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**Interbody Fusion**  
Implants with PEEK core  
and PLASMAPORE<sup>XP</sup><sup>®</sup>  
titanium coating

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SPINE SURGERY

AESCULAP<sup>®</sup> XP  
THE CHOICE OF EXPERTS



PEEK + TITANIUM  
AESCULAP® XP

## Built on eXperience

AESCULAP®, as a pioneer in the manufacture of high-quality hip implants, introduced the PLASMAPORE® titanium coating on the Bicontact® hip prosthesis as early as 1986. In 1995, AESCULAP® introduced the first PLASMAPORE®-coated titanium implant for posterior fusion – the PROSPACE® Titanium.

The AESCULAP® XP product line is therefore the result of 20 years of innovation in spinal column technology and over 30 years of successful use of the PLASMAPORE® coating on titanium orthopedic and spinal implants (1-4).

## eXPanding possibilities

The longterm experience with the PLASMAPORE® coating on titanium implants provided the impetus for thinking of new material compositions as well (1-4). Combining the PLASMAPORE® coating with a PEEK-OPTIMA® (3) core was a big technical challenge we undertook to bring together the advantages of both technologies in a single product. In a complex procedure, the cores of all AESCULAP® XP products are coated on the top and bottom, as well as on the side surfaces, with PLASMAPORE<sup>XP</sup>®, a porous, osteoconductive and biocompatible pure titanium coating (5).

Arcadius<sup>XP</sup> C<sup>®</sup>



CeSPACE<sup>®</sup> XP



TSPACE<sup>®</sup> XP



PROSPACE<sup>®</sup> XP



Arcadius<sup>XP</sup> L<sup>®</sup>



## Excellent qualities

AESCULAP<sup>®</sup> XP products combine the advantages of the PEEK material with the proven qualities of a titanium coating and as a result provide the following properties (5–10):

- High primary stability due to the roughened surface, which provides an increased migration resistance and mechanical strength (5, 17)
- A modulus of elasticity, which is very close to the modulus of elasticity of cortical bone, to reduce implant subsidence (7, 8, 11, 14)
- High secondary stability due to the potential ingrowth of bone cells into the PLASMAPORE<sup>XP</sup><sup>®</sup> structure (5)
- Good imaging properties (13, 16)

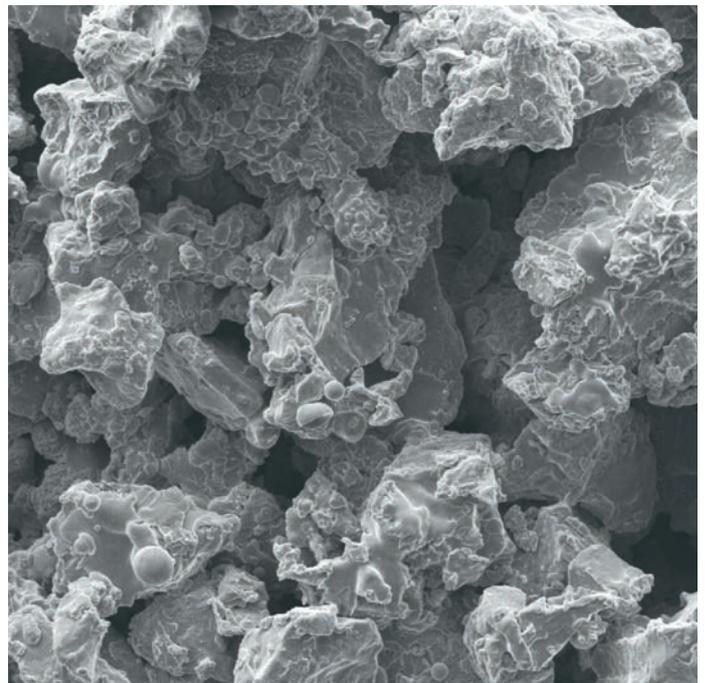
PLASMAPORE<sup>XP</sup><sup>®</sup> structure under the microscope (magnification: 1000 x)

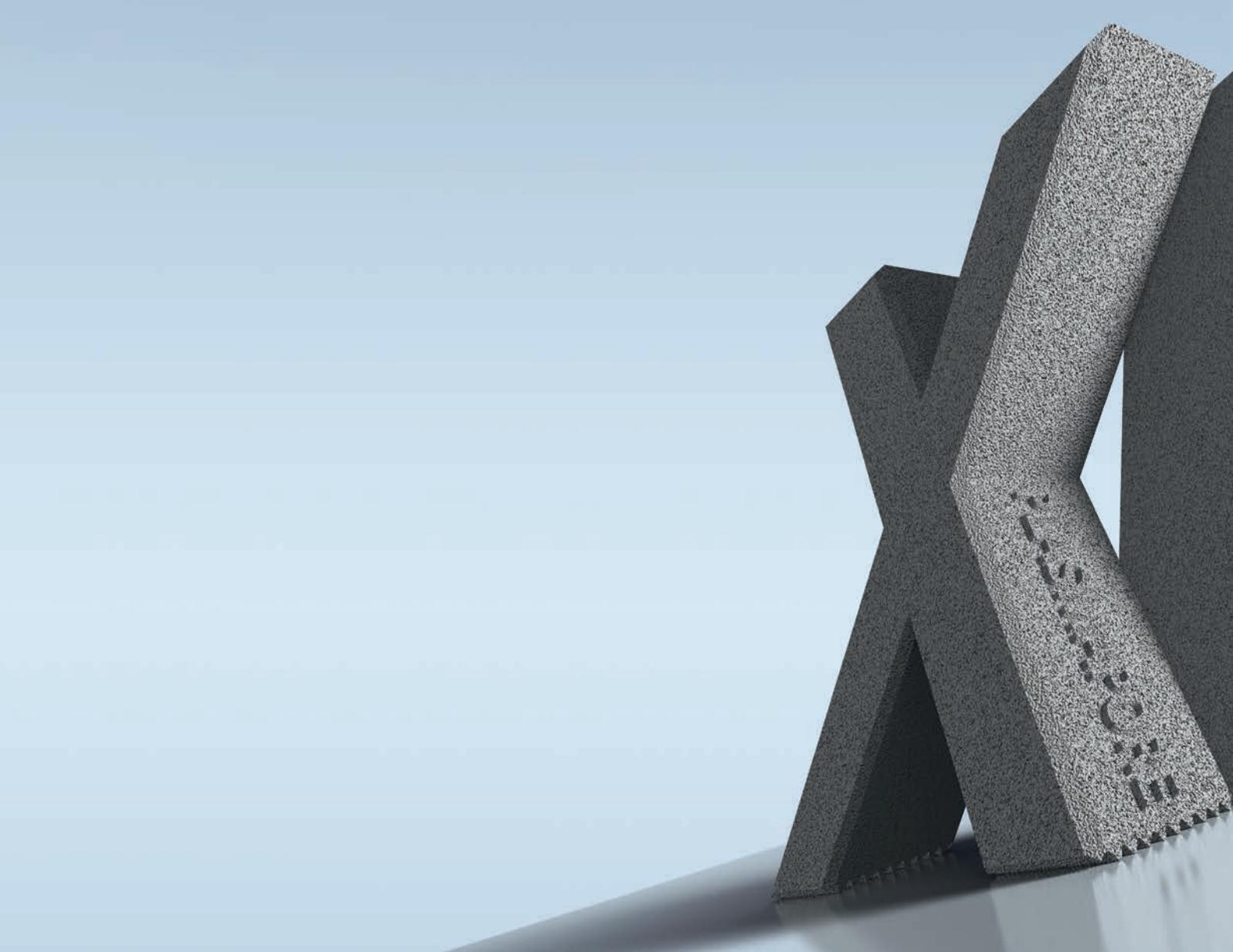
## The choice of eXPerts

A success story already:

Over 100 000 (Dec. 2021) AESCULAP<sup>®</sup> XP products have been implanted by spinal column eXPerts worldwide to date.

AESCULAP<sup>®</sup> XP. The choice of eXPerts.





# STABILITY

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HIGH PRIMARY STABILITY (5, 17)

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Porosity of up to 60% enables very good contact with the bone (5)

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Good migration resistance (8)

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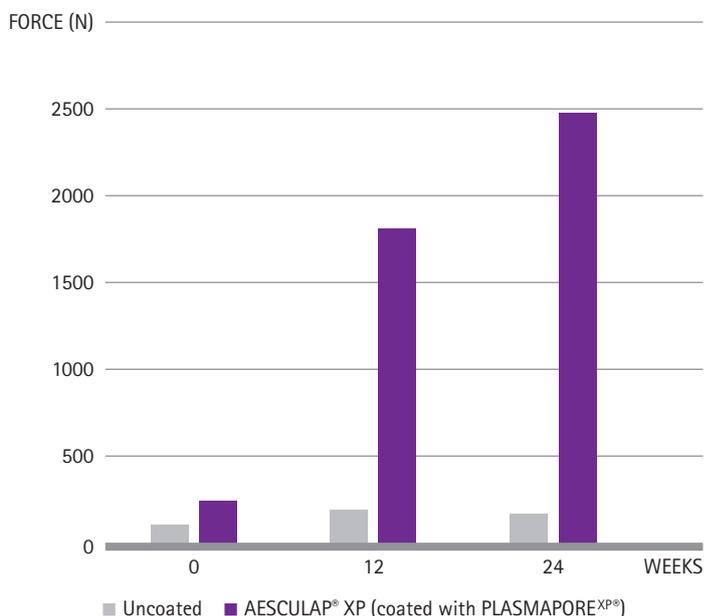


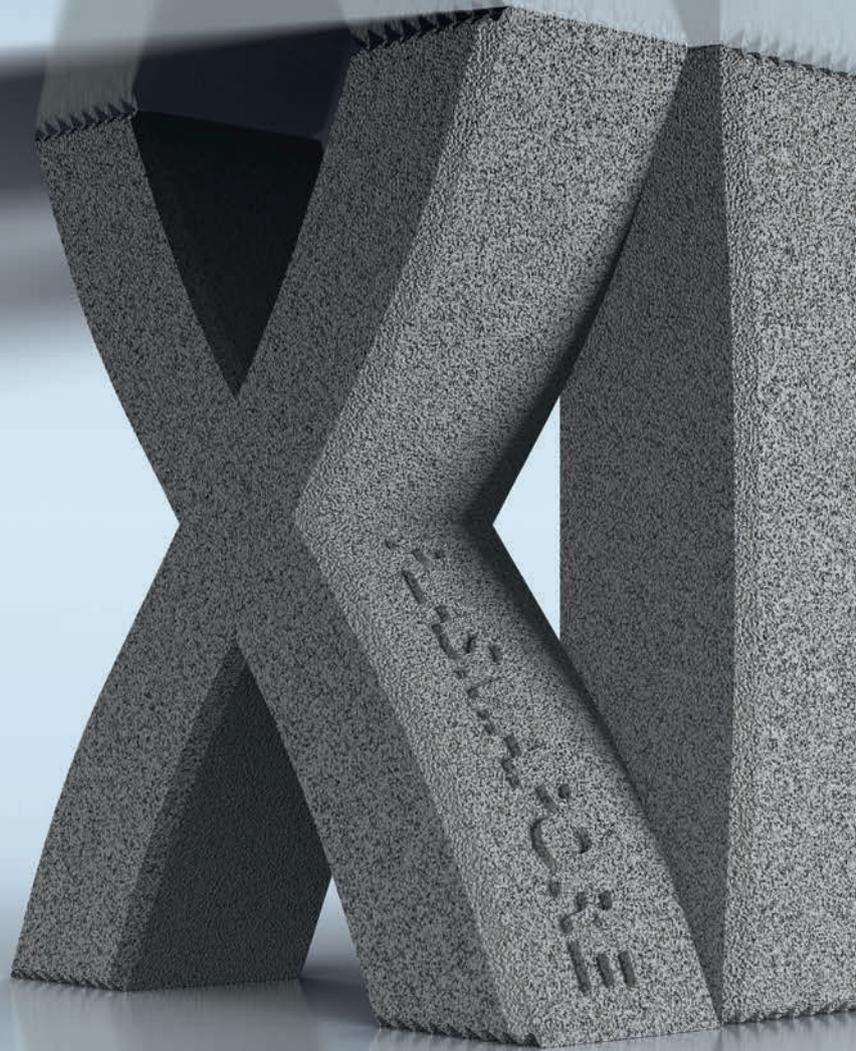
A study has shown that AESCULAP® XP implants have far higher primary stability than PEEK implants, even immediately after implantation (5). For this study, AESCULAP® XP implants and PEEK implants were implanted into sheep bone and the force required to pull these implants out was then measured at specific time points.

Even immediately after implantation, it was observed that a much greater force was required to pull out AESCULAP® XP implants than to pull out the comparator PEEK implants. After 12 weeks the force required to pull out the AESCULAP® XP implants was already 6 times higher than the force required to pull out the PEEK implants. This effect became more pronounced to the extent that the pullout strength after 24 weeks had increased to be 9 times greater than the pullout strength of the comparator PEEK implants.

Study results show: Right from the start, more force is required to pull out AESCULAP® XP implants than PEEK implants. After 24 weeks, the pullout strength of AESCULAP® XP implants was 9 times higher than that of uncoated PEEK implants.

Biomechanical pullout strength and histology of AESCULAP® XP PLASMAPORE<sup>XP</sup> coated implants (5).





# ELASTICITY

## MODULUS OF ELASTICITY

Elasticity close to cortical bone material (7, 8, 11, 14)

Reduces implant subsidence into the vertebral body (8)

Prevention of stress-shielding effects (7, 8, 11, 14)

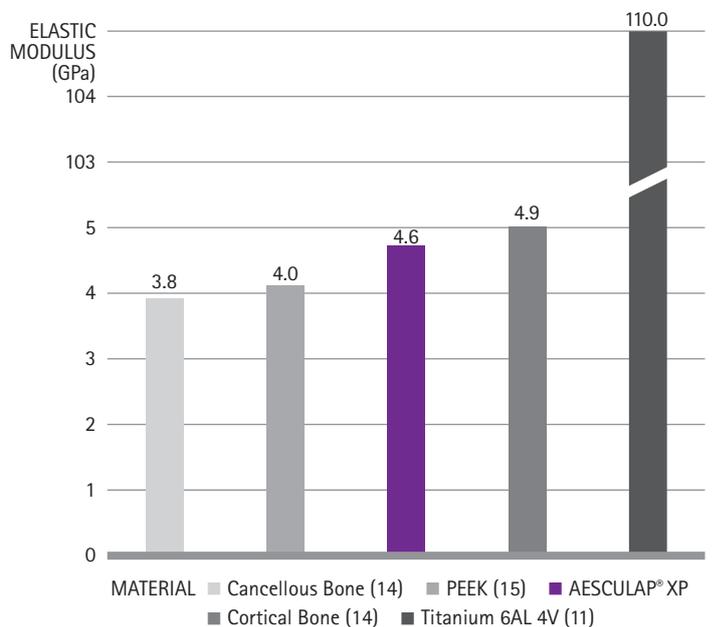


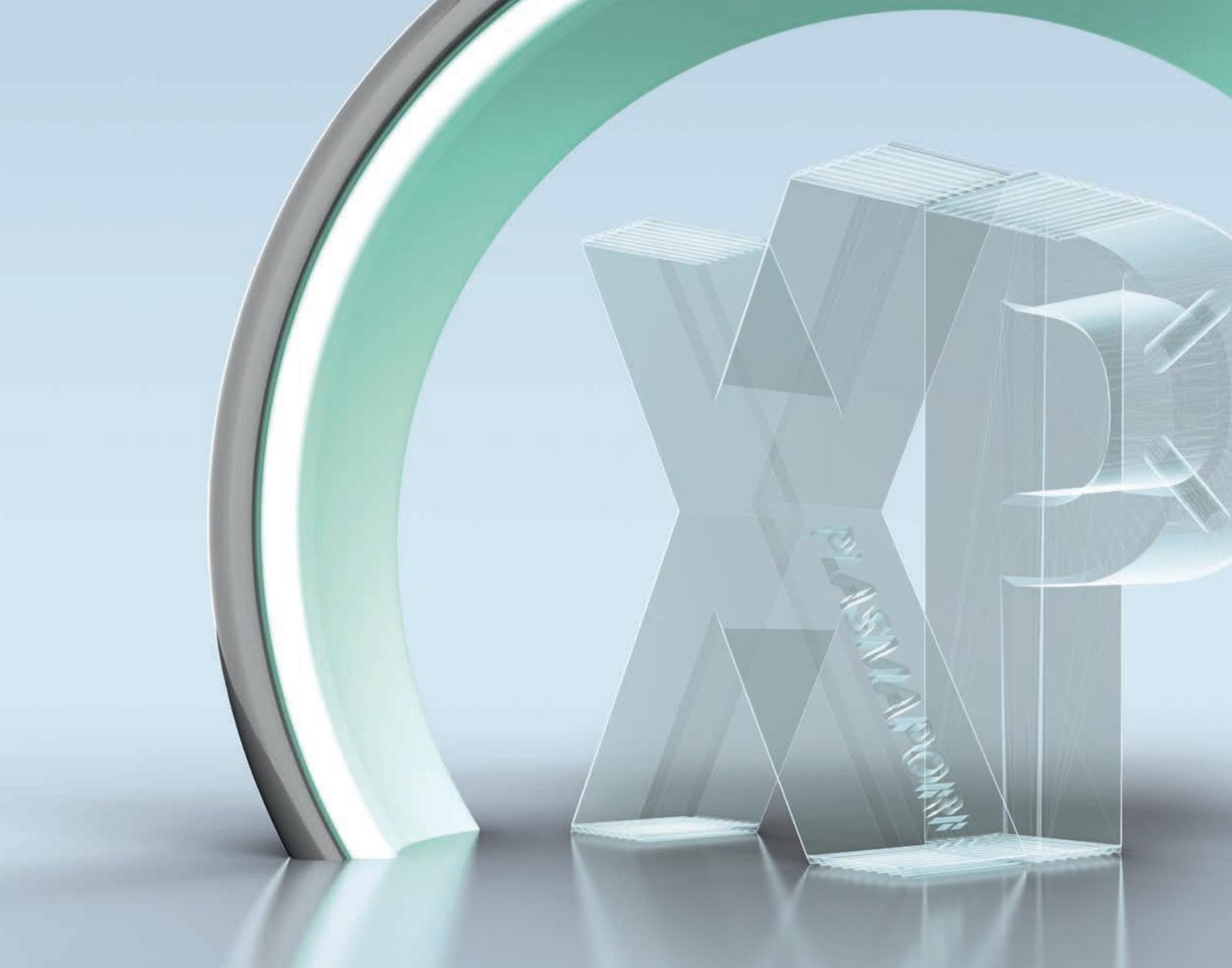
All implants in the AESCULAP® XP product line are based on a PEEK core. This gives the implants a low modulus of elasticity (E-modulus) that is close to the E-modulus of cortical bone (7, 8, 11, 14).

In order to prevent subsidence of the implant into the vertebral body, which might occur with relatively rigid titanium implants, the XP implants have an elasticity similar to that of bone (8). However, the advantages of a porous coating, in comparison to a plain PEEK implant, can be kept.

In addition, the low E-modulus may result in improved bone growth due to the isoelasticity of AESCULAP® XP, as bone, to remain strong, must be dynamically loaded (12).

The modulus of elasticity of AESCULAP® XP implants is close to the modulus of elasticity of cortical and cancellous bone (7, 8, 11, 14, 18).





# V I S I B I L I T Y

GOOD QUALITIES FOR IMAGING (13, 16)

Clear delineation of the implant contours (13, 16)

No or minor artifacts in CT scans (13, 16)

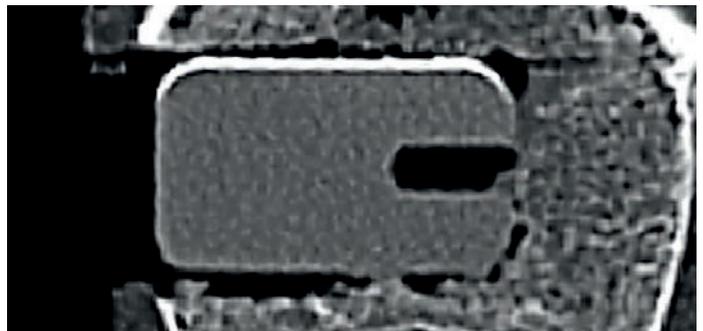
Assessment of bones/soft tissue and fusion progress (13, 16)



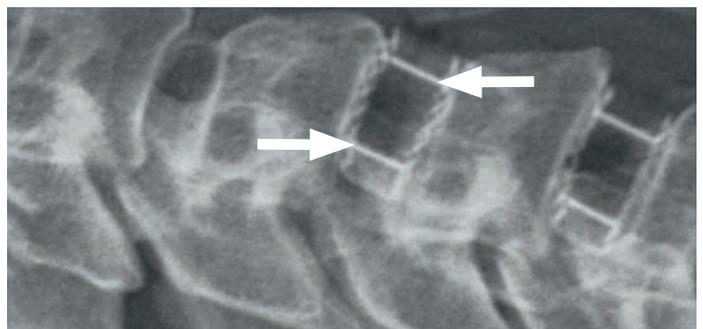
AESCULAP® XP has good imaging properties. This is made possible by the radiolucent PEEK core and the thin PLASMAPORE<sup>XP</sup> coating. This means the implant contours can be clearly seen in X-rays, depending on the X-ray system used and the patient's physical condition (e.g. obese patients) (13, 16).

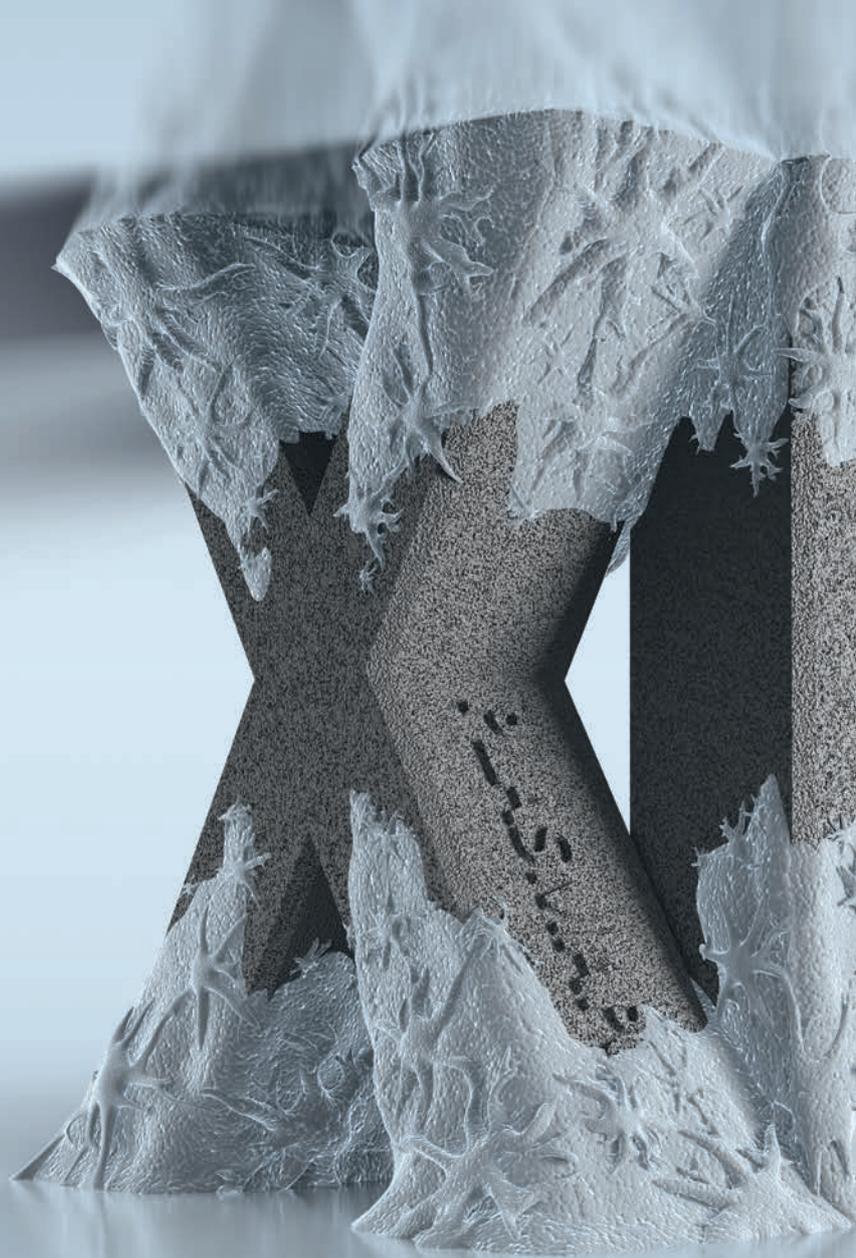
Because of the low artifact formation in CT scans, the surrounding tissue and bone fusion progress can be assessed post-operatively (13, 16).

Trial of a test sample with an AESCULAP® XP implant in a CT scan: The use of radiolucent materials prevents artifact formation. This enables surgeons to assess the structures around the implant, even post-operatively, using existing procedures (successful fusion, changes to the tissue, etc.). The image shows that the surrounding bone structure is well visible up to the border of the implant.



X-ray markers are integrated into all the systems for additional support when positioning the device. The contours of the implant and the X-ray markers for positioning are clearly visible in the X-ray on the right of the AESCULAP® CeSPACE® XP implant.





# CONNECTION

PLASMAPORE<sup>XP</sup>® SURFACE

Biocompatibility (5)

Solid osseointegration through rapid bone cell apposition (5)

High secondary stability (5)



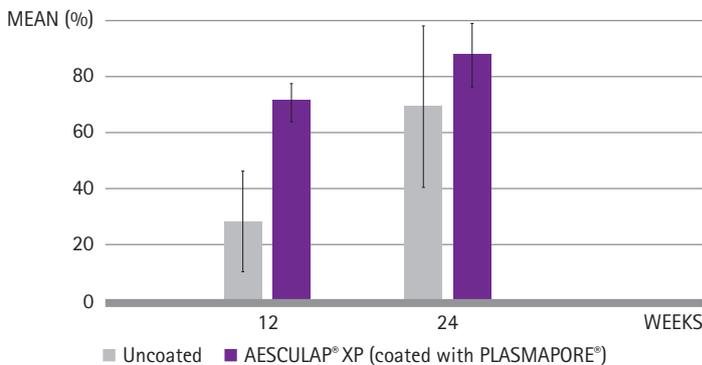
The osteoconductive, porous PLASMAPORE<sup>®</sup> XP surface facilitates bone ingrowth into the structure of the AESCULAP<sup>®</sup> XP implant. The bone ingrowth behavior at the implant surface was proven in animal testing in sheep models (5). For this, an PLASMAPORE<sup>XP</sup><sup>®</sup> implant and an uncoated PEEK implant were used in each test object.

The histological examination of the objects after 12 and 24 weeks showed osseointegration with the AESCULAP<sup>®</sup> XP implants at both time points.

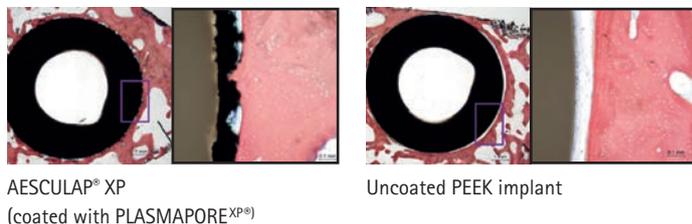
The bone apposition percentage was significantly higher with the coated implants than with the PEEK implants at both time points. In addition, better bone healing and a minimization of fibrous tissue formation was observed with the AESCULAP<sup>®</sup> XP implants.

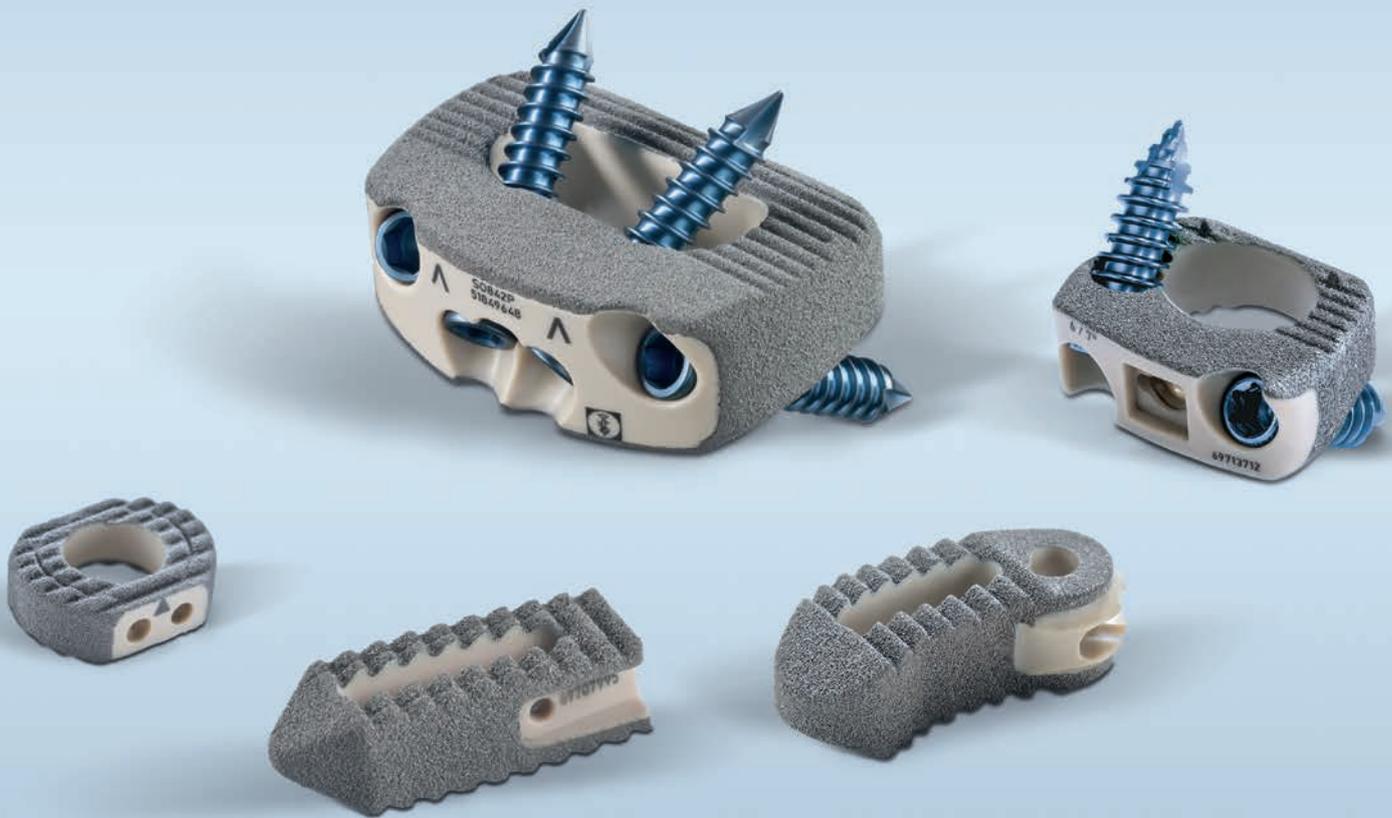
With a porosity of up to 60%, the PLASMAPORE<sup>XP</sup><sup>®</sup> surface of the AESCULAP<sup>®</sup> XP implants provides an especially developed combination of micro- and macro structures, in order to facilitate bone growth right from the start.

Percentage of bone apposition by time and implant type (5).



The histological data show significant bone ingrowth and adhesion with the AESCULAP<sup>®</sup> XP implants after 24 weeks. In comparison, increased fibrous tissue was observed at the contact points of the uncoated PEEK implants (5).





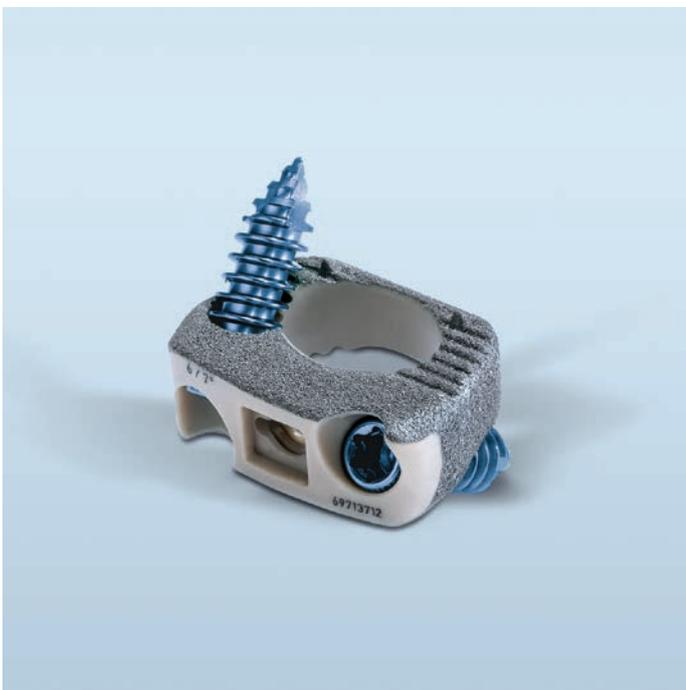
## AESCULAP® XP PRODUCT RANGE

The AESCULAP® XP product range includes both cervical and lumbar interbody implants.

In addition to the good properties resulting from the combination of the PLASMAPORE<sup>XP</sup>® surface with a PEEK core, the products also offer the following advantages:

- Specifically designed (13, 16) and clearly arranged instrument sets
- A wide variety of sizes for individualized patient care

## THE CHOICE OF EXPERTS



### AESCULAP® Arcadius<sup>XP</sup> C®

Stand-alone system for anterior cervical fusion with innovative surface technology.

#### KEY FEATURES

- Stand-alone system avoiding supplementary fixation systems.
- Zero-Profile design.
- Dual locking mechanism with single step activation.
- Integrated spikes.



### AESCULAP® CeSPACE® XP

Anterior cervical system for interbody fusion with innovative surface technology.

#### KEY FEATURES

- Anatomical shape and serrated profile for implant fit.
- Increased ratio between contact area and opening.
- Option of filling with bone or bone substitute to enhance bone bridging.
- Clamping mechanism allows a firm connection to inserter.

## THE CHOICE OF EXPERTS



### AESCULAP® TSPACE® XP

Transforaminal lumbar interbody fusion (TLIF) system with innovative surface technology.

#### KEY FEATURES

- Bulleted nose to facilitate implant insertion.
- Specially designed interface to allow connection with articulating inserter.
- Adequate range of sizes to enable the choice of implant size to fit the patient.
- Option of filling with bone or bone substitute to enhance bone bridging.
- Articulating interbody inserter available.



### AESCULAP® PROSPACE® XP

Posterior lumbar interbody fusion (PLIF) system with innovative surface technology.

#### KEY FEATURES

- Anatomical shape and bulleted nose facilitate implantation and fit.
- Clamping mechanism for connection with inserter.
- Adequate range of sizes to enable the choice of implant size to fit the patient.
- Option of filling with bone or bone substitute to enhance bone bridging.



## AESCULAP® Arcadius<sup>XP</sup> L®

Stand-alone system for anterior lumbar interbody fusion (ALIF)  
with innovative surface technology

### KEY FEATURES

- Midline accessibility for screw insertion.
- Diverging screw design.
- Dual locking mechanism.
- Self-centering, self-drilling and self-tapping bone screws.

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A radiological visibility test was performed using a PEEK implant sample coated with vacuum plasma spray (VPS) titanium. The sample was implanted in a adjacent vertebral body segment of a human spine specimen. Results show that the VPS coating on PEEK substrate increases the visibility of the implant in X-ray and CT images. Artefacts were also not observed in the X-ray and CT.
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# AESFULAP® – a B. Braun brand

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