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Brief Communication

SECRETION OF IODINE 131 IN BULL SEMEN COMPARED TO BLOOD PLASMA AND BLOOD CORPUSCLES

Iodine 131 is among the biologically most important fission products. ^{131}I decays with a half life of 8.05 days. The metabolism of ^{131}I and especially its secretion into cow's milk has been widely studied.

To our knowledge no information exists as regards the secretion of ^{131}I (or stable iodine) in semen. *Åberg & Gillner* (1966) have determined radiostrontium in ram sperm, and *Ekman et al.* (1967) have studied the occurrence and significance of radiocaesium in bull semen.

The present study was carried out during the winter 1971—72 with two 2-year old twin bulls of the Red Danish breed Nos. 187 and 188 with body weights of 600 and 590 kg respectively. The bulls were in all respects normal and had been trained with the artificial vagina during a 5-month period before the experiment started. Because of the frequent semen collections during the first week of the experiment, the bulls sometimes started with an incomplete ejaculation ("prostate secretion").

The bulls 187 and 188 received 100 μ Ci and 1 μ Ci ^{131}I respectively (as NaI) with 10 l of drinking water. The experiment was repeated 2½ months later. Before the ^{131}I intakes samples of stabilized blood (4 ml) and semen were collected and served as background. The size of the ejaculates ranged between 3 and 10 ml, usually a 3-ml sample was used for the ^{131}I measurements.

The blood samples were separated (by centrifugation) into plasma and corpuscles before the measurement. A number of semen samples were measured separately as seminal plasma and sperm cells (washed with $NaHCO_3$ buffer before measurement).

The ^{131}I concentrations of the samples were reported as parts per million per ml of dose (ppm/ml). All measurements were corrected for radioactive decay.

As shown also by other authors (*Garner & Russell* 1966) the concentrations of ^{131}I in the body fluids from a single ^{131}I intake decay according to a multiple exponential expression (Fig. 1):

Semen: $\text{ppm/ml} = 2\ e^{-0.75d} + 0.04\ e^{-0.06d}$ $(r = 0.87^{**})$

Blood plasma: $\text{ppm/ml} = 5.2\ e^{-1.05d} + 0.5\ e^{-0.07d}$ $(r = 0.97^{***})$

Blood corpuscles: $\text{ppm/ml} = 5.1\ e^{-0.94d} + 0.1\ e^{-0.06d}$ $(r = 0.89^{***})$

where

d is the time in days since the ^{131}I intake, and

r is the correlation coefficient between observed and calculated values.

Significance levels: 0.05*, 0.01**, and 0.001***

The equations were calculated by the method of *Solomon* (1953).

In the first days the plasma level is mainly determined by the uptake of ^{131}I in the thyroid gland and excretion of the inorganic ^{131}I (through the urine). Hence the rate constant 1.05 days^{-1} is the sum of the rate constants for accumulation of ^{131}I in the thyroid gland (k_1) and excretion of ^{131}I from the organism (k_2) respectively. *Sørensen* (1958) has studied these rate constants for bullocks, heifers, and cows. He found $(k_1 + k_2) = 0.94 \pm 0.07$

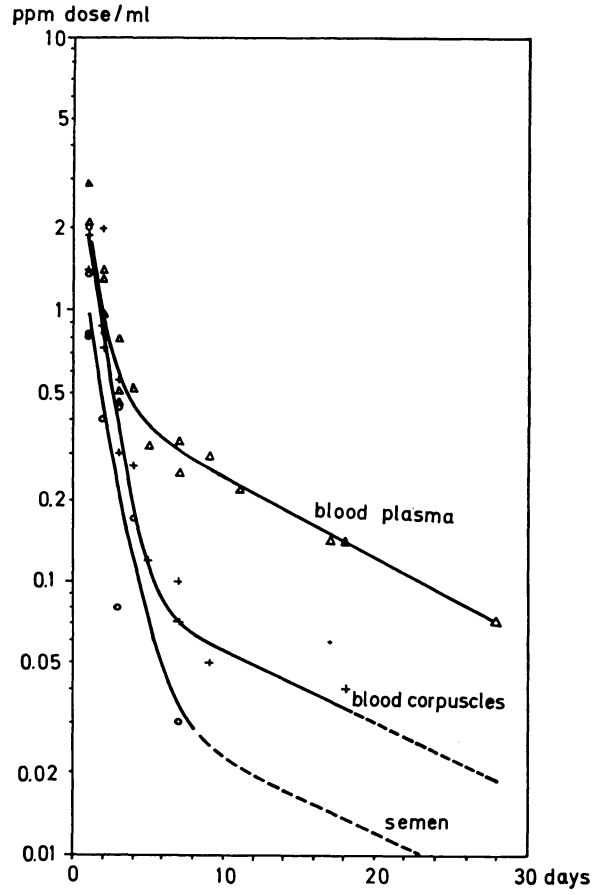

Figure 1. ^{131}I levels in blood and semen from bulls as a function of time since the intake. The curves are the multiple exponential expressions given in the text. The points are the observed values.

days^{-1} (26 animals). After approx. 5 days the curve flattens out (cf. Fig. 1). At that time it is mainly the excretion of ^{131}I by decomposing of thyroxin which determines the ^{131}I concentration in the plasma. The rate constant (k'_4) for this excretion was 0.06 days^{-1}. *Sørensen* found $k'_4 = 0.06 \pm 0.01$ days^{-1} in his material.

The regression analysis of the data showed no significant difference between the biological half lives of blood and semen in the first week after the intake. However, the concentration of ^{131}I in blood plasma was nearly two times higher than in semen. The ^{131}I activity in the semen was concentrated in the plasma phase; the sperm cells did not contain measurable amounts of ^{131}I. The "prostate secretion" showed nearly the same ^{131}I level as the seminal plasma. After the first week the blood corpuscles showed lower ^{131}I than the blood plasma, which probably means that the uptake of proteinbound ^{131}I from the thyroid in the blood corpuscles as compared to plasma is less pronounced than the uptake of inorganic ^{131}I.

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