

MAGNEZIX^{M3}

IT HELPS YOU GET FIT AGAIN, FASTER AND SAFER

**THE IMPLANT THAT TURNS INTO BONE - MAGNEZIX[®] OBVIATES
THE NEED FOR A SECOND OPERATION TO REMOVE METAL IMPLANTS**



Intelligent innovations for a better life.
www.syntellix.com

 SYNTELLIX

DOCTORS AND PATIENTS EQUALLY ENTHUSIASTIC ABOUT MAGNEZIX®

An implant, which degrades by itself

START-UP COMPANY FROM HANNOVER WINS INNOVATION PRIZE. PATIENTS DON'T NEED SECOND OPERATION.



Kerstin Pape (29) had a painful foot, a bunion.

A new bone screw saves me from a second operation.

„I USE THESE SCREWS BECAUSE THEY OFFER GOOD HANDLING AND PATIENTS DO NOT SUFFER THE STRESS OF A SECOND OPERATION FOR METAL REMOVAL.“

DR. MED. BERND HINKENJANN, BOCHOLT

The screw which disappears

CAPIO-ELBE-JEETZEL CLINIC USES REVOLUTIONARY BONE-HEALING METHOD

„THE RESULTS WITH MAGNESIUM SCREWS ARE OUTSTANDING AND SURPRISE BOTH PATIENTS AND MYSELF, AGAIN AND AGAIN.“

DR. MED. CHRISTOPH JASCHKE, WALDKIRCH

MADE IN HANNOVER
This screw is a medical sensation

BILD HANNOVER

“The critical difference is however, that the minerals are degraded in the body and also stimulate bone growth and provide materials to build more stable bones,”

EXPLAINS DR. KLAUSER.



MODERN IMPLANT

Today's experts work with magnesium instead of titanium.

„WE APPLY MAGNEZIX® WITH SUCCESS, BECAUSE MEDICAL ADVANCES SHOULD BE AVAILABLE TO ALL PATIENTS.“

DR. MED. ARND ROLLER, FELLBACH

YOU ALL DESERVE THE MOST INNOVATIVE IMPLANT

DEAR PATIENTS,

As you know, you are scheduled to have an operation soon in which an implant is to be emplaced. You have perhaps been thinking about this, or worrying because every operation is always associated with a number of risks. For many surgical treatments on tendons, ligaments and bones, it is now standard procedure to use implants made of steel or titanium or even degradable polymers (based on sugar or lactic acids). If they remain in the body as a foreign material they can cause problems over the long term, and then need to be removed, or can cause allergies.

BUT THAT WAS YESTERDAY!

The use of a revolutionary material called **MAGNEZIX®** means **there is no need for a second operation to remove implants and hence no need to undergo the risks (infections, anaesthetics) or the stresses involved.** Transformable MAGNEZIX® implants are made of magnesium: although magnesium is a metal, so it is very stable, it actually dissolves over time and is not only degraded by the body but even converted into bone. This makes it absolutely unique: it sets new standards in surgery!

REVOLUTIONARY, FUTURE-PROOF, SAFE - MAGNEZIX®

MAGNEZIX® CS



MAGNEZIX® Pin



MAGNEZIX® CBS



CONVINCING ARGUMENTS - MAGNEZIX® AT A GLANCE

- MAGNEZIX® is the **world's first** magnesium alloy approved for use in implants.
- The **properties are similar to bone**, which helps to prevent bone loss during immobilisation.
- During degradation, magnesium creates an anti-bacterial, **infection-inhibiting milieu**.
- **No allergies** are known of.
- MAGNEZIX® implants **stimulate bone growth** and are actually transformed into endogenous bone tissue.
- The controlled degradation of MAGNEZIX® **obviates the need for a second operation** to remove the metal and no foreign materials are left in the body.










Syntellix AG is an internationally active medical technology company based in Germany specialised in the research, development and distribution of self-degrading metallic implants made of magnesium. We have received many awards for our work: 2013 the "German Industry Innovation Award", in 2015 and 2016 the award for the "Top Innovator" of the German Mittelstand as well as the "German Future Prize Healthcare". In 2017 we were ranked in the Top 3 for the Industry Award and acclaimed as the "Innovator of the Year."

THE REMOVAL OF METALWORK – A NECESSARY EVIL – BUT NOT ANY LONGER

Every operation has its associated risks. The goal must always be to minimise or avoid risks and to help you, the patient, return to your normal daily/working life as quickly and as easily as possible. And what could serve this purpose better than an innovative implant which makes a second operation to remove the metal simply unnecessary?!

TYPICAL COMPLICATIONS DURING IMPLANT REMOVAL:

REMOVAL RATE - UP TO **81%**⁷

COMPLICATIONS	TYPE OF TREATMENT	COMPLICATION RATE
RENEWED BREAK	Implants of titanium/stainless steel ^{1,2}	 3-26%
INFECTIONS	Metal removal of implants of titanium/stainless steel, various ^{1,3}	 11.6-37%
	Metal removal ankle ⁴	 14.8%
	Metal removal heel bone ²	 16.3%
NERVE DAMAGE	Metal removal implants of titanium/stainless steel general ^{1,5}	 8-29%
	Metal removal lower arm ⁵	 12%
	Metal removal lower arm/elbow (proximal radius) ⁶	 30%

NO NEED FOR METAL REMOVAL – WHICH FOR YOU MEANS:

THE MAGNEZIX® PRINCIPLE: FIRST HEAL, THEN DISSOLVE!



LESS PAIN



FEWER RISKS
(INFECTION, ANAESTHETIC)



LESS STRESS, FEWER WORRIES



LESS TIME LOST
(HOSPITAL DAYS, SICK DAYS OFF WORK)

Sources:

- ¹ Vos D., Hanson B., Verhofstad M. (2012): Implant removal of osteosynthesis: the Dutch practice. Results of a survey. In: *Journal of Trauma Management & Outcomes*, 6: 6
- ² Evers B. (2004): Indication, timing and complications of plate removal after forearm fractures: results of a metaanalysis including 635 cases. In: *J Bone Joint Surg Br* 2004; 86: 289.
- ³ Backes M., Schep N. W., Luitse J. et al. (2015): High Rates of Postoperative Wound Infection Following Elective Implant Removal. In: *The Open Orthopaedics Journal*, 9: 418-421.
- ⁴ Vos D., Hanson B., Verhofstad M. (2012): Implant removal of osteosynthesis: the Dutch practice. Results of a survey. In: *Journal of Trauma Management & Outcomes*, 6: 6.
- ⁵ Backes M., Schep N. W., Luitse J. et al. (2013): Indications for implant removal following intraarticular calcaneal fractures and subsequent complications. In: *Foot Ankle Int* 2013; 34: 1521-1525.
- ⁶ Langkamer V. G., Ackroyd C. E. (1990): Removal of forearm plates. A review of the complications. In: *J Bone Joint Surg Br* 1990; 72: 601-604.
- ⁷ Maier M., Marzi I. (2013): Frakturen und Folgeschäden. In: Wirth C. J., Mutschler W., Kohn D.: *Praxis der Orthopädie und Unfallchirurgie*, 3. Aufl., 148-167.
- ⁸ Bostman O., Pihlajamäki H. (1996): Routine implant removal after fracture surgery: a potentially reducible consumer of hospital resources in trauma units. In: *J Trauma*, 1996; 41: 846-9.

METAL REMOVAL IS MADE UNNECESSARY

The risks listed above demonstrate that it is always better to avoid a superfluous second operation to remove metalwork. For some groups of patients, the use of MAGNEZIX® implants is particularly important. This group includes in particular children and juveniles, sportsmen and -women and the elderly.

MAGNEZIX®: SMALL IMPLANT, BIG ADVANTAGES FOR CHILDREN

In the case of children and juveniles it is absolutely essential that after healing any metal implants are removed, because in bodies which are still growing foreign materials left in place can be the cause of many complications and problems. It is also especially crucial that additional operations are avoided wherever possible - together with all associated physical and metal risks and stresses.

MAGNEZIX® implants save you and your child the nerve-racking experience of a second hospital intervention, which often entails children being without their parents and traumatic experiences overall.

On top of this there is the additional anaesthetic risk and an increased risk of infection caused by a second operation - these negative effects can be drastically minimised by deploying MAGNEZIX® implants.



Made
in
Germany.

How safe is MAGNEZIX®?

Technically speaking, MAGNEZIX® implants are class III medical devices and so they are subject to the highest safety standards and the most stringent quality requirements. The implants produced by us are tested by the TÜV (German technical inspectorate) and approved for use in Europe (CE certificate). In addition, MAGNEZIX® also satisfies the high standards of internationally renowned approval and health authorities in Australia, Israel and Singapore. In world-wide terms, MAGNEZIX® is authorised in 49 countries (as of August 2017) and has proven its qualities several thousand times. MAGNEZIX® implants are absolutely safe and of top „Made in Germany“ quality. Because all of our devices are developed and produced exclusively in Germany!

SPORTY. FAST. HEALTHY.

Sport is good for the health – but anyone playing sports knows that accidents can happen, and bones can be broken. Lower arm and elbow fractures are some of the most frequent broken bones because in a fall your reflex is to use hands and arms to stop the fall. Another factor in sports is that continuous physical loads and over-stressing can cause stress fractures in bones – often on the bones of the middle foot, ankles and shin bones on runners and football players.

Treating sport injuries with MAGNEZIX® implants offers many advantages:

- Controlled dissolution of MAGNEZIX® makes a second operation for **metal removal unnecessary** and no foreign materials remain in the body.
- The **bone-like properties** mean there is no loss of bone during immobilisation.
- MAGNEZIX® implants have metal stability values and are **especially able to withstand stresses**.
- MAGNEZIX® implants **stimulate bone growth** and are converted into endogenous bone tissue.
- When magnesium is degraded it creates an anti-bacterial, **infection-inhibiting milieu**.
- MAGNEZIX® has **excellent biocompatibility** – no allergies are known of.

MAGNEZIX® implants can help in a speedy return to everyday life; back to family, job or team.



Fit again faster with MAGNEZIX®

Improve your quality of life with MAGNEZIX®!

Fit and healthy – attributes which no longer apply exclusively to young people: in particular people over 50 are now focussing more on quality of life with an active lifestyle. **MAGNEZIX® implants help people continue to be active even after an operation and to get back into action faster.** These implants are highly compatible: the main component in MAGNEZIX® is magnesium – an essential mineral which is indispensable for many essential bodily functions.

MAGNEZIX® – THE IDEAL IMPLANT CAN DO EVEN MORE

MAGNEZIX® [ma'gneziks] describes a material based on magnesium (over 90 % Mg-fraction) which, while having metallic properties, is actually completely dissolved within the body and replaced by **endogenous tissue**. The biomechanical properties of MAGNEZIX® are extremely similar to those of human bone, with a stability very similar to that of titanium! Studies have shown that magnesium alloys have **osteoconductive properties**. Osteoconductive means that they stimulate bone growth.⁸ On top of this they can reduce infections because the degradation of magnesium is a corrosive process (i.e. the metal is degraded by a fluid reaction) and this creates an **anti-bacterial, alkaline (non-acidic) milieu** in the immediate vicinity of the implant.⁹

How does that work? See for yourself: **metal turns into bone!**

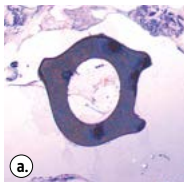


Figure a:
Microscopic view of tissue section (histological preparation) of an implanted MAGNEZIX® CS after a few days.



Figure b:
Transformation of MAGNEZIX® CS into bony tissue has started after a few months.

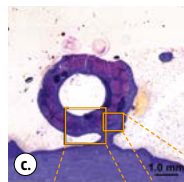
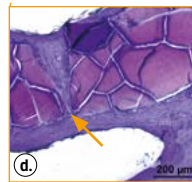
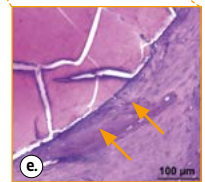


Figure c:
12 months after the OP there has been a full transformation of the metal implant.



Section d:
The new bone formation is visible at the surface of the degraded implant.



Section e:
The presence of bone cells (osteoclasts and osteoblasts) are signs of the transformation process.

Source:
Waizy H., Diekmann J., Weizbauer A. et al. (2014). In vivo study of a biodegradable orthopaedic screw (MgYZREZr-alloy) in a rabbit model for up to 12 months. In: J Biomater Appl 28 (5), 667-75.

⁸ Liu et al. (1988): Magnesium directly stimulates osteoblast proliferation. In: J Bone Miner Res 1988;3:104.

Zreiaq et al. (2002): Mechanisms of magnesium-stimulated adhesion of osteoblastic cells to commonly used orthopaedic implants. In: J Biomed Mater Res 2002 Nov;62(2):175-84.

⁹ Robinson et al. (2010): In vitro antibacterial properties of magnesium metal against Escherichia coli, Pseudomonas aeruginosa and Staphylococcus aureus. In: Acta Biomaterialia 6 (2010): 1869-1877.

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*Implants are manufactured in Germany in cooperation with
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Errors and omissions reserved.

