

Plasma Cholesterol in Pregnant Rhesus Monkeys.* (32321)

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The concentration of total plasma cholesterol changes during pregnancy in several animal species including man(1-3) and baboon(4). In women a slight depression in plasma cholesterol occurs during the first trimester of pregnancy which is followed subsequently by a progressive rise, with peak values occurring at, or near, parturition. In the baboon, however, no such elevation occurs; plasma cholesterol levels are low throughout gestation.

This report presents data which demonstrate that total plasma cholesterol changes during pregnancy in the rhesus monkey are similar to, but more marked than those which occur in the pregnant baboon.

Materials and methods. Pregnant rhesus monkeys (*M. mulatta*) whose date of conception was known were used in this study. The length of gestation of the 22 animals was 167 ± 2 (SE) days. Blood samples were obtained following an overnight fast. Samples were taken at weekly intervals for 3 weeks immediately preceding mating and at weekly intervals during pregnancy and following parturition. Blood was centrifuged within 30 minutes after withdrawal and analyzed for total plasma cholesterol(5). All monkeys were fed a standard laboratory diet which has been described in detail(6). Newborn infants were removed from their mothers within 12 hours after birth.

Results. The mean concentration of plasma total cholesterol in nonpregnant monkeys was 156.7 ± 8.3 mg/100 ml of plasma. Four weeks following observed matings of the same animals, cholesterol concentrations decreased significantly ($p < .001$) to 118.8 ± 5.4 mg/100 ml of plasma. Cholesterol continued to decline until week 12 of gestation at which time a mean level of 70.3 ± 3.9 mg/100 ml of plasma was observed. No

further decrease occurred during the remainder of gestation. One week following delivery, however, the concentrations increased to 119.6 ± 4.6 mg/100 ml of plasma, a level significantly greater ($p < .001$) than that observed on the day of parturition (81.7 ± 4.7 mg/100 ml of plasma), but still significantly lower ($p < .001$) than the nonpregnant level. Cholesterol continued to increase and by the third week following delivery did not differ significantly from the levels observed prior to pregnancy.

Discussion. Fasting plasma concentration of total cholesterol in pregnant monkeys was significantly lower than that obtained in the same animals prior to mating. This decrease is similar to that observed in the baboon(4) but is different from the elevation which occurs in the pregnant human(1-3), rat(7,8), and dog(9).

No explanation for the decrease in lipid level is apparent. Since cholesterol is a precursor of steroids, it is tempting to ascribe the decrease in circulating cholesterol to an increase in steroid secretion during pregnancy. This explanation, however, does not appear to be justified. During pregnancy in the rhesus monkey, the concentration of adrenocortical steroids is essentially unchanged(10) and the increase in estrogen and progestagen excretion occurs only during the last month of gestation(11,12) which is well after the cholesterol decrease has occurred.

It is of interest that serum hormonal iodine levels rise during pregnancy in the monkey (13). The elevation is observed during the first month following conception and continues for approximately 4 months, at which time the values remain level until term. Since thyroid hormones are known to be hypocholesterolemic(14) it is possible that the low cholesterol is the result of the increase in thyroid function. This possibility is supported by observations in the pregnant baboon in which serum cholesterol is also

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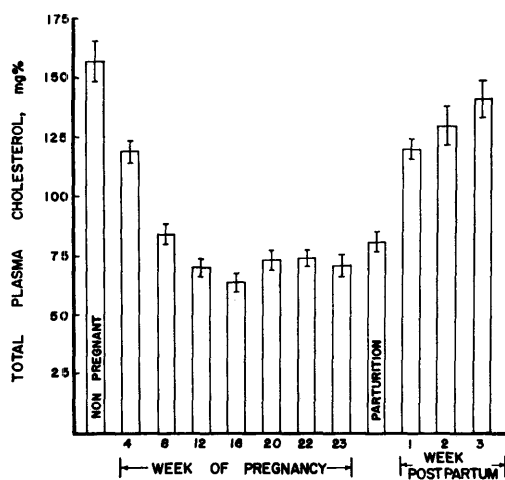


FIG. 1. Total plasma cholesterol concentration in pregnant and postpartum rhesus monkeys. Height of the bars represents the mean \pm SE concentrations.

depressed while serum hormonal iodine is increased(4). In women, however, both serum hormonal iodine and cholesterol concentrations are elevated(15).

It is unlikely that the low cholesterol values are the result of a dilution phenomenon since the decrease occurs prior to any change in blood volume or body weight. Furthermore, should dilution contribute in part to the low lipid values, this would simply magnify the difference between the human female and rhesus monkey since an increase in blood volume is also observed in women(16).

It is possible that the depression in plasma cholesterol in the pregnant monkey is a consequence of an increased cholesterol excretion in bile. This possibility is consistent with observations in the hypercholesterolemic pregnant human in whom emptying of the gall bladder is retarded(17) and bile, containing a reduced concentration of cholesterol is retained(18,19).

Summary. Plasma concentration of total

cholesterol is decreased during pregnancy in rhesus monkeys. The decline is observed within one month following conception and continues until the 12th week of gestation. Plasma cholesterol does not change until one week following parturition when a return to nonpregnant levels is observed. At 3 weeks postpartum cholesterol concentrations are the same as those found prior to conception.

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