KURZ Middle Ear Prostheses

WELL-ESTABLISHED KNOWLEDGE OF THE MIDDLE EAR

The aim of reconstructing the ossicular chain is to create the natural function as closely as possible and conduct the incoming acoustic signal to the inner ear with minimal loss. The complex mechanics of acoustic sound transmission places high demands on the development of implants and calls for well-established knowledge of the middle ear. Furthermore, prostheses must have properties that facilitate implantation for the surgeon and help to minimize risks.

SOLUTIONS FOR EVERY SITUATION

KURZ covers the entire range of implants required for tympanoplasty and stapes surgery. In addition, the product line is rounded off by precision otological instruments and ventilation tubes.

INNOVATIVE DESIGNS AND MATERIALS

Innovative KURZ product designs and materials have set new standards in middle ear prosthetics throughout the world. For example, length adjustable prostheses can be shortened to a Functional Length of 0.75 mm. Clip prostheses standardize coupling to the incus or stapes. New types of ball-joint designs counterbalance the natural movements of the tympanic membrane and anatomically adapted bells create a secure connection to the stapes head. Furthermore, finely balanced weight distribution provides the prostheses with intraoperative stability.

These developments are based not only on well-established anatomical understanding but also on the latest results of scientific research and extensive test series. KURZ prostheses are available in numerous types and offer ideal solutions also in challenging anatomical situations.

MR information is available on www.kurzmed.com

IMPLANT MATERIALS AND PROCESSING

UTMOST CARE AND HIGHEST PRECISION

In order to achieve best possible results, the elegant design of the KURZ prostheses often probes the limits of feasibility. The manufacturing process of these prostheses requires highest precision and utmost care. Stringent inspections furthermore ensure compliance with highest quality standards.

INTENSIVE CLEANING PROCESS

All KURZ prostheses undergo an intensive cleaning process. The result is an extremely pure surface. This contributes toward ensuring irritation-free contact with the sensitive mucosa and helps to prevent inflammations and granulomas which can develop as a result of residues or dirt particles.

HIGH DEMANDS TO BE MET BY MATERIALS

For the production of their prostheses, KURZ uses only high-quality, clinically tested material: Due to its excellent biocompatibility titanium has since decades proven its worth as implant material. In addition, KURZ employs innovative nitinol variants which offer numerous clinically unique benefits.

MR SAFETY TESTS

MR safety tests also cover the compatibility of KURZ prostheses, as long-term implants, with potential future Tesla strengths (up to 7.0 T). For further MR-related information, see www.kurzmed.com

NITINOL

Nitinol was discovered in 1958 by the Naval Ordnance Laboratory (USA). The alloy is made up of nickel and titanium in roughly equal proportions. It is distinguished by good mechanical properties as well as high resistance to corrosion.

Nitinol can assume different properties: As a shape memory alloy, the metal is malleable and returns to its pre-programed state when heated. The NiTiBOND® makes use of this closing effect.

Nitinol can also be produced in a superelastic configuration. These properties have been utilized in the design of the NiTiFLEX. The clip attachment exhibits extreme spring elasticity and gently couples to the long process of the incus.

TITANIUM

KURZ uses only high-quality (ASTM F67, medical grade), pure titanium for its prostheses. The properties of this material grade are ideally suited due to its rigidity, weight and technical manufacturing possibilities. The biocompatibility of this metal is also suitable for long-term applications.

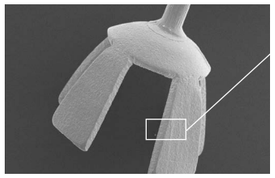
Thanks to its low mass, titanium is particularly suitable for the use in middle-ear prosthetics. Compared to other materials, it minimizes losses in connection with the transmission of sound energy. Moreover, the material is extremely resistant to deformation, while at the same time it can, if required, be adapted to individual anatomical situations by bending.

References:
Wirsching K., Lehle K., Jacob P., Gleich O., Strutz J., Kwok P.
Influence of Surface Processing on the Biocompatibility of Titanium.
Materials 2011, 4(7), 1238-1248; doi: 10.3390/ma4071238

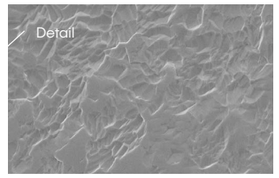
PURE TITANIUM (ASTM F67): CHEMICAL COMPOSITION

Element	Grade 1	Grade 2	Grade 3	Grade 4
Titanium (Ti)	99.48	99.31	99.19	98.94
Nitrogen (N)	0.03	0.03	0.05	0.05
Carbon (C)	0.10	0.10	0.10	0.10
Hydrogen (H)	0.0125	0.0125	0.0125	0.0125
Ferrite (Fe)	0.20	0.30	0.30	0.50
Oxygen (O)	0.18	0.25	0.35	0.40

Maximum cut-off grades in % (m/m)



**BELL after cleaning.
50 times magnification
(KURZ Prosthesis)**



**Titanium surface after cleaning.
1000 times magnification
(KURZ Prosthesis)**