Study of the Aluminium Biokinetics in Humans with ^{26}Al

G. Kislinger, T.H. Ittel [a], E. Nolte, and C. Steinhausen
[a] Medical Clinic II, RWTH Aachen, D-52057 Aachen, Germany

This investigation is a continuation of a cooperation with the Medical Clinic II of RWTH Aachen. The aim of this cooperation is to study the aluminium biokinetics in humans, to establish an multicompartment model for the Al biokinetics and to investigate Al anomalies in the metabolism of patients with renal failure. An oral dose of 100 ng ^{26}Al as $AlCl_3$ was administered to a healthy volunteer of 54 y and an intravenous (i.v.) dose of 1 ng ^{26}Al as $AlCl_3$ was administered to two healthy volunteers of 24 and 26 y. The radiation doses were calculated to be as low as 12 and 50 μSv, respectively. Studies with two healty volunteers (22 and 21 y) and with two patients (57 and 54 y) with renal failure after oral administering were described in [1].

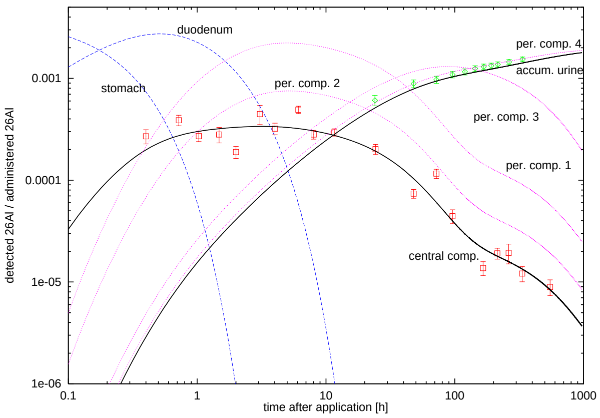

Fig. 1: ^{26}Al contents in blood and accumulated urine of a healthy volunteer (54 y) after oral administering a dose of 100 ng ^{26}Al as $AlCl_3$.

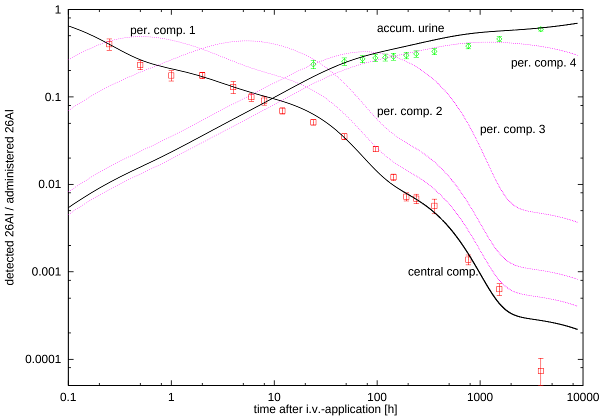

Fig. 2: ^{26}Al contents in blood and accumulated urine of a healthy volunteer (24 y) after i.v. administering a dose of 1 ng ^{26}Al as $AlCl_3$.

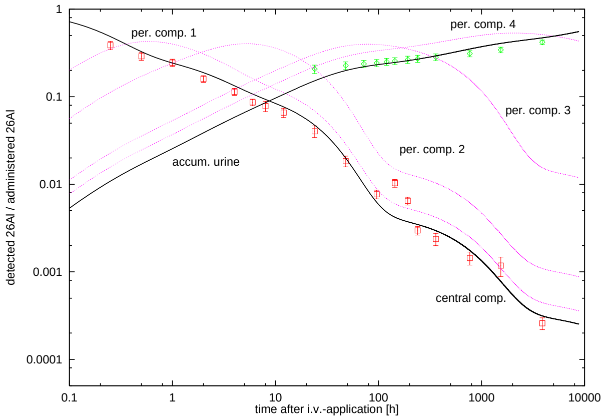

Fig. 3: Same as Fig. 2 for a healthy volunteer (26 y).

Blood and urine samples were taken in a time period of 20 min to up to 1/2 y. Creatinine clearances and haematocrite values were measured. After physical and chemical treatment of the samples, Al samples were obtained for AMS measurements of ^{26}Al. The AMS measurements were performed at the Munich accelerator laboratory using the Wien velocity filter at the high energy side of the MP Tandem accelerator and a Bragg ionization chamber. The detection limit ^{26}Al/Al is $< 10^{-15}$. ^{26}Al contents in blood and accumulated urine for the three healthy volunteers are plotted in Figs.1-3. As seen from the urine values in Fig.1, the Al resorption factor in this case of oral administering was several 10^{-3}. From Figs.1-3 it is also seen that the sensitivity is high enough to perform studies even after one year or years after administering such low ^{26}Al doses. The calculations shown in Figs.1-3 are results of the multicompartment model described on page 75.

References

[1] C. Steinhausen et al., Jahresbericht 1994, p. 150
[2] C. Steinhausen, Nucl. Instr. Meth. **B 5754** (1996) 1 - 5