyi *et al.*¹ namely that HLA genes index endocrine abnormalities which form necessary (but not sufficient) conditions for the diseases. (1) All the major diseases associated with HLA-B27 (Reiter's disease, ankylosing spondylitis, acute anterior uveitis, psoriatic arthritis) occur predominantly in men. (2) All the major diseases associated with HLA-B8 (Graves' disease, coeliac disease, myasthenia gravis, Sjögren's disease, systemic lupus erythematosus) occur predominantly in women. (3) Men have higher testosterone levels than women.

1 Sutherland GR, Baker E. The common fragile site in band q27 of the human X chromosome is not coincident with the fragile X. *Clin Genet* 1990;37:167-72.

2 Webb T, Bunday S, Thake A, Todd J. The frequency of the fragile X chromosome among school children in Coventry. *J Med Genet* 1986;23:396-9.

3 Thake A, Todd J, Webb T, Bunday S. Children with the fragile-X syndrome at schools for the mildly mentally retarded. *Dev Med Child Neurol* 1987; 29:711-9.

4 Bunday S, Webb TP, Thake A, Todd J. A community study of severe mental retardation in the West Midlands and the importance of the fragile X chromosome in its aetiology. *J Med Genet* 1985;22:258-66.