Biokinetics Studies of Nephrectomized Rats with ^{26}Al

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In this study, 5/6 nephrectomized Sprague-Dawley rats and control rats obtained an oral dose of 20 ng ^{26}Al as $AlCl_3$. At time intervals of 2 h, 5 h and 24 h after administration, the rats were sacrificed. Samples of blood, accumulated urine, femur, liver and spleen were taken. ^{26}Al contents were determined with AMS at the Munich accelerator laboratory. The intestinal uptake of ^{26}Al and the ^{26}Al ratio of bones to organs were larger for the nephrectomized rats compared to the control group. Nephrectomized rats have a reduced renal excretion and larger citrate concentration than control rats. The reduced renal function explains lower ^{26}Al contents in the accumulated urine for the nephrectomized animals (see Figs. 1 and 2). The larger citrate concentration in the plasma involves a higher percentage of citrate bound aluminium. Since bones are supplied with aluminium from citrate bound Al and organs from the transferrin bound Al in the interstitium, the larger ^{26}Al ratio of bones to organs for nephrectomized rats is explained by this larger citrate concentration.

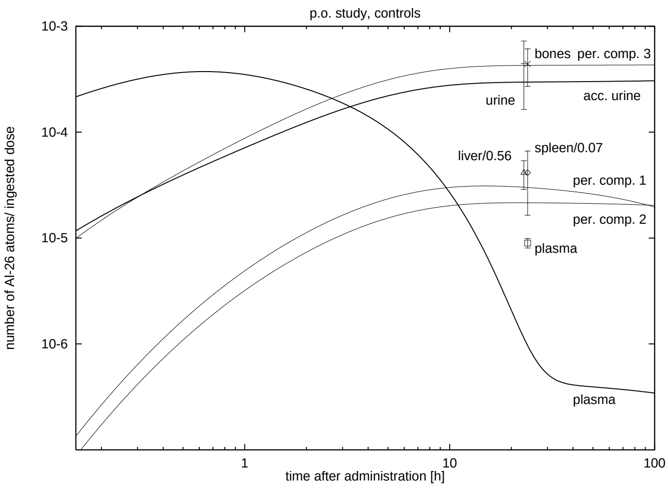

Fig. 1: ^{26}Al contents relative to the administered oral dose in plasma, urine, bones, liver (/0.56) and spleen (/0.07) at times of 2 h, 5 h and 24 h after administration for the control group of rats together with results of simulation calculations with the compartmental biokinetics model.

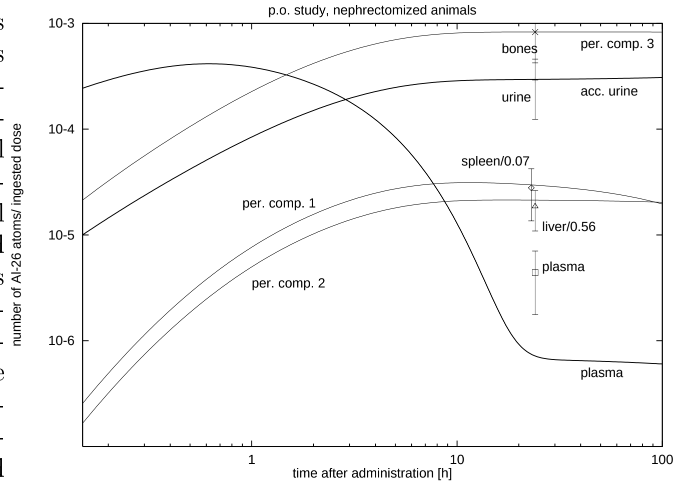

Fig. 2: Same as Fig. 1 for the group of 5/6 nephrectomized rats.

Simulation calculations with the compartmental biokinetics model were performed for both groups of rats (see Figs. 1 and 2). For nephrectomized rats, the urine excretion time T_U was chosen three times larger and the citrate concentrations in blood plasma and interstitial fluid were chosen two times larger than for the control group. All other constants were kept equal for both groups. The results of the simulation calculations are also shown in Figs. 1 and 2. From the comparison, it is seen that the simulation calculations reproduce well the measurements and are able to explain the differences observed between nephrectomized and control rats.

References

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