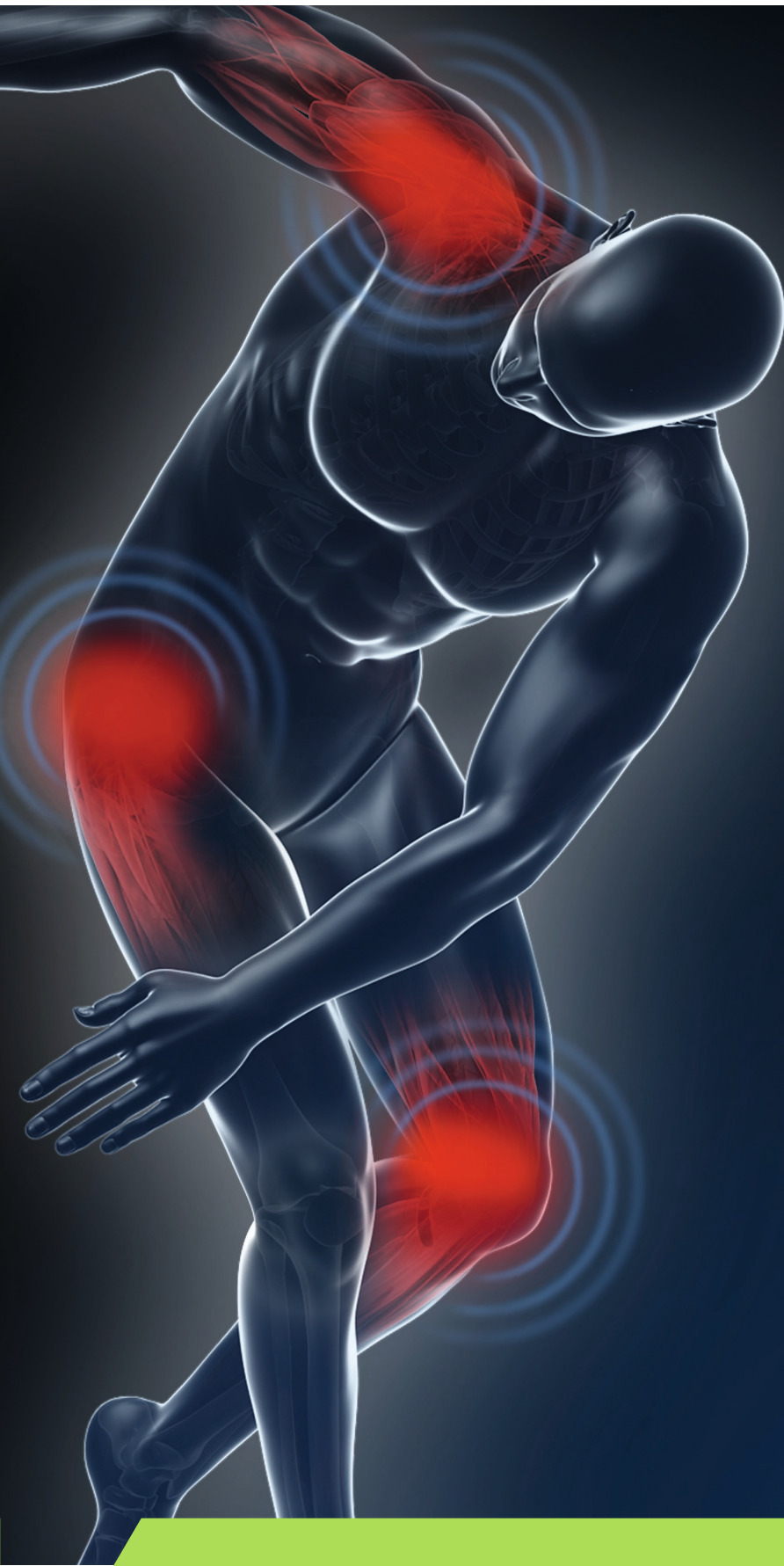


Heraeus



COPAL[®]

Preventing and reducing
periprosthetic joint infections

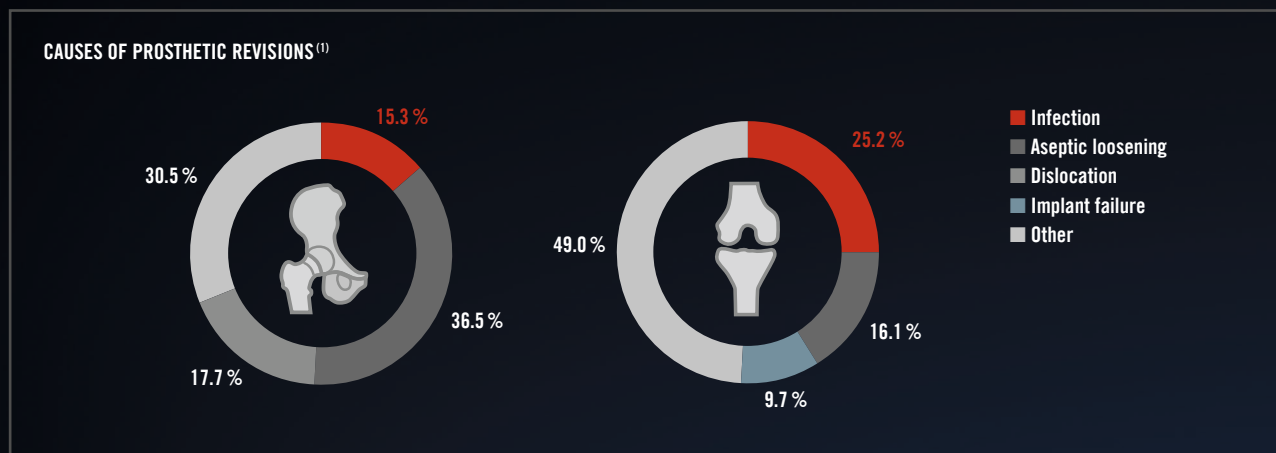


PERIPROSTHETIC JOINT INFECTION

Rising numbers of revisions

A higher life expectancy and surgery in younger patients is leading to an increasing number of revision procedures. These revisions are commonly caused by periprosthetic joint

infections (PJI) as well as aseptic loosening. These are serious complications that affect the treatment algorithm, the patient and the healthcare system.⁽¹⁻³⁾



Burdens for the hospital...



- The costs of a septic revision (hip & knee) exceed the refund at least two fold.⁽⁴⁻⁶⁾
- Due to increasing numbers of revisions, the cost issue will become increasingly important.⁽⁷⁾
- Choosing the right antibiotic-loaded bone cement is the key to long-term success.⁽⁸⁾

...and the patient



- Extended down time
- Subsequent operations
- Mortality⁽⁹⁾
- Reduction in the quality of life due to
 - incipient loss of mobility
 - loss of autonomous life choices

⁽¹⁾ Otto-Lambertz C. et al. Dtsch Arztebl Int 2017.

⁽²⁾ Wengler A. et al. Dtsch Arztebl Int 2014.

⁽³⁾ Kurtz S. et al. J Bone Joint Surg Am. 2007.

⁽⁴⁾ Haenle M. et al. Scientific World Journal. 2012.

⁽⁵⁾ Haenle M. et al. Orthopäde. 2012.

⁽⁶⁾ Vanhegan IS. et al. J Bone Joint Surg Br. 2012.

⁽⁷⁾ Wirtz DC. et al. Orthopäde. 2009.

⁽⁸⁾ Sprowson AP. et al. Bone Joint J. 2016.

⁽⁹⁾ Arch Osteoporos (2013) 8:136.

Michael Stenvall: J Rehabil Med 2007; 39: 232-238; DOI: 10.2340/16501977-0045.
Robert Koch-Institut (Hrsg) (2002) Gesundheit im Alter. Gesundheitsberichterstattung des Bundes Heft 10. Robert Koch-Institut, Berlin

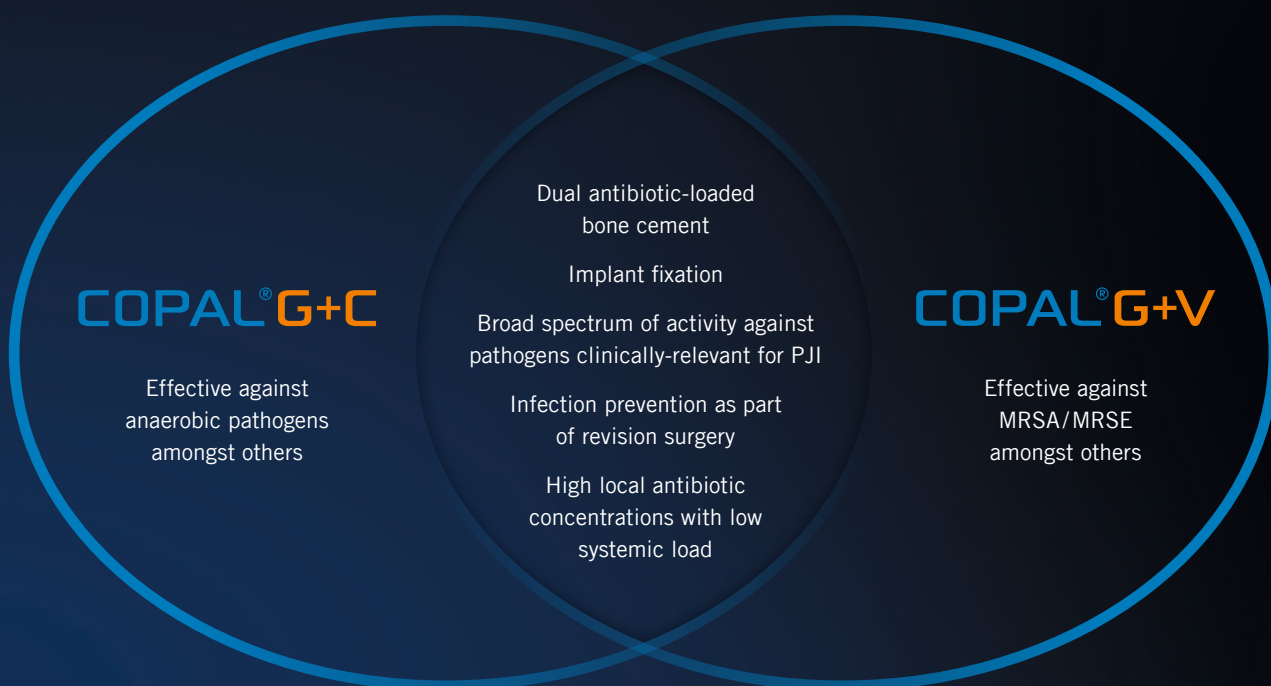
COPAL® – SUCCESSFUL AGAINST INFECTION

For patients at risk of infection & for revision surgery

Choosing the right treatment algorithm is an essential factor for successfully preventing and reducing periprosthetic infections. For revisions – whether one-stage with good soft tissue conditions and known sensitive pathogens or two-stage with difficult soft tissue conditions and unknown resistant pathogens – the effectiveness of the therapy is increased by using antibiotic-loaded bone cement.⁽¹⁰⁾

Heraeus provides support for therapy with COPAL® bone cement and COPAL® knee moulds to fabricate articulating knee spacers. COPAL® bone cements also help with primary procedures at an increased risk of infection due to comorbidity or as a result of a femoral neck fracture as a trauma case.⁽¹¹⁾

COPAL® bone cements offer:



⁽¹⁰⁾ Sprowson AP, et al. Bone Joint J. 2016.

⁽¹¹⁾ Engesaeter in Wahlenkamp. Local Antibiotics in arthroplasty. 2007, p. 152.

INCREASED RISK OF INFECTION ALSO FOR PRIMARY PROCEDURES

Comorbidity and traumatic incident

The risk of infection after primary implantation of a hip or knee prosthesis is 1% and 2% respectively.⁽¹²⁾

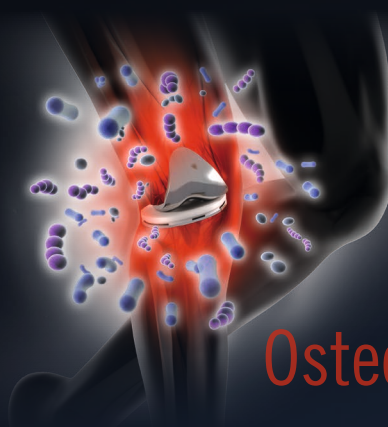
Comorbidities and attendant circumstances may increase the individual risk of infection.⁽¹³⁻¹⁵⁾

Hypertension

Mobility

Diabetes

Gender



Dementia

Smoking

Excess weight

Kidney disease

Osteoporosis

Mortality and morbidity as a consequence of femoral neck fracture

Older, frail patients are more commonly affected by femoral neck fractures. Every femoral neck fracture is associated with risk for patients.⁽¹⁶⁻¹⁸⁾

For patients with limited mobility and reduced general health, hemiarthroplasty is one therapy option after a femoral neck fracture. It achieves good clinical and functional results with short surgery times and rapid postoperative mobilisation.

~ **6%** perioperative mortality during hospitalisation

~ **30%** mortality within a year

Only up to **40%** recover their previous competence in basic everyday activities

⁽¹²⁾ Convec S. et al. Int J Artif Organs. 2012.

⁽¹³⁾ Malchau H. et al. J Bone Joint Surg Am. 2002.

⁽¹⁴⁾ Engesaeter LB. et al. Acta Orthop Scand. 2003.

⁽¹⁵⁾ Josefsson G. et al. Clin Orthop Relat Res. 1993.

⁽¹⁶⁾ Carpintero P. et al. World J Orthop. 2014.

⁽¹⁷⁾ Wijeratna MD. et al. Ann R Coll Surg Engl. 2015.

⁽¹⁸⁾ Sprowson AP. et al. Bone Joint J. 2016.

DUAL ANTIBIOTIC-LOADED BONE CEMENT REDUCES THE RATE OF INFECTIONS AFTER FEMORAL NECK FRACTURE

The use of COPAL® G+C for femoral neck fractures significantly lowers the risk of infection in patients with cemented hip arthroplasty. This was the conclusion of

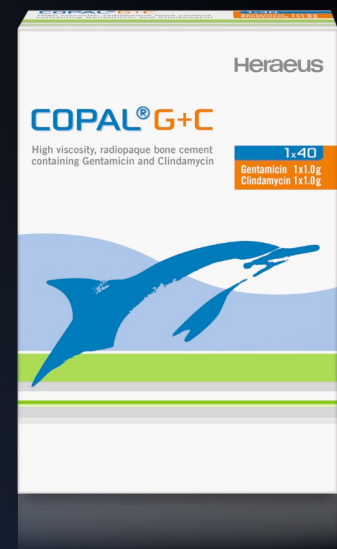
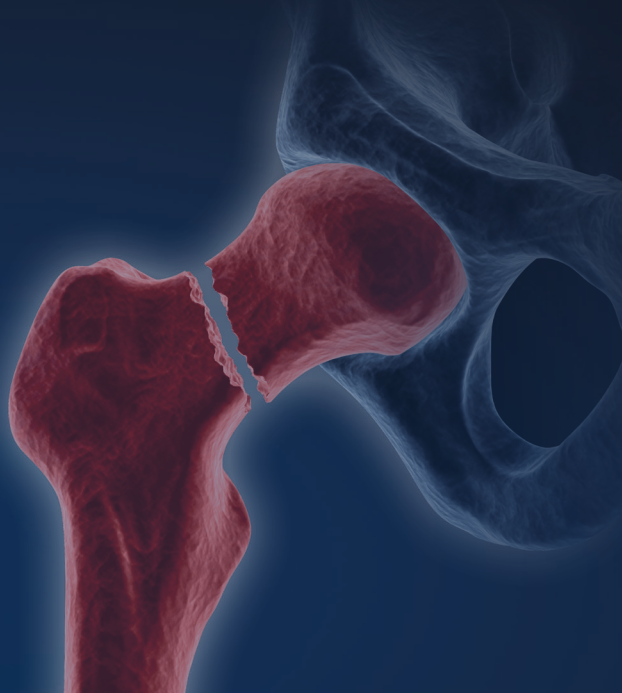
a double-blind, two-arm, quasi-randomised study of 848 patients that recommended the use of high dose dual antibiotic-loaded bone cement.⁽¹⁹⁾

INFECTION RATE DEEP SSI (IN %)

- Low dose single antibiotic-loaded bone cement
- High dose dual antibiotic-loaded bone cement



69% lower rates of infection in patients with high dose dual antibiotic-loaded bone cement



⁽¹⁹⁾ Sprowson AP, et al. Bone Joint J. 2016.

INFECTION – CAUSE AND POSSIBLE CONSEQUENCE OF THE REVISION

Microbial diagnostics as the basis of treatment

A common cause of revisions is septic loosening due to a periprosthetic infection. Correctly identifying the pathogen responsible is essential for choosing the appropriate antibiotic – both systemic and local. Depending on the spectrum

of pathogens, COPAL® bone cements support the outcome of the treatment for septic revision. COPAL® bone cement combined with COPAL® knee moulds is an effective solution, particularly with the use of knee joint spacers.

| Microorganism | Prevalence |
|----------------------------------|------------|
| Coagulase-negative staphylococci | 30–43 % |
| Staphylococcus aureus | 12–23 % |
| Streptococci | 9–10 % |
| Enterococci | 3–7 % |
| Gram-negative bacteria | 10–17 % |
| Anaerobic bacteria | 2–4 % |
| Candida spp. | 1–3 % |
| Polymicrobial | 10–20 % |
| Unknown (false negative culture) | 10–30 % |

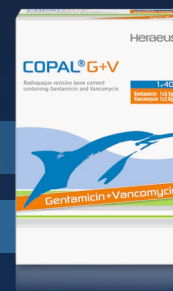
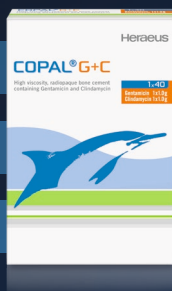
COPAL® G+C

COPAL® G+V

Primary/Trauma

One-stage exchange

Two-stage exchange



- Broadly effective spectrum of activity, including against anaerobic bacteria
- Contains 1.0g gentamicin and 1.0g clindamycin

- Effective against MRSA/MRSE amongst others
- Contains 0.5g of gentamicin and 2g of vancomycin

COPAL® SPECTRUM OF PATHOGENS*

| | Gentamicin | Clindamycin | Vancomycin |
|---|------------|-------------|------------|
| Coagulase-positive staphylococci (CoPS) (GRAM +) | | | |
| Staphylococcus aureus (MSSA) | ✓ | ✓ | ✓ |
| Staphylococcus aureus (MRSA) | | | ✓ |
| Coagulase-negative staphylococci (CoNS) (GRAM +) | | | |
| Staphylococcus epidermidis (MSSE) | ✓ | ✓ | ✓ |
| Staphylococcus epidermidis (MRSE) | | | ✓ |
| Streptococcus spp. (GRAM +) | | | |
| Streptococcus pneumoniae | | ✓ | ✓ |
| Streptococcus pyogenes | | ✓ | ✓ |
| Streptococcus agalactiae | | ✓ | ✓ |
| Enterococcus spp. (GRAM +) | | | |
| Enterococcus faecalis | ✓ | | ✓ |
| Enterococcus faecium | ✓ | | ✓ |
| Enterococcus spp. (VRE) | ✓ | | |
| Enterobacteriaceae spp. (GRAM -) | | | |
| Escherichia coli | ✓ | | |
| Enterobacter spp. | ✓ | | |
| Klebsiella spp. | ✓ | | |
| Proteus mirabilis | ✓ | | |
| Serratia spp. | ✓ | | |
| Other (GRAM -) | | | |
| Pseudomonas aeruginosa | ✓ | | |
| Anaerobic bacteria (GRAM +) | | | |
| Clostridium difficile | | | ✓ |
| Clostridium perfringens | | | ✓ |
| Cutibacterium acnes | | ✓ | |

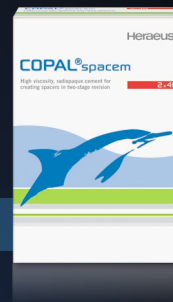
*Please check the antibiogram

COPAL® knee moulds



- For simple fabrication of temporary articulating spacers
- Can be combined with COPAL® bone cement

COPAL® spacem



- Low-wearing bone cement for the fabrication of spacers

| COPAL® | Description | Contents | REF |
|--------------------|---|-------------|----------------------------------|
| COPAL® G+C | High-viscosity, radiopaque bone cement with gentamicin and clindamycin | 1 x 40 | 66017790 |
| COPAL® G+V | High-viscosity, radiopaque bone cement with gentamicin and vancomycin | 1 x 40 | 66038973 |
| COPAL® spacem | High-viscosity, radiopaque special bone cement for the manufacture of spacers | 2 x 40 | 66038972 |
| COPAL® knee moulds | Moulds for temporary knee spacers | S M L | 66058094 66058095 66058096 |

Simply order from Heraeus.

www.heraeus-medical.com