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THE EFFECT OF LACTATION ON THE
MOBILIZATION OF ^{203}Pb AND ^{47}Ca IN RATS

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The mobilization and transfer of lead and calcium from mother rat to the litter were determined 5 days after a single intravenous application of 2.5 μCi ^{203}Pb and 2 μCi ^{47}Ca on the 4th and 15th day of lactation. Both minerals were mobilized and transferred in significant amounts from mother to the litter. The percentage lead retention in the litter was 4–6 times lower than the percentage calcium retention.

Lead is a widespread metal poison (1), whose environmental impact seems to be especially high in the very young (2, 3). However, quantitative data on the lead transfer from mother to offspring are still insufficient. In our previous work on rats we were able to show that the transplacental transport of lead was 8 times lower than that of calcium while its transmammary transport was only 4 times lower (4). The purpose of this work was to obtain additional data on lead transfer at later time intervals after its application during the early and late lactation in rats.

The method used was essentially the same as in our previous experiments (4). Three groups of 16-week-old female virgin albino rats were used. Two groups of animals were mated and the third group of virgin rats served as control. The number of baby rats in each litter was reduced to 6 immediately after the parturition. All groups were fed on a stock laboratory diet (1.2% Ca and 0.8% P) with water *ad lib.* On the 4th and 15th day of lactation the experimental and control rats were given a single intravenous dose of 2.5 μCi ^{203}Pb and 2 μCi ^{47}Ca both almost carrier free with the addition of 0.1 μg Pb as chloride per 0.5 ml. All rats were then transferred to individual metabolic cages for 5 days and urine and faeces were collected until sacrifice on the 5th day.

The whole body retention of lead-203 and calcium-47 (Table 1) was rats their litters, was determined in a single channel, twin crystal assembly (Tobor, Nuclear Chicago). The percentage of each radioactive dose recovered in the whole body and excreta was more than 96%.

The whole body retention of lead-203 and calcium-47 (Table 1) was lower in animals during the early ($P < 0.02$ for ^{203}Pb and $P < 0.001$ for ^{47}Ca) and during late lactation period ($P < 0.001$ for both radionuclides) than in the control group. There were no differences in the whole body lead-203 retention between the early and late lactation group — the

Table 1
The cumulative 5 day whole body retention and excretion of intravenously dosed ^{203}Pb and ^{47}Ca in rats

	Percentage of dose	
<i>Control</i>		
Whole body	49.65 ± 2.03* (11)**	65.98 ± 1.72 (12)
Urine	12.23 ± 0.96 (11)	5.28 ± 0.83 (12)
Faeces	34.89 ± 1.30 (11)	27.60 ± 1.38 (12)
<i>Early lactation</i>		
Whole body	42.21 ± 2.12 (9)	31.24 ± 1.74 (10)
Litters	11.58 ± 0.83 (9)	48.53 ± 1.19 (10)
Urine	11.63 ± 1.28 (9)	3.26 ± 0.78 (10)
Faeces	32.63 ± 1.24 (9)	18.95 ± 1.30 (10)
<i>Late lactation</i>		
Whole body	41.51 ± 1.25 (8)	25.89 ± 1.04 (10)
Litters	9.54 ± 0.71 (8)	57.22 ± 1.65 (10)
Urine	10.51 ± 0.82 (8)	0.91 ± 0.08 (10)
Faeces	35.89 ± 1.16 (8)	12.11 ± 0.65 (10)

*Mean ± SE

** Number of samples

values in both groups being about 15 percent lower than in controls. The calcium-47 whole body retention was lower in the late as compared to the early lactation group ($P < 0.001$). The percentage lead-203 retention in the litter remained almost the same at both time intervals ($P < 0.1$) while the calcium retention was higher in the litter of the late as compared with the litter of the early lactation group ($P < 0.001$). The percentage calcium retention was 4 to 6 times higher than for lead.

The excretion of lead in urine and faeces remained unchanged in control and both lactating groups. Meanwhile the calcium excretion diminished progressively from control over the early to the late lactation group both in urine and faeces ($P < 0.001$).

The results obtained confirm our previous findings on lead and calcium transfer from mother to litter during lactation (4). We suppose that

the lack of the increase in lead retention as compared to calcium in the litter between the early and late lactation might be the result of the extremely low lead plasma concentration in nursing mothers. We also suppose that numerous changes in the gastrointestinal tract of suckling rats at weaning i. e. in second part of lactation as well as mixed food digestion instead of milk diet only might influence lead metabolism much more than calcium metabolism.

The results of this experiment further confirm our previous conclusion regarding the risk of lead intoxication during lactation.

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Sažetak

UTJECAJ LAKTACIJE NA MOBILIZACIJU ^{203}Pb I ^{47}Ca U ŠTAKORA

Prijelaz olova i kalcija iz majke u mladunčad određivan je u štakora u toku laktacije. Ženke su primile radioaktivno olovo i kalcij oko $2,5 \mu\text{Ci } ^{203}\text{Pb}$ i $2 \mu\text{Ci } ^{47}\text{Ca}$ 4. i 15. dana laktacije. Nakon 5 dana određen je postotak radioaktivnosti olova i kalcija u tijelu i ekskretima majki i u njihovim leglima. Ustanovljeno je da se oba minerala prenose iz majke u mladunčad i da je postotak retencije olova u mladima bio oko 4—6 puta niži od postotka retencije kalcija.

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