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Zone Electrophoresis in Studies of Maternal and Fetal Sera.* (22365)

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Qualitative and quantitative differences between concentrations of serum proteins in fetal, maternal and normal bloods have been demonstrated by means of electrophoresis(1, 2) and other fractionation methods(3,4). Differences between maternal and fetal serum polysaccharide levels have also been observed (5). The purpose of this paper is to describe a qualitative study of serum proteins and polysaccharides in sera from 15 pregnant women and their newborn offspring using the technic of zone electrophoresis.

Materials and methods. Fifteen normal women in the third trimester of pregnancy were selected for study. Blood samples were collected from one week to 3 months before

delivery and again at the time of parturition. A sample of uncontaminated fetal blood was obtained immediately after birth of the child from the umbilical vein of the cord on the placental side after clamping and cutting the cord. Filter paper electrophoresis was carried out using the technic of Kunkel and Tiselius(6). Each experiment was usually performed on duplicate sheets of filter paper using technics which have been described elsewhere(7,8). Following electrophoresis of the proteins, staining was carried out using an alcoholic mixture of mercuric chloride and brom phenol blue(6). Protein-bound polysaccharides were stained with basic fuchsin reagent following fixation and treatment with periodic acid(9-11).

Results. All of the electrophoretically separated maternal sera stained for proteins showed a decrease in albumin and gamma globulin and an increase in the beta and alpha globulins as compared with normal controls.

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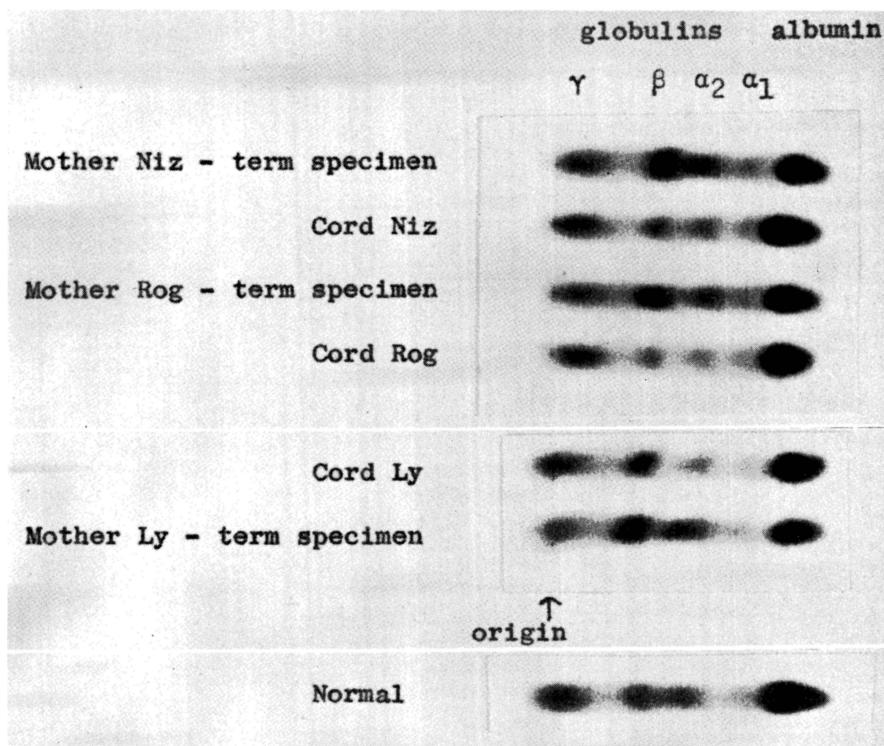


FIG. 1. Comparisons between zone electrophoresis patterns of maternal and cord sera stained for proteins.

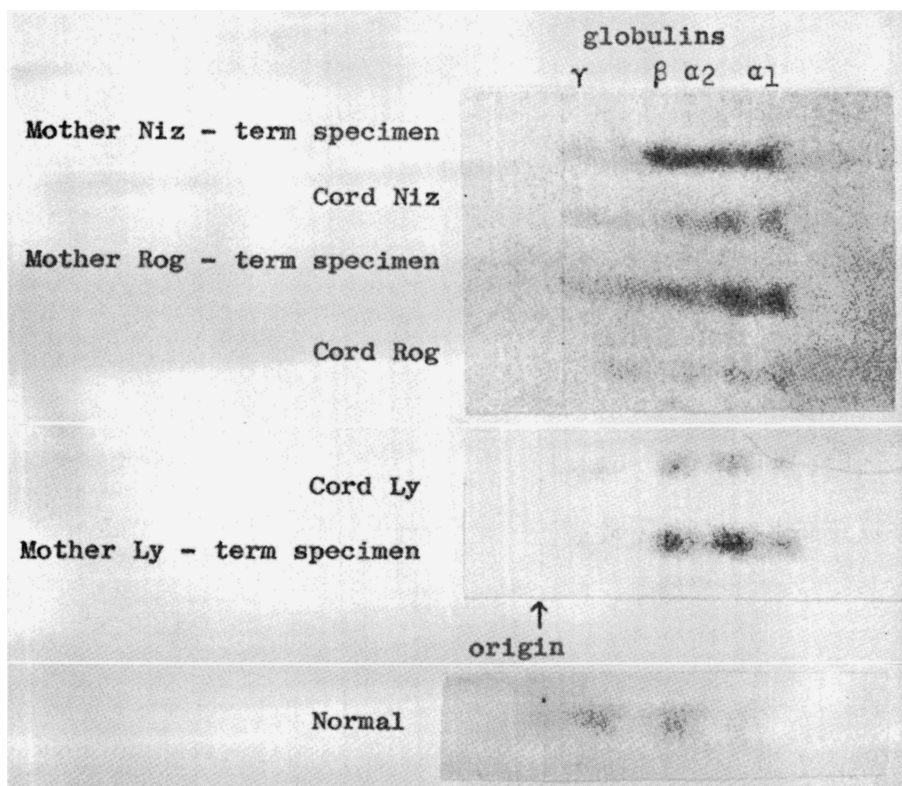


FIG. 2. Comparisons between zone electrophoresis patterns of maternal and cord sera stained for protein-bound polysaccharides.

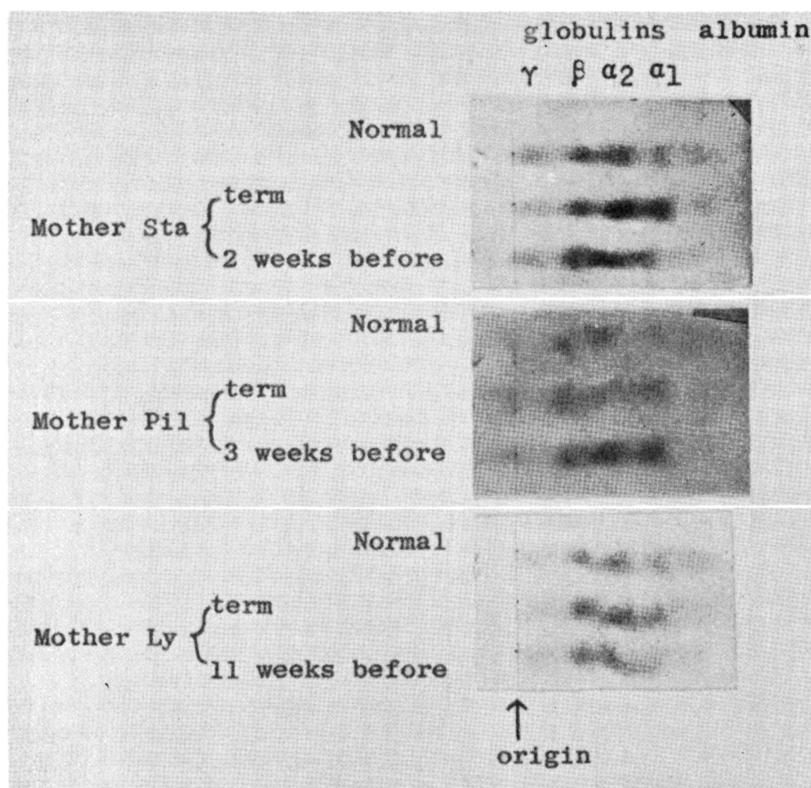


FIG. 3. Protein-bound polysaccharides in electrophoretically separated maternal sera obtained during last trimester of pregnancy and at term.

Corresponding cord sera which were stained for proteins showed relatively normal albumin patterns but decreases in total globulin. Alpha and beta globulins were decreased as compared with corresponding maternal patterns and also with normal patterns. Gamma globulin in cord blood specimens showed an increase above the maternal gamma globulin. Protein patterns of three maternal-cord serum combinations are shown in Fig. 1.

Differences in the electrophoretic distribution of protein-bound polysaccharides were also observed between maternal and cord sera. There were marked increases in protein-bound polysaccharides in all maternal sera. This was frequently reflected uniformly throughout the α_1 , α_2 and β globulins. On the other hand, the protein-bound polysaccharides contained in corresponding cord sera usually showed decreases as compared with normal patterns. The component associated with gamma globulin seemed to be about the

same in maternal and cord sera and in normal sera (Fig. 2).

In 5 instances more than one pre-term serum specimen was studied for polysaccharides. The results of this study indicated that these components increased in two patients, decreased in one patient, and remained the same in two patients during the last trimester of pregnancy. Comparative patterns of sera from three persons are illustrated in Fig. 3.

Discussion. The present work provides qualitative confirmation of previous electrophoresis studies which have shown that the concentrations of alpha and beta globulins in sera of pregnant women are significantly elevated above normal and that the concentrations of fetal alpha and beta globulins are lower than maternal values(1). On the other hand, the concentration of gamma globulin in fetal sera is higher than in maternal sera. Protein-bound polysaccharides determined by

the periodic-acid-Schiff stain showed considerable increases in maternal sera as compared with corresponding cord sera or normal sera. These findings parallel the glucosamine and non-glucosamine polysaccharide content of maternal and cord sera(5). This does not necessarily indicate that the same materials are being demonstrated by the different techniques. The periodic-acid-Schiff stain yields positive results when materials contain vicinal OH or NH₂ groups which can be oxidized to aldehyde. In serum only the high molecular weight substances (*i.e.* protein-bound polysaccharides and glycoproteins) possessing these characteristics are likely to be present in adequate amounts to give visible color.

Summary. Zone electrophoresis was carried out on 15 pairs of maternal and cord sera. Qualitative differences between all maternal and cord bloods were observed in electrophoretic patterns stained for proteins and protein-bound polysaccharides. Maternal sera consistently showed decreases in albumin and gamma globulin and increases in alpha and beta globulins. Corresponding cord sera exhibited decreases in alpha and beta globulins

and an increase in gamma globulin. Protein-bound polysaccharides associated with alpha and beta globulins were markedly increased in mothers' sera but were decreased below normal in the corresponding cord serum specimens.

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C-Reactive Protein during Pregnancy and in Cord Blood. (22366)

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C-reactive protein (CRP) an abnormal constituent of human serum(1,2), is found in a variety of pathologic conditions(3,4). This protein, considered as a very sensitive index to inflammation or tissue destruction(5,6), has been crystallized and shown to be a beta globulin(7,8). CRP has been reported to be present in the late months of pregnancy (9,10).

The purpose of the present study was to examine the occurrence of CRP in a larger series of pregnant women and to see whether it passes the placental barrier. Since antistreptolysin O was found to occur in cord blood at a titer comparable to that of the

maternal blood(11,12), determination of antistreptolysin O in maternal and foetal blood was included for purpose of comparison. CRP was also determined in a limited number of very young babies.

Materials and methods. Ninety-one women in the 2nd and 28 in the 3rd trimester of pregnancy together with 71 women in labour, were examined for the presence of CRP in their serum. Their ages varied from 19 to 42. Only healthy persons were included. Blood was taken during labour *i.e.* 2-12 hours before delivery and before the start of any necessary intervention. Concomitantly cord blood was also examined. As there were 2 pairs of