AESCULAP® XP
THE CHOICE OF EXPERTS

Interbody Fusion
Implants with PEEK core and Plasmapore XP®
titanium coating
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.\(^1,2\)

**Built on eXPerience**

The excellent experiences with the Plasmapore coating on titanium implants\(^1,2\) provided the impetus for thinking of new material compositions as well. 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 XP, a porous, osteoconductive and biocompatible pure titanium coating.\(^4,5\)

**eXPanding possibilities**
Excellent qualities

Aesculap XP products combine the advantages of the PEEK material with the excellent qualities of a titanium coating and as a result provide the following properties:

- High primary stability due to the roughened surface, which provides an increased migration resistance and mechanical strength\(^5\)
- A modulus of elasticity, which is very close to the modulus of elasticity of cortical bone, to reduce implant subsidence\(^6,7,8,9\)
- High secondary stability due to the potential formation of bone cells in the Plasmapore XP structure\(^4\)
- Excellent imaging properties

The choice of eXPerts

A success story already:
Over 20,000 (as of April 2016) Aesculap XP products have been implanted by spinal column eXPerts worldwide to date.

Aesculap XP. The choice of eXPerts.
HIGH PRIMARY STABILITY

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

High initial stability (primary stability$^5$)

Improved long-term migration resistance$^5$
A study has shown that Aesculap XP implants have far higher primary stability than PEEK implants, even immediately after implantation. 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.

Biomechanical pullout strength and histology of Aesculap XP Plasmapore XP coated implants.
EXPECT MORE
ELASTICITY

IMPROVED MODULUS OF ELASTICITY

Elasticity close to natural bone material
Reduces implant subsidence into the vertebral body
Prevention of stress-shielding effects
Long-term fixed implant position
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.\textsuperscript{7,8,9} Having an elasticity similar to that of bone can prevent subsidence into the vertebral body, which can occur with coated, somewhat rigid titanium implants.\textsuperscript{6} 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, bone must be dynamically loaded.\textsuperscript{11}

The modulus of elasticity of Aesculap XP implants is close to the modulus of elasticity of cortical and cancellous bone.
EXCELLENT QUALITIES FOR IMAGING

Clear delineation of the implant contours

No or minor artifacts in CT and MRI scans

Quick assessment of bones/soft tissue and fusion progress
Aesculap XP has excellent imaging properties. This is made possible by the radiolucent PEEK core and the thin Plasmapore XP 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).

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

Trial of a test sample with an Aesculap XP implant in a CT scan:
The use of radiolucent materials prevents, to the greatest possible extent, 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.
PLASMAPORE XP SURFACE

Unique all around titanium surface

Biocompatibility

Solid osseointegration through rapid bone cell apposition

High secondary stability
The osteoconductive, porous Plasmapore XP surface facilitates bone ingrowth into the structure of the Aesculap XP implant. The exceptional bone ingrowth behavior at the implant surface was proven particularly impressively in animal testing in sheep models. For this, an Aesculap XP 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 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 XP implants.

With a porosity of up to 60%, the Plasmapore XP surface of the Aesculap XP implants provides an ideal frame for microstructures and macrostructures, in order to facilitate bone growth right from the start. This leads to early and long-term stability.

The histological data show significant bone ingrowth and adhesion with the Aesculap XP implants after 24 weeks. In comparison, increased fibrous tissue was observed at the contact points of the uncoated PEEK implants.
The Aesculap XP product range includes both cervical and lumbar interbody implants. In addition to the outstanding properties resulting from the combination of the Plasmapore XP surface with a PEEK core, the products also offer the following advantages:

- Intelligent implant design
- Sophisticated and clearly arranged instrument sets
- A wide variety of sizes for individualized patient care
THE CHOICE OF EXPERTS

AESCULAP® Arcadius XP 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 an well-adapted implant fit
- Increased ratio between contact area and opening
- Option of filling with bone or bone substitute to enhance bone bridging
- Simple in handling and clearly arranged instrument set
AESCULAP® PROSPACE®XP

PLIF - intervertebral implant for posterior lumbar interbody fusion

KEY FEATURES
- Bulleted nose for easier implantation especially in strongly degenerated segments
- Clamping mechanism with undercut for easy connection with the inserter
- Wide range of sizes for an individual patient treatment as for example 1 mm increments in height
- Enhanced ratio between contact area and opening

AESCULAP® TSPACE®XP

Transforaminal Lumbar Interbody Fusion System with Innovative Surface Technology

KEY FEATURES
- Intelligent implant design with bullet shaped nose for easier implantation
- Interface for safe and easy connection with articulating inserter
- A wide variety of sizes to better suit patient anatomics
- Increased ratio between contact area and opening
- New articulating interbody inserter for easy interbody positioning
REFERENCE:


3. PEEK-OPTIMA® is a registered trademark of Invibio Ltd.


10. Based on data provided by Fraunhofer MEVIS
