

Disclosures

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Release of Yttrium-90 from Resin Based Microspheres used in Radioembolisation of Primary and Secondary Liver Malignancies

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Aim

Radioembolization (RE) with Yttrium-90 (Y-90) labeled microspheres is an established therapy for patients with primary and secondary liver malignancies. For a single type of microsphere, SIRSpheres® (SIRTEX, Sydney, Australia), a slight urinary excretion of Y-90 (25–50 kBq/L/GBq) was reported for the first 24 h after RE [1].

The aim of the study was to re-evaluate the excretion analysis performed during the rollout of Y-90 SIRSpheres®.

Methods

Urinary excretion was evaluated from 11/2013 to 10/2014 by 24-hour urine collection during the first 48 h post RE. The urinary activity was measured with a probe system (ISOMED 151, MED, Dresden, Germany) constructed for large-volume samples (V = 1L in Marinelli geometry). The system was previously calibrated for Y-90 measurements.

Results were presented as median and range.

Results

Analysis was performed in 32 patients (m= 13, f= 19; 62.3 y, range= 43.8 - 79.3 y). Radioembolisation was realized with a median activity of 780.0 MBq Y-90 (range= 430.0 – 2030.0 MBq). The volume of the excreted urine was 1100 ml (day 1; range = 300 - 2.600 ml) and 1250 ml (day 2; range = 600 - 2.300 ml). The difference was not significant (p= 0.8). The excretion rates were 49.9 kBq/L/GBq (Q25/Q75= 30.2/70.7 kBq/L/GBq ; range= 3.5 – 173.6 kBq/L/GBq) and 16.0 kBq/L/GBq (Q25/Q75= 8.6/34.6 kBq/L/GBq; range= 1.8 – 58.8 kBq/L/GBq) at the first and second day, respectively. The excretion rate decreased significant (p= 0.00002, Figure 2). The maximum rate of 173.6 kBq/L/GBq was observed in a patient with a reduced urinary excretion of 800 ml and a prescribed activity of 740 MBq Y-90-SIRSpheres®.

The urinary excretion rate decreased significantly from the first to the second day after RE (p< 0.0001). The overall excreted activity also decreased significantly from the first to the second day from 76.0 kBq (Q25/Q75= 71.9/19.9 kBq; range = 13.2 – 311.0 kBq) to 19.9 kBq (Q25/Q75= 12.6/37.3 kBq; range = 2.3 – 103.9 kBq), respectively (p< 0.0001).

In total 0.009 % (Q25/Q75 = 0.005/0.012 %; range=0.0009 - 0.024 %) and 0.004 % (Q25/Q75 = 0.0019/0.0058 %, range= 0.0008 - 0.013 %) of the implanted activity were excreted at the first day and second day.

Conclusions

The observed actual excretion kinetics for Y-90 differ from published information. The estimated excretion rate was higher at the first day and a further excretion of Y-90 was observed at the second day after RE. Both facts need to be considered in radiation protection.

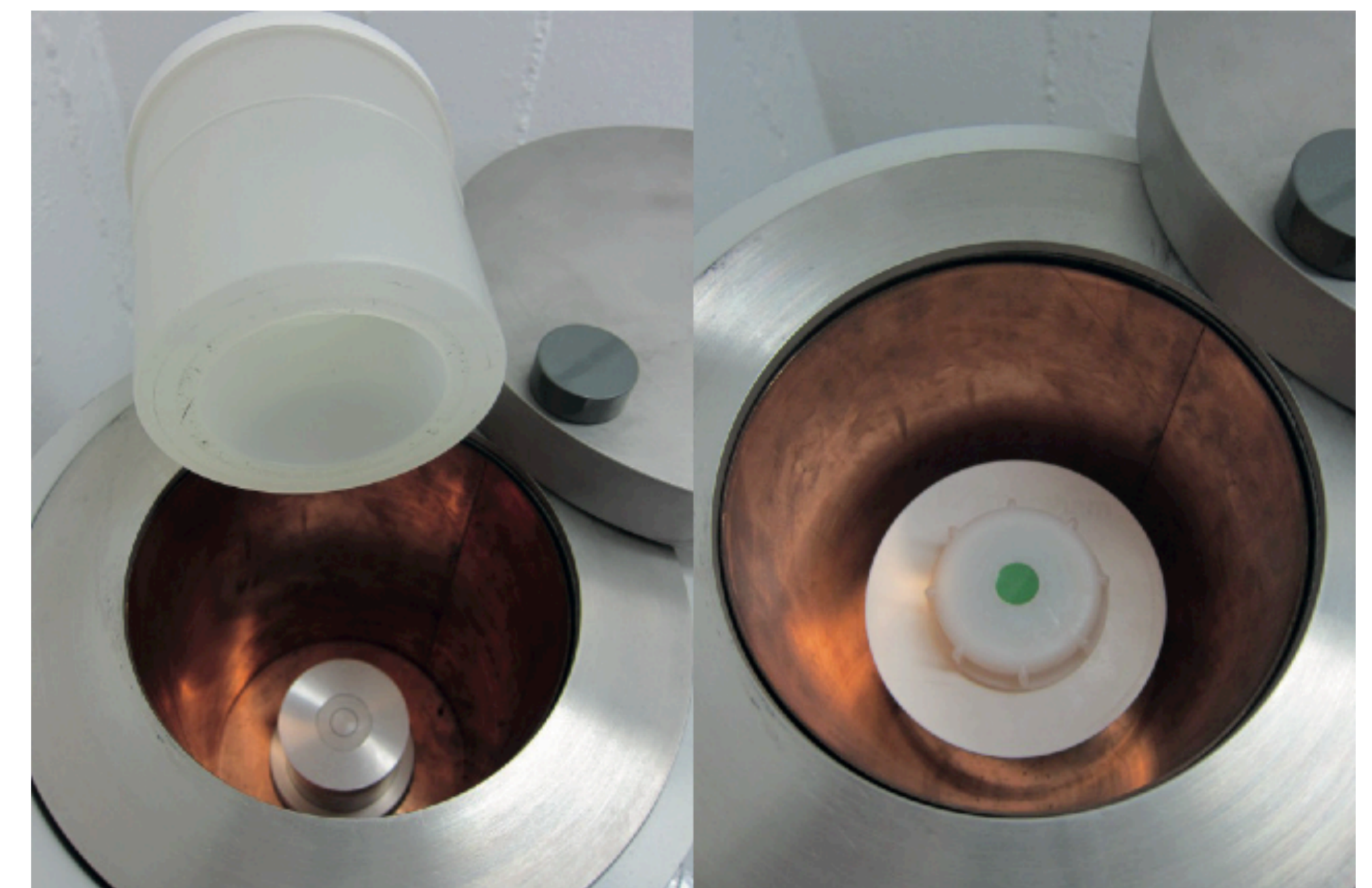


FIGURE 1: Probe system with Marinelli geometry

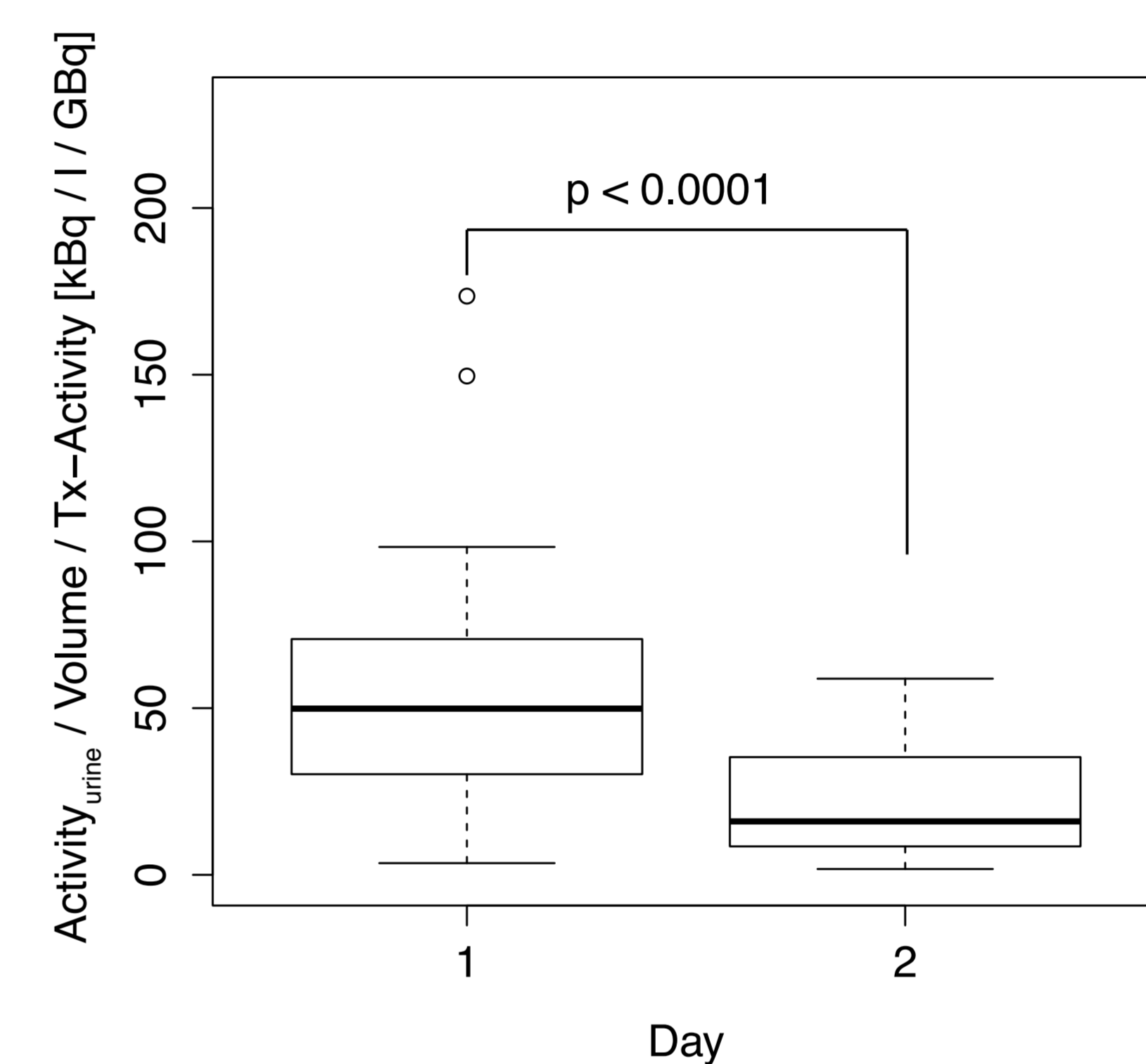


FIGURE 2: Y-90 excretion rates after RE.

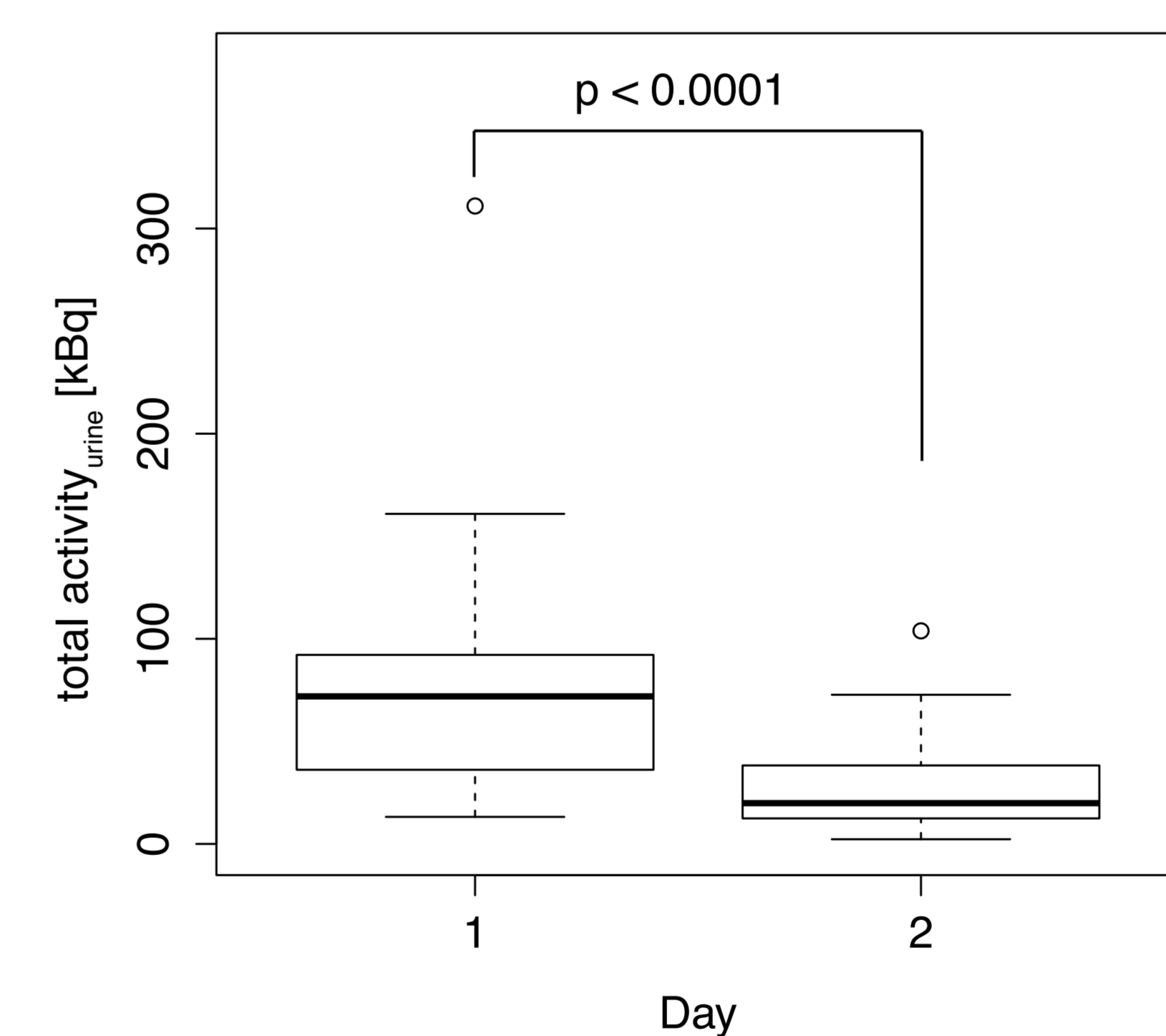


FIGURE 3: Total excretion of Y-90 after RE.

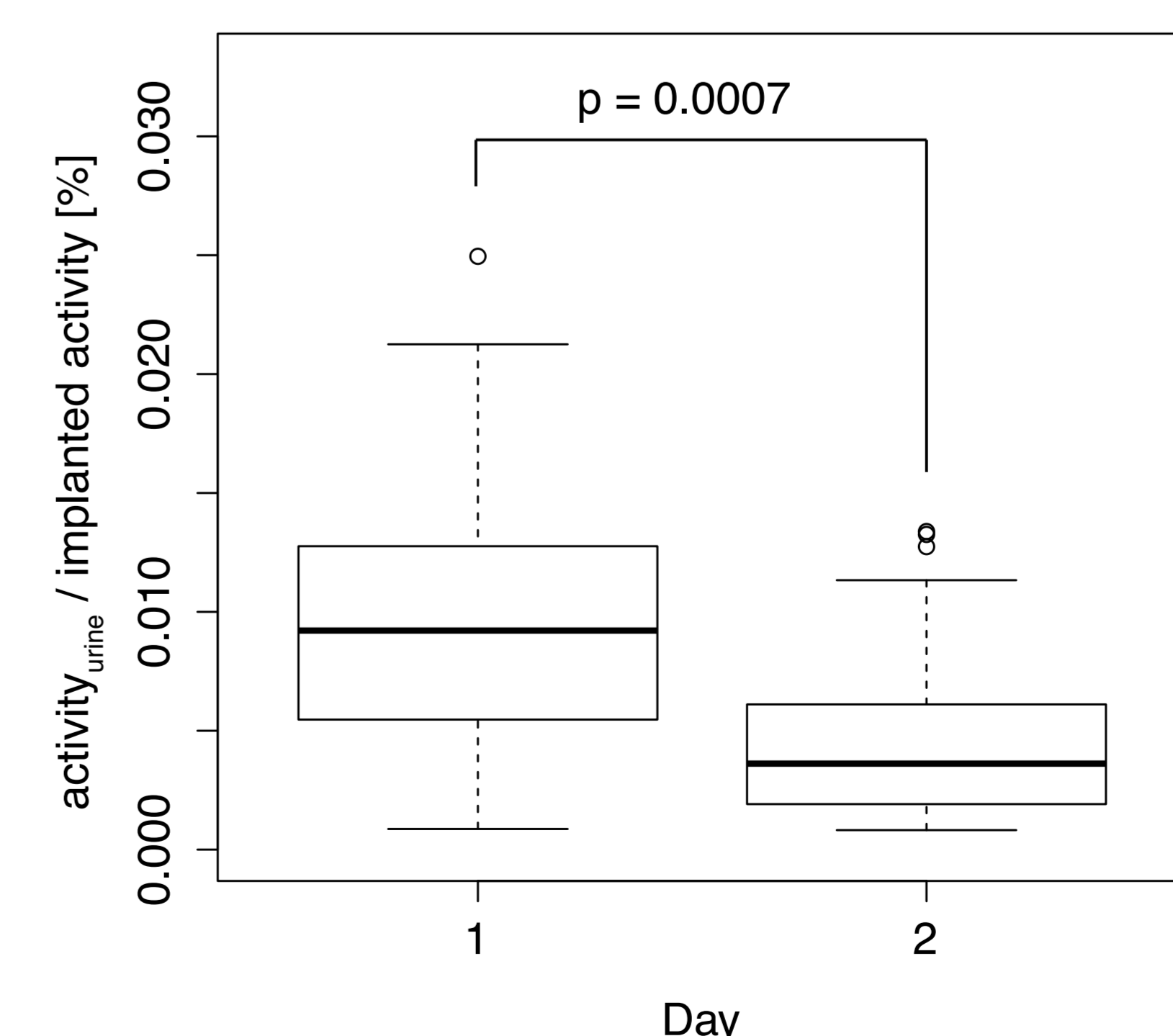


FIGURE 4: Y-90 excretion rate regarding implanted activity

[1] Klemp P, et al., Radiation Protection in Australia. 1989;7:70–3.