Cesium Uptake in Pregnant Rat

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Cesium is one of the important radio-nuclides because of its long physical half life and the close chemical association with potassium. When we consider about the radiation hazard to fetus, it is important to know the distribution of cesium in pregnant mother, placenta and fetus. The present experiments were undertaken to determine the tissue distribution of mother, and placental and fetal uptake of cesium in pregnant rat as a function of time, and to know it's difference between 14th and 19th day of gestation.

Those studies were carried out on female rats of the Wistar strain. At the time of estrus each female rat was mated to a male rat of the same strain. On the 14th or 19th day of gestation each rat was given 0.05 μCi/g of 137CsCl solution (carrier free) intravenously. Each rat was sacrificed at various intervals ranging from 1 to 96 hours following injection, and placenta, fetus and some maternal tissue were dissected out. They were weighed and gamma-determinations were made with well-type scintillation counter.

Cesium concentration in placenta showed no significant difference between the two gestational period, and it decreased with time rapidly in the early 6 hours. In fetus we found slightly higher concentration in 19th than in 14th day of gestation, but no significant difference. The maximum fetal concentration of Cs at approximately 24 hours after administration in both groups. The ratio of fetal concentration to placental concentration increased in proportion to time within 24 hours, and it showed that Cs transferred across the placenta rapidly for the first several hours. The ratio of Cs concentration in fetus to maternal blood was higher than 1.0 in the 48 hours after administration. It showed Cs was incorporated into placental tissue against the concentration gradient. The ratio of Cs concentration in fetus to in maternal blood was higher than 1.0 between 12 and 48 hours after administration, it showed 0.82 at 96 hours. Concentration of Cs in amniotic fluid showed nearly the same change with fetal concentration, but the value was about 1/7 of fetal concentration. The distribution of Cs in some maternal tissue showed no significant difference between 14th and 19th day of gestation. The organ and tissue were classified by the concentration of Cs as a function of time, the concentration decreased rapidly within 12 hours in kidney, heart, salivary grand, intestine, lung and blood for the first group. As the 2nd group we found relatively slower decrease in liver, spleen, thymus, uterus, bone and skin. Muscle and brain showed gradual increase within 96 hours. The concentration of Cs became highest in muscle than any other organ and tissue at 48 hours after administration.