

## The bone cement mantle creates a stable connection between the bone and the prosthesis

Bone cement made of PMMA is not a glue. It has no chemically adhesive properties but creates a mechanical connection between two boundary surfaces. In arthroplasty, bone cement forms a boundary layer with the prosthesis as well as with the bone. The bone cement layer around the endoprosthesis is also referred to as a bone cement mantle.

### Criteria for an optimal bone cement mantle:

#### ■ 'Intactness' of the interfaces

Debris, fat, blood or liquid films prevent a closed boundary layer. When manually applying bone cement, do not work with damp or bloody gloves.

#### ■ Complete bone cement mantle

The bone cement mantle should enclose the entire hip stem (hip arthroplasty) and the entire underside of the tibia (knee arthroplasty) because both parts are exposed to high mechanical loads. The porosity of the bone cement mantle due to the inclusion of air bubbles should be as low as possible to avoid fatigue fractures and cracks in the bone cement. This is achieved by mixing the bone cement under vacuum.

#### ■ Minimum thickness of the bone cement mantle for hips

The bone cement mantle should have a minimum thickness of 2–3 mm. If the mantle thickness is less than 2 mm the likelihood of bone cement fractures increases.

#### ■ Minimum thickness of the bone cement mantle for knee

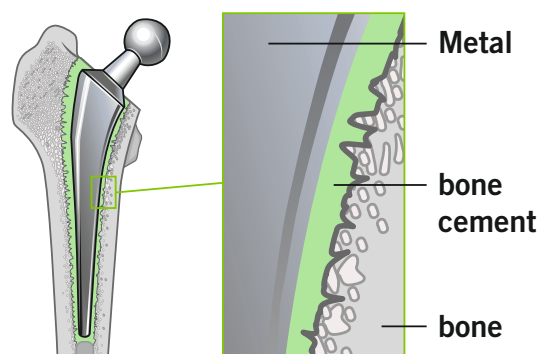
The bone cement mantle below the tibia should be between 3 and 5 mm to prevent micro-movements with high mechanical load. This can be achieved by additional application of pressure on the bone cement by using a knee pressuriser.

#### ■ Application of pressure (pressurisation) of the bone cement

The application of pressure with the bone cement gun improves the penetration of the bone cement into the cancellous bone tissue. In hip arthroplasty it should be dosed depending on the patient's health and bone status. In knee arthroplasty a relatively high penetration depth of the bone cement is important, particularly for anchorage of the prosthesis in the tibia.

#### ■ Limits of the bone cement layer

Avoid a bone cement penetration of more than 5 mm as it may trigger heat necrosis and negatively affects osteocyte viability. Heat necroses can be seen in the X-ray imaging as radiolucent lines. Lines that enlarge over time may lead clinically to micro-movements of the implant and are considered indications for loosening.



*The interdigitation of the bone cement and the bone is carried out by the penetration of the bone cement into the bone bed. On the side of the prosthesis, a frictional connection is created through pressure.*

### Setting Phase Intervention

The implant should be kept immobilized during the Setting Phase. Stability or range of motion (ROM) must not be assessed until the bone cement is completely hardened.

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