Preliminary Screening Results

Investigation of "Fragile X", X-linked Mental Retardation

Faribault State Hospital

Audrius V. Plioplys M.D.
Resident in Pediatric Neurology
Mayo Graduate School of Medicine
November 17, 1981

In order to investigate the incidence of the "fragile X" chromosomal abnormality in the mentally retarded male population of the Faribault State Hospital, a preliminary screening was performed on November 10, 12 and 16 of 1981.

The medical staff of the state hospital screened the medical records in order to select appropriate candidates--i.e., males, with unknown cause of mental retardation, without marked somatic abnormalities. To this population were added individuals identified as likely candidates on the basis of general inspection on selected wards, as well as individuals who were known to have a family history of retardation.

The vast majority of these individuals were briefly examined with special attention paid to: general appearance, hand abnormalities, head circumference, ear size, iris color, palate height, chin prominence, forehead and supraorbital ridge prominence, testicular size, penile length and Tanner stage. The total number examined was 102. (Total population at the state hospital was 787, of whom 463 were males.)

In each case, the available medical records were examined in order to identify a possible cause of retardation, as well as positive family histories.

The results of this screening are presented in the attached table, which needs explanation. The somatic manifestations of the "fragile X" syndrome have been reported to include prominent forehead, prominent supraporbital ridges and ears, pale blue irises, high arched palates, pointed chins, and most consistently, enlarged testicles. To this list must be added the lack of marked somatic abnormalities. Testicular dimensions were measured in length and width with a ruler (a technique which is only approximate). Testicular volumes were calculated by the formula $\pi/6 \times l \times w^2$ (l = length, w = width). Since all of the individuals examined were adults, testicular volumes greater than 25 ml were considered to be abnormal. When there was a discrepancy in testicular size, the measurements of the larger of the two were used. Individuals who demonstrated aspects of a compatible phenotype and macro-orchidism were assigned to the first vertical column, whereas

those without enlarged testicles were placed in the second. Those who had marked somatic abnormalities, or had a definite explanation for their retardation, were assigned to the final vertical column. The horizontal columns are self-explanatory.

Following the table, there is a listing, by category codes A through I, of the names and residencies of all of the individuals examined.

It should be stressed that these are preliminary results of a screening procedure. This information gathered should only be used for further organization of data collection and amplification. Some of the major inadequacies include: (1) only a selected population was screened--for exact incidence figures the entire male population should be examined; (2) physical examinations were brief and circumscribed--more detailed examinations may uncover important phenotypic data; (3) testicular volumes are approximate and should be repeated by another observer; (4) only the available medical records were examined--the stored records should be reviewed in detail in order to elucidate both the medical histories and family histories; (5) the ultimate identification of the "fragile X" retarded individuals must rely on appropriate chromosomal analysis.

Selected Bibliography

Turner G., et. al., X-linked mental retardation, macro-orchidism, and the Xq27 fragile site, Journal of Pediatrics 96:837, 1980

Turner G., et. al., Heterozygous expression of X-linked mental retardation and X-chromosome marker fra(X)(q27), New England Journal of Medicine 303: 662, 1980

Howard-Peebles P. N., et. al., Familial X-linked mental retardation with a marker X chromosome and its relationship to macro-orchidism, Clinical Genetics 17:125, 1980

American Journal of Medical Genetics devoted the July, 1980 issue to articles concerning the "fragile X" abnormality.

	Physical exam strongly suggestive of "fragile X" phenotype (with macro-orchidism)	Physical exam compatible with "fragile X" phenotype (without macro-orchidism)	Physical exam (or history) not suggestive of "fragile X" phenotype
Family history suggestive of X-linked mental retardation	16 A	9 D	1 G
Family history minimal or absent	13 B	37 E	10 H
Family history not suggestive of X-linked mental retardation	3 C	7 F	6 I

Total examined: 102

Total number of residents: 787

Total number of males: 463

Letters indicate category codes