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Abstract
Based on a Dissertation read before the Royal Medical Society on Friday. 2nd March, 1962.

Mongolism is a neuro-endocrine disorder, based on a molecular disturbance, which is manifested by a chromosome abnormality. The mental defect is probably due not specifically to a gene or gene complexes on the chromosomes but to a generalised imbalance of the chromosome set as a result of aneuploidy.
There are three types of chromosome abnormality which have so far been described in mongols;

1. Non-disjunction.
2. Translocation.
3. Mosaics.

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THE BIOLOGY OF MONGOLISM

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NON-DISJUNCTION

Mongols in this group have 47 chromosomes with chromosome 21 trisomy. This was first described by Lejeune in 1959[1] and then by Court Brown and his colleagues[2] at the Western General Hospital in Edinburgh in 1960.

An American family described by Miller et alia[3] throws an interesting light on non-disjunction. The father died of chronic lymphatic leukaemia (a condition in which chromosome abnormalities have been demonstrated). His sister and his niece by another sister were both mongols. His wife and another son were both normal, genetically and mentally.

His son was a mental defective (IQ 21) with strabismus, cleft palate, eunuchoidism and multiple skeletal abnormalities. This boy's sex chromosomes were found to be XXXY and for this to be possible no fewer than three non-disjunctional events must have occurred. It is probable that all three of these events occurred on the father's side because :

(a) The father was 32 and the mother 23 when the child was born and non-disjunctional effects are more common with increasing age.

(b) The father's sister and niece were both mongols and probably had meiotic non-disjunctions.

TRANSLOCATION

This was the next type of chromosome abnormality to be described in mongols. Fruccaro, Kaysir and Lindsten[4] were the first workers to described such a case (1960).

Mongolism can be inherited by translocations involving chromosome 21 and one of the other acrocentric chromosomes—numbers 13, 14, 15 and 22. A chromosome count would reveal only 46 chromosomes in such cases but Karyotype analysis shows that extra material was present on one of the acrocentric chromosomes.

Penrose[5] points out that in cases of 21 : 22 translocation paternal age is a highly significant actiological factor. In these cases the average age of the fathers were 10 years above that of fathers in the general population and in only one of the 8 cases so far described was the father under the age of 40.

This was not found in cases of 21 : 13, 14 or 15 translocation.

It has been shown[6] that the increased risk of young mothers with one mongol child producing a second child similarly affected is mainly due to families in which translocation has occurred. This is borne out by a Swedish family[7] in which the parents were healthy. The wife's first pregnancy ended in abortion. Her second pregnancy resulted in a live born mongol as did her third. These children unfortunately died before chromosome analysis could be carried out. The fourth pregnancy resulted in a live born mongol of translocation resulting in a family of mongols.

If a mother is under 25 and her first child is a mongol the chances of her producing another mongol are fifty times that of a random group of women of the same age.

If the mother is between 25 and 34 her chances are only five times greater than that of a random group of the same age.

If the mother is over 35 her chances are the same as that of a random group of the same age.

Young mothers of mongol children will run a high risk of producing a second affected child because either they or their husbands have a chromosome abnormality. In the older mother this is a rare event so that the risk is the same as the random risk allowing, of course, for age.

MOSAICS

The last type of chromosome abnormality described in mongols are the Mosaics. Mosaicism in cytogenic usage describes a condition in which a substantial minority of cells differ from the majority in their chromosomal content.

Six cases of mosaicism have been described either in mongols or in people with mongoloid features. Four cases[9-12] have had two stemlines (i.e. some cells have had 46 chromosomes and others 47 chromosomes) and two cases[13-14] have had three stemlines (46, 47 and 48 chromosomes).

This mosiacism may be explained by mitotic non-disjunctions in a normal diploid resulting in one cell with 48 chromosomes and one non-viable cell with 44 chromosomes. The 47 chromosome cells may arise by chromosome loss through anaphase lagging, a phenomena which has been described in plants.[15]

SUMMARY

Three types of genetic abnormalities have been described in mongols. These have been briefly reviewed here.

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