

Transplacental Transfer of Fetal Cells with the Y-fluorescent Body in the Maternal Circulation

Satoshi YANAGISAWA

Department of Pediatrics, Yamaguchi University

School of Medicine, Ube, Japan

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Transplacental passage of maternal/fetal blood cells has been emphasized by several authors (Desai and Creger, 1963 ; Rigby, Hanson and Smith, 1964 ; McLarey and Fish, 1966 ; Tuffrey, Bishun and Barnes, 1969). Walknowska, Conte and Grumbach (1969) described on fetal lymphocytes in the maternal circulation and chromosome analyses were carried out on these fetal cells for prenatal sex determination.

These findings prompted the author to study on fetal lymphocytes with Y-fluorescent body in the maternal circulation for the prenatal sex determination.

MATERIALS AND METHODS

Peripheral blood samples were obtained from the earlobes of 30 pregnant women who were between 20 and 43 weeks of gestation.

Blood films were stained with 0.5% quinacrine dihydrochloride after the methanol fixation (Borgaonkar and Hollander, 1970). Cells were examined with an Olympus "Photomax" microscope by transmitted ultraviolet light from an HBO 200 watt mercury vapor lamp with a BV exciter filter and a Y-52 barrier filter. All observations were made with an apochromatic oil immersion objective containing an iris diaphragm ($\times 40$).

The number of the Y-fluorescent bodies was determined in 200 to 600 lymphocytes of each case under the fluorescence microscope with dark field immediately after treatment of the fluorochrome.

RESULTS

The incidence of lymphocytes with the Y-fluorescent body in the maternal peripheral blood was ranged from 0% to 4.0% (Table I). The incidence of cells with the Y-fluorescent body was 0.28% and 0.33% in women who gave birth to male and to female infants, respectively.

Table I. Incidence of cells with the Y-fluorescent body in the circulation blood of pregnant women and the sex of the infant.

| Case No. | Gestation (wk.) | No. of cells examined | No. of cells with Y body | Sex of infant |
|----------|-----------------|-----------------------|--------------------------|---------------|
| 1 | 43 | 200 | 1 (0.5%) | M |
| 2 | 34 | 600 | 3 (0.5%) | F |
| 3 | 43 | 200 | 1 (0.5%) | M |
| 4 | 33 | 600 | 0 (0.0%) | M |
| 5 | 20 | 600 | 0 (0.0%) | F |
| 6 | 37 | 600 | 0 (0.0%) | M |
| 7 | 41 | 200 | 1 (0.5%) | M |
| 8 | 40 | 200 | 8 (4.0%) | F |
| 9 | 38 | 200 | 0 (0.0%) | F |
| 10 | 33 | 300 | 0 (0.0%) | F |
| 11 | 39 | 300 | 0 (0.0%) | M |
| 12 | 39 | 200 | 2 (1.0%) | M |
| 13 | 42 | 200 | 2 (1.0%) | M |
| 14 | 33 | 400 | 0 (0.0%) | M |
| 15 | 38 | 600 | 6 (1.0%) | M |
| 16 | 14 | 200 | 0 (0.0%) | M |
| 17 | 40 | 200 | 0 (0.0%) | M |
| 18 | 34 | 500 | 0 (0.0%) | F |
| 19 | 34 | 300 | 0 (0.0%) | M |
| 20 | 34 | 300 | 0 (0.0%) | F |
| 21 | 40 | 200 | 1 (0.5%) | F |
| 22 | 40 | 200 | 1 (0.5%) | M |
| 23 | 34 | 300 | 0 (0.0%) | F |
| 24 | 34 | 300 | 0 (0.0%) | M |
| 25 | 41 | 200 | 1 (0.5%) | M |
| 26 | 40 | 200 | 0 (0.0%) | F |
| 27 | 33 | 300 | 0 (0.0%) | F |
| 28 | 34 | 200 | 0 (0.0%) | M |
| 29 | 35 | 300 | 0 (0.0%) | F |
| 30 | 40 | 200 | 1 (0.5%) | M |

M=male, F=female

The pregnancy and delivery were normal in almost all cases. The newborns had no congenital anomalies except Case 28 who had hypospadias of the penis. Y-fluorescent body in peripheral leukocytes of this baby was positive.

COMMENT

The Y chromosomes stained with quinacrine mustard reveal brightly fluorescent part on the distal portion of the long arm (Zech, 1969). These findings are also seen in the interphase nuclei of cells as the Y-fluorescent body (Y-chromatin) (Pearson, Bobrow and Vosa, 1970).

Transplacental passage of fetal and maternal cells has been documented (Desai and Creger, 1963; Rigby et al., 1964; McLarey and Fish, 1966; Tuffrey et al., 1969). On the other hand, some investigators have not found the maternal cells in the infantile circulation (Turner, Wald and Quinlivan, 1966; Seller, 1970; Sharpe, 1970; Kay, 1971).

Zimmerman and Schmickel (1971) reported that the number of Y-fluorescent bodies was not related to the sex of the subsequently delivered infant. These results are in agreement with the present study. Walknowska et al. (1969) described on chromosomal findings of fetal lymphocytes in the maternal circulation and the incidence of cells with XY sex chromosome constitution in the mother circulation who gave birth to male infants was 0.43%. In our study, however, the incidence of cells with the Y-fluorescent body in the maternal circulation was 0.28% in women who gave birth to male infants, but the difference was not significant between mothers with male infant and with female infant.

It may be concluded from the results that fetal lymphocytes are difficult to cross the placenta for the presence of fetal/maternal barrier, or that fetal lymphocytes in the maternal circulation are removed rapidly.

SUMMARY

Peripheral blood lymphocytes derived from 30 pregnant women were examined to investigate the possible transplacental transfer of leukocytes from the fetus to the mother utilizing quinacrine dihydrochloride staining.

The incidence of fetal cells in the maternal circulation who gave birth to male infants was not significantly higher than that of women who gave birth to female infants. These results suggest that there is likewise no relationship to the sex of the infant.

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