

Local Vancomycin Delivery in Hip and Knee Spacers

A Prospective Comparison of 1g and 2g Vancomycin per Cement Batch

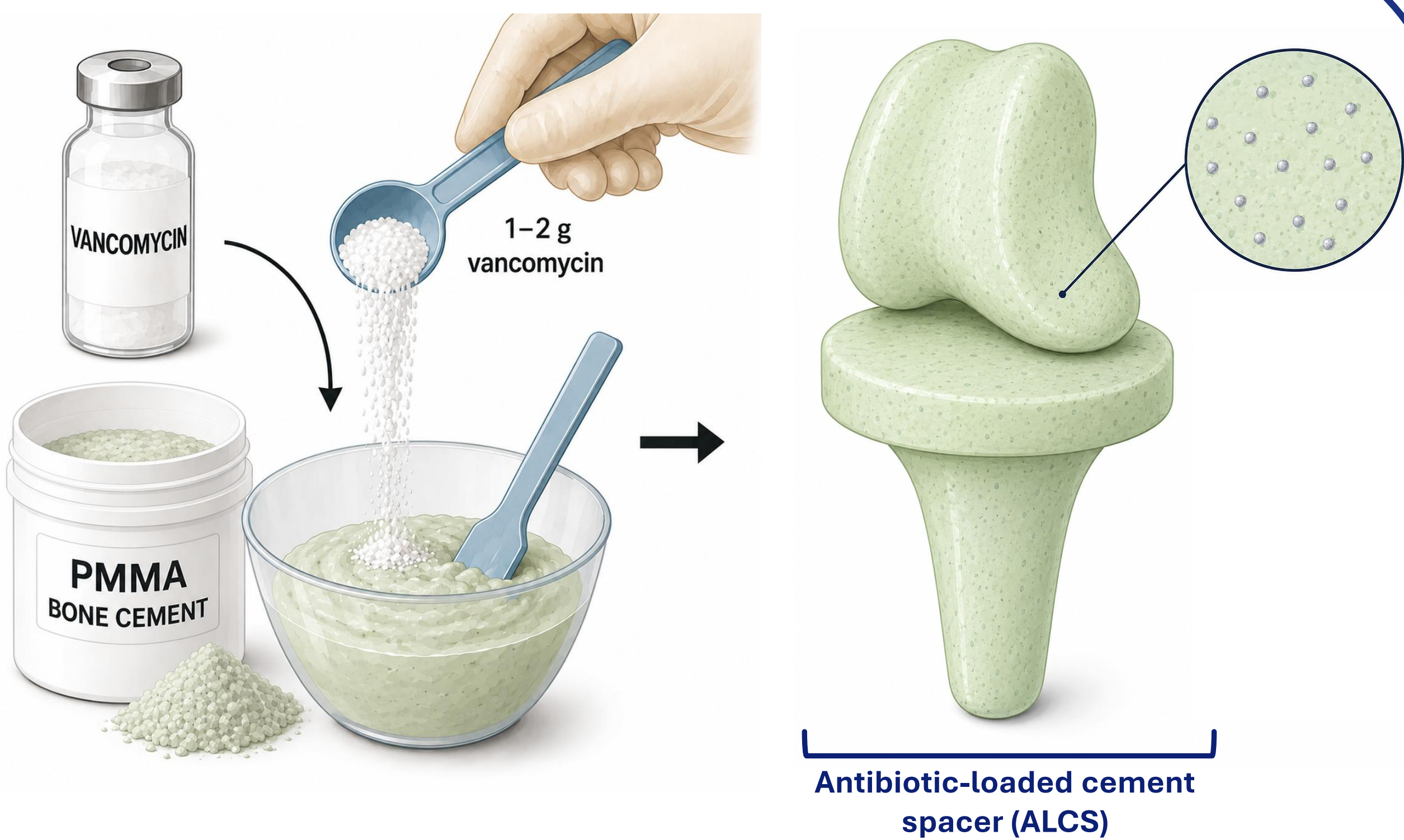
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Background & Aim

Chronic periprosthetic Joint Infection (PJI) is a serious complication following total joint arthroplasty (TJA). During two-stage revision surgery, antibiotics can be delivered locally using an antibiotic-loaded cement spacer (ALCS). Yet, it is unclear whether sufficient local target tissue concentrations are reached. We quantified intramedullary bone concentrations following vancomycin-loaded spacer implantation and compared these to the individual Minimal Inhibitory Concentration (MIC).

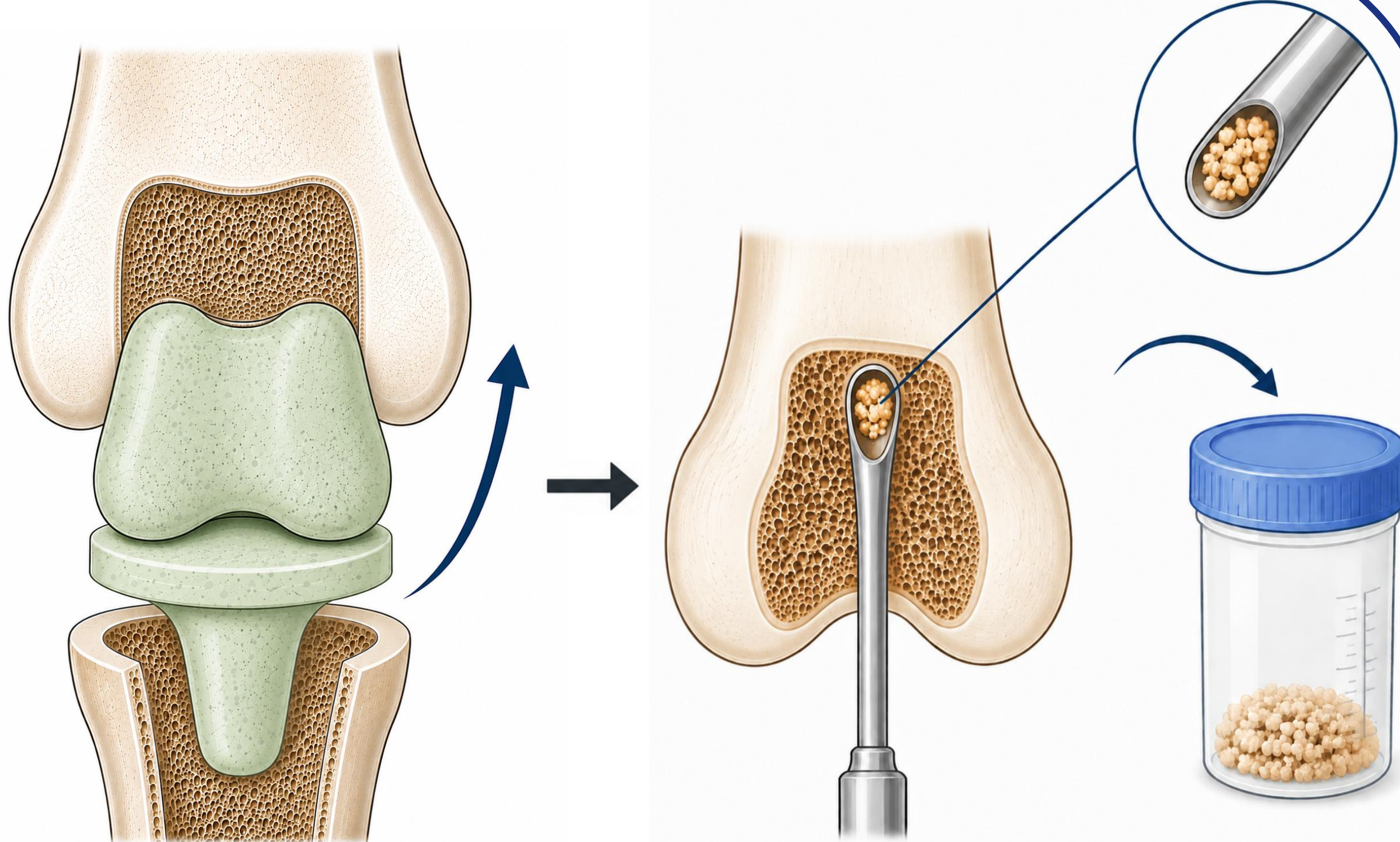
Stage one: spacer implantation



1 gram (group A) or 2 gram vancomycin (group B) was manually added to one batch (40g) PALACOS® R+G bone cement.

Custom-made articulating spacers were fabricated for hip patients (Link® Lubinus Classic Plus Stem and Link® IP 46 mm Acetabular Cup). Spacer molds were used in knee patients (COPAL® molds).

Stage two: removal + sample collection



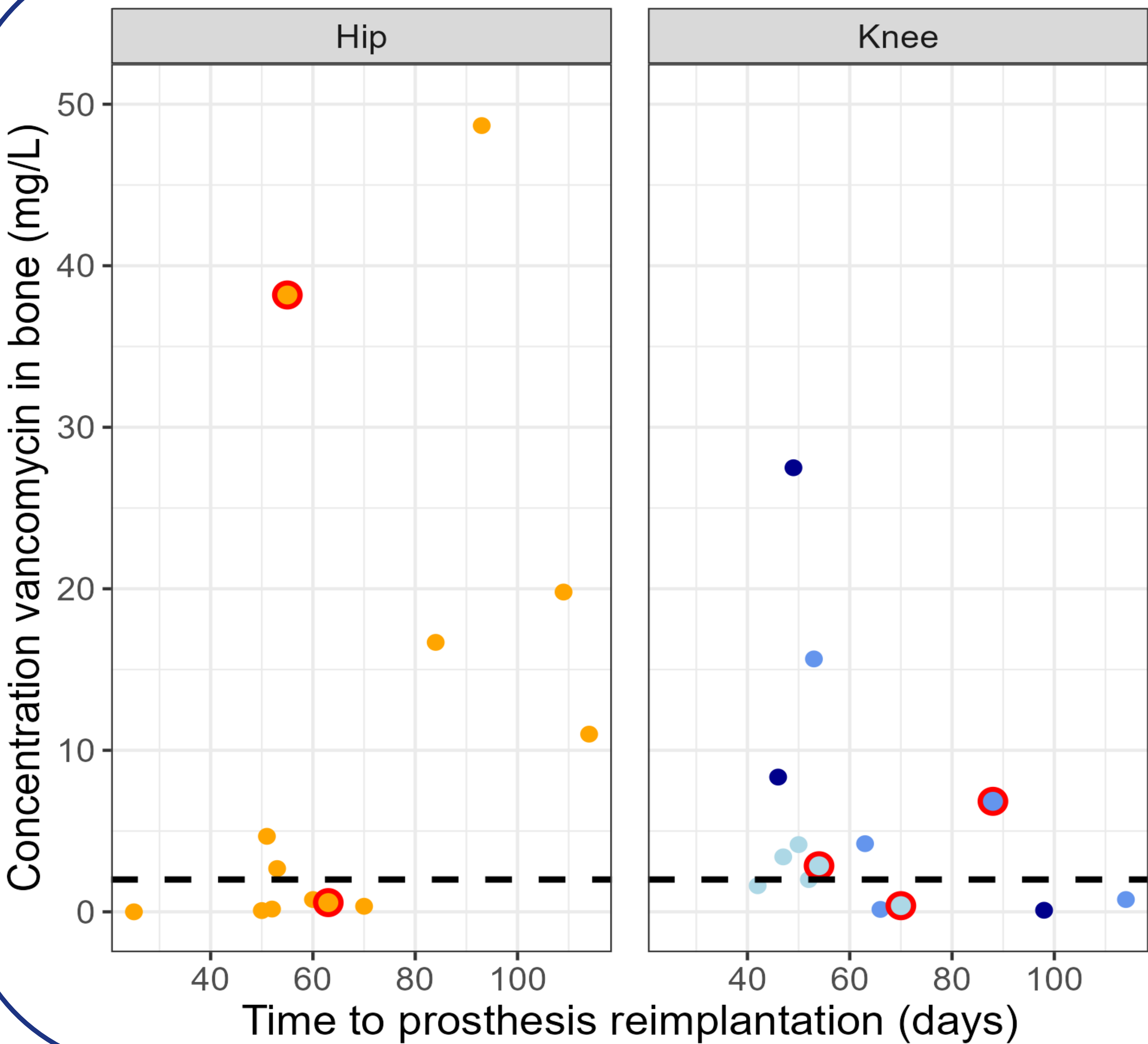
Timing of spacer removal and therefore sample collection followed routine clinical practice.

Bone samples were collected after spacer removal from the intramedullary bone stock, primarily from the acetabulum (hip) and distal femur (knee).

Analytical methods

Samples were analyzed using validated ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS) assay. Bone concentrations were crushed and compared to the individual minimum inhibitory concentration (MIC) by applying a bone density of 1.9 kg/L.^[1] If the individual MIC was unavailable, the epidemiological cutoff (ECOFF) for the respective microorganism was used as an alternative reference.^[2]

Results



In total (A+B): **71.4%** of the knee patients and **57.1%** of the hip patients exceeded the individual MIC at a mean of 65 days after spacer implantation (*range 25-114 days*)

Increasing the vancomycin from 1g to 2g did not seem to result in more patients achieving their individual MIC

Knee: 72.7% vs. 66.7%

Hip: 54.5% vs. 66.7%

Thicker knee spacers yielded higher mean vancomycin concentrations compared to medium and thin spacers:

Thickness	Group A	Group B
Thick	12.0 mg/L	-
Medium	5.2 mg/L	6.8 mg/L
Thin	2.8 mg/L	1.6 mg/L

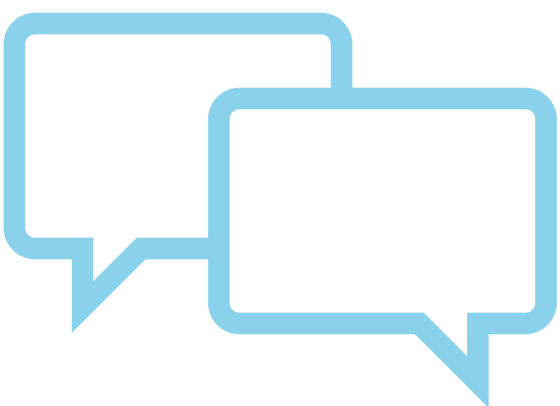
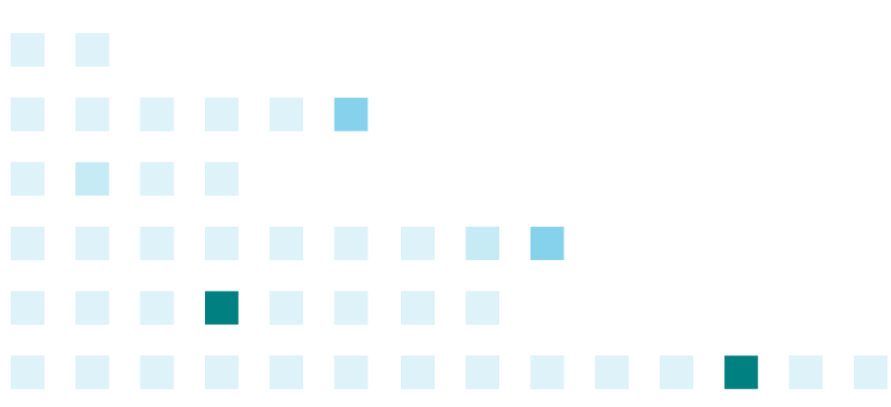
Figure legend

■ ■ ■ Highest determined MIC
●/● No outline: 1g vancomycin/batch (group A)
●/● Red outline: 2g vancomycin/batch (group B)
○ ○ ○ Spacer thickness
○ Thin
○ Medium
○ Thick
One outlier (hip 2g: 61 days; 266.2 mg/L) is not shown to improve readability.

Conclusions

Antibiotic-loaded spacers can achieve adequate bone concentrations up to 16 weeks after spacer implantation. Doubling the vancomycin dosage to 2g did not increase bone concentrations.

References: [1] Koch BCP et al. *Expert Opin Drug Metab Toxicol.* 2022;18(9):587-600. [2] EUCAST MIC distributions and ECOFFs (<https://mic.eucast.org>).



Questions or ideas? Contact us!

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