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Turner Phenotype:
Mosaic 45,X/47,XY,+18*

Summary. A 14-year-old girl with Turner phenotypes is described, whose
lymphocyte and skin fibroblast cultures both revealed a 45,X/47,XY,+18
chromosomal mosaicism. In blood cul-
tures one third and in fibroblasts 7% of
the cells had 47 chromosomes. The
identity of the Y and the supernumerary
18 were determined by fluorescence and Giemsa banding patterns. The patient
is of normal intelligence and does not ex-
hibit any signs of masculinization or
stigma of trisomy 18.

There are several instances of mosaicism with
X-monomosomic and 21-trisomic cell lines. Cohen
and Davidson (1972) published one case of a
mosaic 45,X/47,XX,+21, and Prieur et al (1972)
one of 45,X/47,XY,+21. Several cases of mosaic
45,X/46,XX/47,XXY+21 (Pfeiffer, 1968) and one

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Case Report

The proposita is the third daughter of healthy un-
related parents; the father was 38 years and the mother
41 years at her birth. All the family is of short stature,
the father being 162 cm, the mother 152 cm, the 21-year-
old sister 150 cm, and the 18-year-old sister 160 cm.
The patient was born by Caesarean section at 36 weeks;
birth weight was 2400 g. Swelling of the dorsum of
both feet was noted at birth and persisted for more than
one year. The patient was said to have been always
smaller than her sisters at comparable ages, but other-
wise her physical and mental development was normal.
At 12 years of age she was referred to this hospital
because of short stature (length 117.7 cm, weight 25.2 kg,
both below third centile) and absence of pubertal signs.
She presented the following stigmata of Turner's
syndrome: multiple pigmented naevi, prominent
auricles, short broad neck with slight pterygium, broad
chest with widely spaced hypoplastic nipples, relatively
large clitoris, hypertensibility of elbow joints, and
short fourth fingers. Radiology of both hands revealed
short fourth metacarpals, a coarse trabecular pattern of
the bone, and a bone age of 9-10 years, giving a pre-
dicted adult height of only 139 cm.

Sex chromatin was studied in buccal smears and in
hair root preparations (Schmid, 1967a and b). The
chromosomes from blood cultures were studied in

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orcein-stained preparations, after staining with quina-crine mustard (Casperson, Zech, and Johansson, 1970) and after trypsin digestion and Giemsa staining (Seabright, 1971). A fibroblast culture was set up from a skin biopsy of the patient. Dermatoglyphics from both hands of the proposita were analysed.

Results

**X-Chromatin** was negative in 500 nuclei counted from both buccal smears and hair roots.

**Chromosome Studies.** The results from peripheral blood and a fibroblast culture are shown in Table I. Two cell lines were present, one with 45 chromosomes with a missing C and the other with 47 chromosomes including 15 of group C, seven of group E, and five of group G, respectively. The latter group contained one Y-like chromosome. This cell line was found in more than a third of lymphocytes but only in 7% of fibroblast mitoses. Cells with 46 chromosomes belonged to the 47,XY,E cell line with random losses. The analysis of orcein-stained preparations showed a brightly fluorescent Y in the cells with 47 chromosomes. The supernumerary element in group E exhibited the characteristics of a No. 18 both in fluorescent preparations and in the Giemsa-stained preparations after trypsin digestion (Figs. 1 and 2).

**TABLE I**

<table>
<thead>
<tr>
<th>CHROMOSOME ANALYSIS</th>
<th>45*</th>
<th>44*</th>
<th>45</th>
<th>46*</th>
<th>47</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood (11.8.1970)</strong></td>
<td>2</td>
<td>2</td>
<td>60</td>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td><strong>Blood (3.10.1972)</strong></td>
<td>2</td>
<td>3</td>
<td>60</td>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td><strong>Skin fibroblasts (3.10.1972)</strong></td>
<td>2</td>
<td>3</td>
<td>60</td>
<td>2</td>
<td>34</td>
</tr>
</tbody>
</table>

* Random losses.

**Dermatoglyphics.** There were ulnar loops on all 10 fingers. The total ridge count was 142 (father: 118, mother: 67). Digital triradii a–d were present on both sides in normal positions. Palmar axial triradii on both sides were in the t position. No thenar patterns were present; hypothenar patterns revealed ulnar loops on both sides. The atd angle was 45° on both sides.

After the finding of chromosomal mosaicism with a Y chromosome, laparotomy was performed. A hypoplastic uterus with oviducts and gonadal streaks in the position of ovaries was found. Streaks and oviducts were resected and histologically examined. The streak gonads were found to contain neither primordial follicles nor did they give evidence of male gonadal elements; the oviducts were normal. A psychological examination at that time revealed average intelligence but emotional infantilism and clinical re-examination showed no signs of trisomy 18 in that the face was normal, micrognathy absent, and the position of fingers and toes not typical of that syndrome. Oestrogen therapy was given for a year, and subsequently the patient developed an induced regular menstruation and scanty pubic and axillary hair. The breasts measured 7 and 8 cm, respectively and had darkly pigmented nipples and areolae.

**Discussion**

The most probable explanation for the origin of a 45,X/47,XY,+18 mosaic is that a 47,XY,+18 zygote was formed, which lost one Y and one 18 chromosome during the same early division. The age of the mother at birth (41 years) is in favour of this hypothesis. Abnormal cell division in a 46,XY zygote leading to an 18-trisomic and 18-monosomic cell line (the latter not being viable) and subsequent simultaneous loss of a Y and an 18 chromosome is more complicated and less likely. It is also rather unlikely, but not impossible, that the extra chromosome is a structurally rearranged element composed of other autosomal or X-chromosomal parts.

All the cases with double aneuploidy, X monosomy, and autosomal trisomy mentioned above exhibited some features of Down's syndrome. In Pfeiffer's case (1968) of a girl with signs of Down's syndrome and 45,X/46,XX/47,XX,+21 mosaicism, no information about the proportion of the three cell lines was given. In the typical Down's syndrome reported by Cohen and Davidson (1972), blood lymphocytes revealed a 45,X/47,XX,+21 mosaicism in a proportion of 86:101, whereas the skin fibroblasts were pure 47,XX,+21. One case of 45,X/46,XY/47,XY,+21 (Edgren et al., 1966) is male and a typical Down's syndrome with very pronounced psychomotor retardation; 33 out of 51 lymphocytes revealed a 21-trisomic cell line and 49 out of 96 were revealed in fibroblasts. On the other hand, the case of 45,X/47,XY,+21 (Prieur et al., 1972), also male, exhibited far fewer signs of Down's syndrome and moderate psychomotor retardation. Here, from a fibroblast culture, 14 out of 52 cells were trisomic, whereas in lymphocytes there were more trisomic cells (47 out of 82). In our patient over one third of the lymphocytes and 7% of the fibroblasts exhibited the karyotype 47,XY,+18; this girl
Fig. 1. Giemsa-stained karyotype containing 47 chromosomes, XY, with a supernumerary No. 18.

Fig. 2. Group E and G chromosomes from two orcein-stained (a and b), one Giemsa-stained (c), and two fluorescent (d and e) mitoses with a 47,XY,+18 karyotype.
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has no trace of masculinization nor stigmata of trisomy 18. She is of normal intelligence and has a Turner phenotype, and her dermatoglyphic patterns are also consistent with Turner’s syndrome. Thus it appears that the distribution of the cells with the two different karyotypes in the fibroblasts more truly reflects the phenotype than the blood culture findings.

The following reports confirm this assumption. Potter and Taiz (1972) reported monzygotic female twins, one normal female and one phenotypic Turner, both of whom had 45,X/46,XX chromosomal mosaicism in lymphocytes. Fibroblast chromosome analysis revealed pure 46,XX in the normal and 45,X in the Turner twin, and the dermatoglyphics were in accordance with those findings.

A case of 45,X/46,XY/47,XY with typical Turner’s syndrome without gonadoblastoma or trace of masculinization (Roubin et al., 1973) had predominantly 45,X cells in cultures from fibroblasts and both gonads, whereas in blood lymphocytes about 50% of cells contained a Y chromosome. This is additional evidence that an XY cell line in about half of lymphocytes does not have a phenotypic influence in X/XY mosaics, if the XY cell line is absent or present only in a low proportion in fibroblast cultures.

Moreover, Beratis et al (1972) found a slight mosaicism with 18-trisomic cell line (blood: 5/70, skin: 4/100) in the normal father of a child with trisomy 18. This finding confirms our conclusion that a low proportion of 18-trisomic cells does not necessarily influence the phenotype. Parental trisomy 21-mosaicism of children with Down’s syndrome was also reported by Hsu et al (1971) and Krmpotic and Hardin (1971).

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Presumptive Mosaic Partial Trisomy Associated with Congenital Anomalies and Mental Deficiency

Summary. The case of a mentally retarded patient with congenital anomalies not typical of any known chromosome imbalance is reported. In his karyotype, 40-60% of the cells were normal, while 59-4% had a missing G and an almost metacentric marker longer than an F chromosome. The abnormal cell line was interpreted as resulting from a chromatid translocation involving the short arm of a No. 22 and a segment from an unidentified chromosome. The translocation probably took place after the first cell division and was followed by segregation of the translocated chromatids. Other obvious hypotheses were excluded by the study of fluorescence patterns. The patient’s clinical features may be due to a partial autosomal trisomy.

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