Elevated serum sialic acid in pregnancy

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Abstract
Objective—Serum sialic acid has recently gained interest as a possible cardiovascular risk factor as well as a potential tumour marker. The effect of pregnancy on serum sialic acid is unclear particularly in the post-partum period.
Design—Longitudinal cohort.
Setting—Teaching hospital antenatal clinic.
Population—29 pregnant women, 27 age matched non-pregnant women.
Methods—Specific enzymatic assay for sialic acid. The first serum sample was taken between 37 and 42 weeks of gestation; in 22 women this was followed by a second serum sample at 12 weeks post-partum. Serum sialic acid concentration was also measured in the 27 controls.
Results—Mean (SD) serum sialic acid concentration was higher during pregnancy than post-partum: 91.1 (11.1) v 77.5 (11.1) mg/dl (p < 0.001); or in the control group: 66.0 (9.7) mg/dl (p < 0.001).
Conclusions—Serum sialic acid is elevated during pregnancy and post-partum.

Keywords: pregnancy; sialic acid; cardiovascular risk factor

Sialic acid is the generic term given to a family of acetylated derivatives of neuraminic acid. Sialic acids have a number of major biological functions: their large electronegative charge has implications for the electronegativity of cells; they are found as essential components of many cell surface receptors; they have some influence on glycoprotein conformational states; they are often part of antigenic determinants of glycolipids or glycoproteins; they prevent ligands from recognising receptors.

Serum sialic acid has been used as a tumour marker for a number of different types of cancer: carcinoma of the bronchus, prostate, ovary, breast, colon, and malignant melanoma. In addition, serum sialic acid has been found to be elevated in chronic liver diseases, pneumonia, rheumatoid arthritis, Behcet's disease, and Crohn’s disease. Patients with chronic glomerulonephritis also have elevated serum sialic acid concentrations. Serum sialic acid has been recently shown to be a cardiovascular risk factor and elevated in patients with an acute myocardial infarction although the underlying mechanism is not known.

This study tested the hypothesis that serum sialic acid may be altered in pregnancy. There are few data concerning serum sialic acid in pregnancy or post-partum and controversy exists regarding whether there is an elevation during and following pregnancy. Such a study has important implications for the interpretation of serum sialic acid status in females.

Methods
SUBJECTS
Twenty nine pregnant women were studied, mean (SD) age 30.3 (4.6) years. The first serum sample was taken between 37 and 42 weeks of gestation; in 22 women this was followed by a second serum sample at 12 weeks post-partum. Twenty seven age matched (28.3 (5.4) years) non-pregnant women formed a control group. All subjects were healthy at the time of study with no history of malignant or inflammatory disease, or myocardial infarction. None of the females was on hormonal therapy during the study. We had ethical committee approval for the taking of blood in these subjects.

ASSAYS
Serum sialic acid was assayed by an enzymatic method purchased from Boehringer Mannheim (Lewes, Sussex, UK) adapted for use on a Roche Cobas Bio or Fara analyser (Roche, Welwyn, Herts, UK). This method uses a coupled enzyme assay reaction, incorporating neuraminidase, N-acetylneuraminic acid aldolase, and pyruvate oxidase linked to a peroxidase dye system. The between batch coefficient of variation (CV%) was about 3.5% or better.

STATISTICAL ANALYSIS
To compare group means the Student’s t test was used. Statistical significance was taken as p < 0.05. Results are shown as mean (SD).

Results
Serum sialic acid was higher in the pregnant subjects (n = 29) than the non-pregnant control (n = 27) group: 91.1 (11.1) v 66.0 (9.7) mg/dl (p < 0.001). Serum sialic acid values were also higher in the post-partum group (n = 22) than in the control group: 77.5 (9.9) v 66.0 (9.7) mg/dl (p < 0.001). Serum sialic acid values during pregnancy were higher than those in the same cohort of women post-partum: 91.1 (11.1) v 77.5 (9.9) mg/dl (p < 0.001).

Discussion
The serum sialic acid concentrations obtained by us in this study are similar to those reported by Hangloo et al and Lindberg et al who reported serum sialic acid values in non-
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