total hip endoprosthesis

UNIBIONIX®

cementless

and **ATL®**

cemented

UNIORbionic®

Associate Professor, Dr Franz Copf, Sen. Dr. med. Emeritus,
Specialist in General Surgery and Traumatology

Breaking new ground with the first bionic endoprosthesis

My work has taken me to various parts of Europe, and also from Slovenia to Switzerland and Germany. I have dedicated my lifetime to research and development in physiology of force transmission in joints, notably in the hip joint. I am very pleased to be able to say that I discovered a new structure in the spongy part of the bone, i.e. the CCL and Ccl tensula membranes. This discovery revolutionized the traditional physiological perception of force transmission in the joint. In my opinion, one of the remarkable discoveries is also the newly uncovered intrinsic relationship between the crystal substance and the two channel systems, a narrow and a wide one. The narrower system contains intra-axial liquid which is subjected to hydrothermal dynamics. The wider system contains what we also refer to as the life (veins, cells etc.). Divided by tensula membranes, the systems function separately and are not interrelated. Based on this discovery, a new prosthetic system was developed enabling permanent growth of prosthesis in the bone spongiosis.

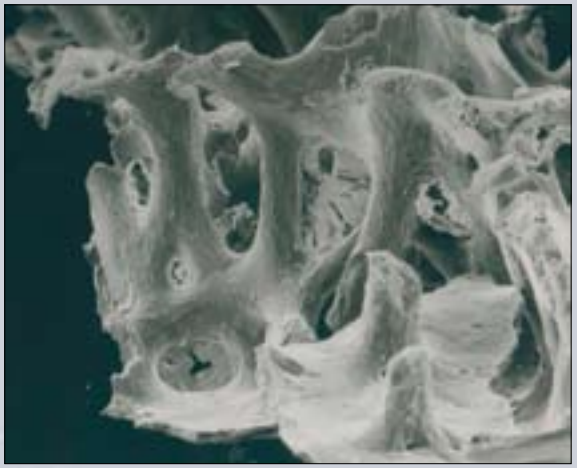
By using the first bionic endoprosthesis, worst complications such as those arising from loosening bone bed, which accounted for 30 percent of all complications during traditional methods of implantation, were entirely avoided.

My work was greatly encouraged by the anticipated effects of the use of the first bionic endoprosthesis. Further, I should like to mention that several awards in recognition of my research and work, among which I am most proud of the First Class Federal Cross of Merits (Bundesverdienst Kreuz, Erste Klasse), have demonstrated that we are on the right track. Our efforts are further confirmed by follow-up research and new discoveries in the field.

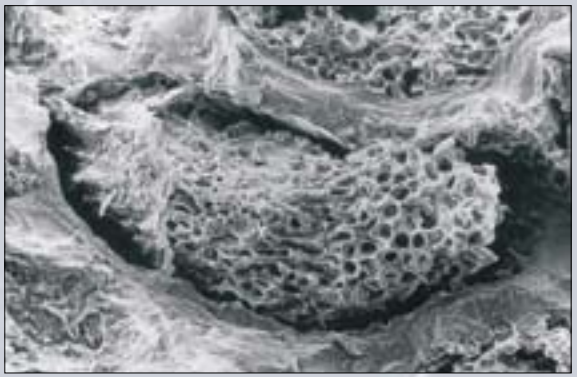
It is assumed that the main problem of ensuring a long-term fixation of hip joint endoprosthesis is that the implantation of the endoprosthesis and related change in the force transmission in the remaining bone results in non-physiological strains leading to long- or short-term loosening of the endoprosthesis.

The stress on human femur is absorbed and diminished by:
- deformable trabecular bone
- compressible intraosseal fluid
- the numerous tensulae
- the hydrodynamic effects

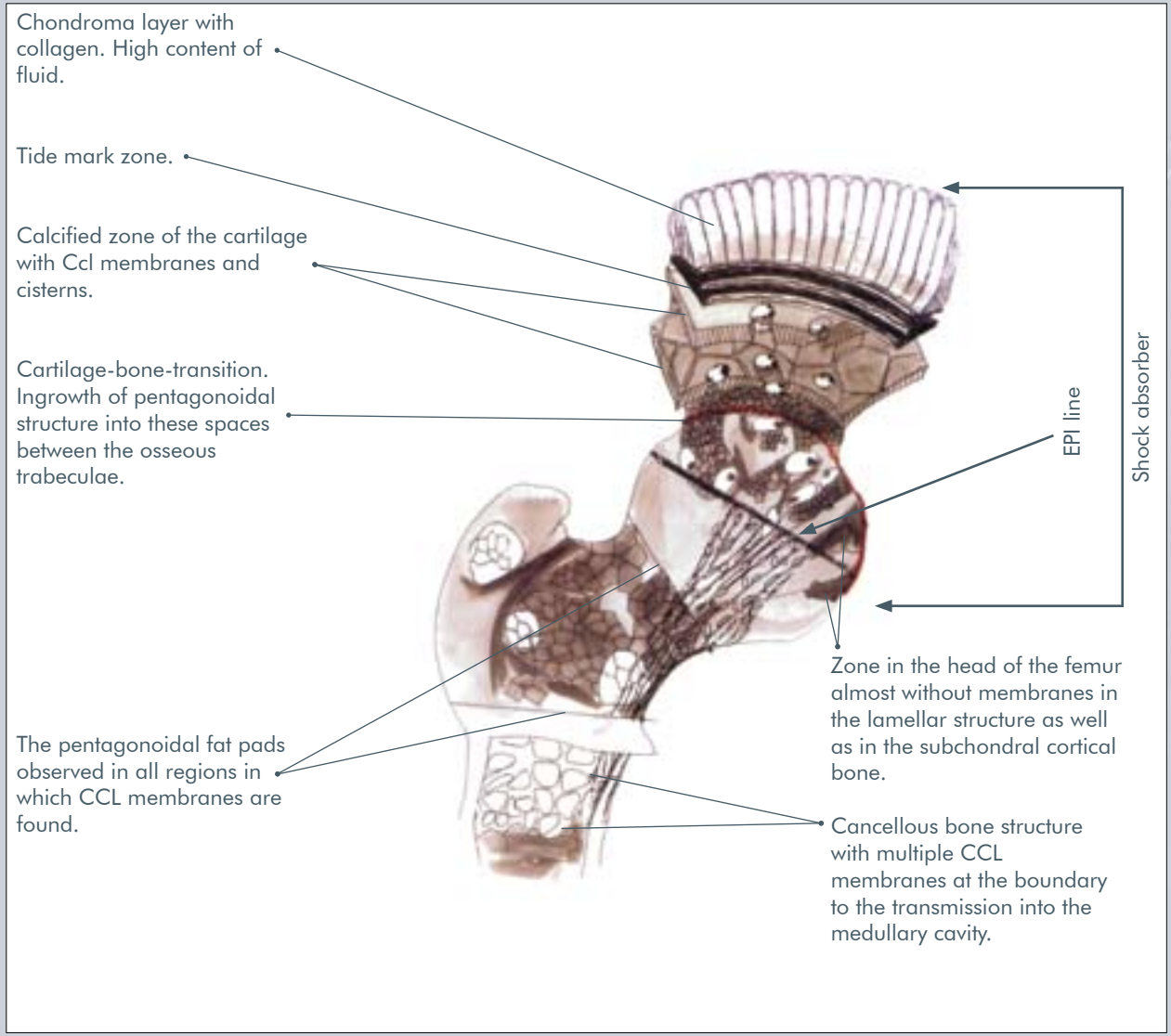
How to ensure the long-term fixation of hip endoprosthesis?



View of subchondral compact bone with adjacent spongiosa trabeculae. Visible are multiple CCL tensulae. The subchondral compact bone is 80/120 μm thick and laminated.



View of the fat cisterns in caput femoris. The cisterns are separated by the tensulae from the intraosseous liquid. Two separated system exist, not mixed with one another.



The distribution of tensulaes-membranes determines the dispersing and reduction of pressure forces in bone. Intraosseal fluid in the deformable trabecular bone of proximal epiphysys moves between two poles on the bipolar principle and the form of bypassing curves, described as the fluid energy path.
In standard surgery procedure one of the two poles is usually sacrificed.

Nature knows the best solutions!

Human bodies cannot withstand the effects of major interventions represented by conventional prosthesis or a computer-controlled prosthesis as well implantations performed by computer, resulting in the destruction of spongiosa volume.

Therefore, a reconsideration of anatomy in both micro and macro scale is required to understand the force of transmission in biological and physiological sense.

Only then we can start to the hip joint prosthesis.

First bionic amendment:
mechanic must imitate and reproduce biology!

UNIBIONIX® cementless endoprosthesis

A great deal of spongiosa is preserved. The volume of metal part represents app.10% of the spongeous bone. The remaining of the spongiosa allow hydro, thermal and elastomechanic process. In this way nature itself can hold the endoprosthesis in the spongeous substance for an unlimited period of time.

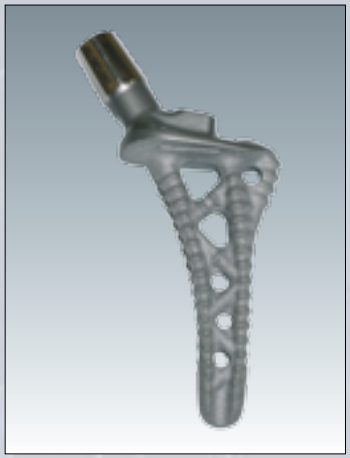
Anatomical, 3D trabecular construction, filled with spongiosa, enables bone ingrowth and restoration of internal hydrodynamic equilibrium. The endoprosthesis ensure good proximal fixation and short intramedulary penetration with physiological load transfer.

UNIBIONIX® endoprosthesis follows the principles of bionic.

Lateral view

Medial view

Rear view



Front view

Lower view

Fixation of conventional endoprosthesis in proximal femur means that the spongiosa is supplanted. Calcinated part of femur is also partly lost since a thighbone is obliquely cut off. UNIBIONIX® has horizontal resection plane. In this way the whole calcinated femur and 80-85% spongiosa volume is preserved. A horizontal plate carries the loading impulses, while an oblique resection plane causes disadvantageous charges of a thighbone.

Medialisation of the neck cone enables valgus position of the femoral neck-shaft angle, resulting in a shift of the external force towards the centre of spongeous bone.

Integrated rings on primary skeletion and additional mechanical treatment resulted in increased surface which reduces surface tensions.

There are two thin slots that are designed for eventual extraction.

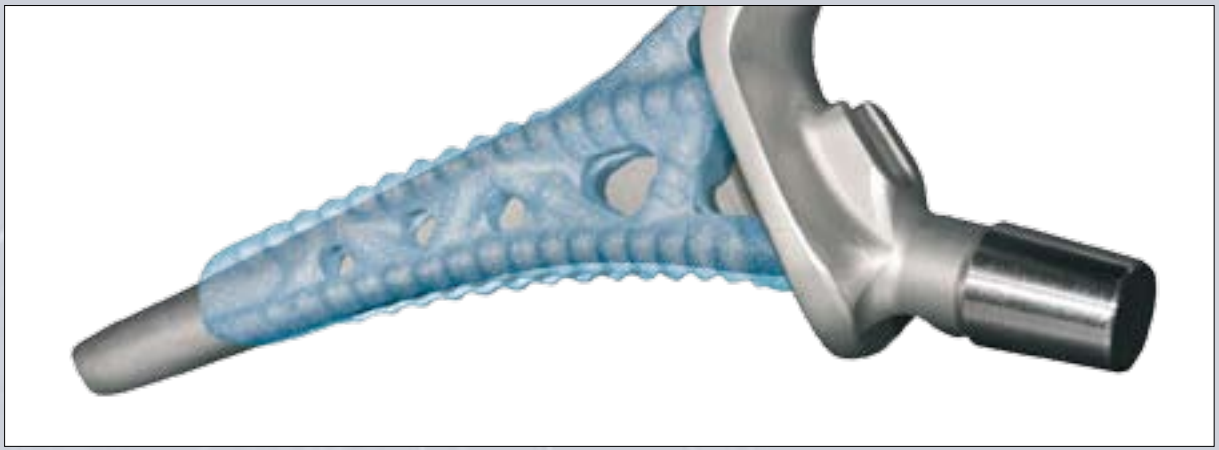
UNIBIONIX® is made of titanium alloy (TiAl6V4), different shape and in right-left form.

UNIBIONIX® as trabecular-oriented endoprosthesis enables the firm osseous integration and the osseous tissue growth straight to the bond of prosthesis.

The shape of UNIBIONIX® endoprosthesis follows the shape of the natural bone axis (4 + 1).

ATL® cemented endoprosthesis

ATL® endoprosthesis is a cemented version of UNIBIONIX® with integrated centering system. Medialisation of the cone on the horizontally oriented plate allows an easy valgus position of the cone, resulting in a shift of the external forces towards the center of the spongiosa. It`s integrated centring system enables the use of anterograde cementing technique. ATL® proximal stem is made of high quality stainless steel (High-N), different shape and in right/left form.



Lateral view

Medial view

Rear view

Front view

Lower view

SURGICAL TECHNIQUE

PREOPERATIVE PLANNING AND TEMPLATING

DORSAL OR LATERAL PATIENT'S POSITON

ENTERING THE FEMORAL CANAL AFTER LUXATION OR SUBCAPITAL RESECTION IN SITU

DOUBLE-ANGLE AIMING DEVICE

MARKING THE RESECTION LINES

REMOVE THE INTRAMEDULARY ROD BEFORE THE OSTEOTOMY

REMOVAL OF THE FEMORAL HEAD

RESECTED FEMORAL SURFACES

ACETABULAR EXPOSURE

ACETABULAR REAMING

THE INSERTION OF THE ACETABULAR CUP

ANATOMICALY SHAPED FEMORAL RASPS

PREPARATION OF THE PROXIMAL FEMUR

TRIAL REDUCTION

FILLING OF THE PROSTHESIS WITH BONE DEBRIS

INSERTION OF THE PROSTHESIS

FINAL REDUCTION

X-RAYS CONTROL

The same instruments are used for insertion of both cementless UNIBIONIX® and cemented ATL® endoprosthesis. A rasp ensures the shape and a 2 mm space for cement fixation of ATL® endoprosthesis.

Instrumention set	
Rasp 30 left	9001020302
Rasp 30 right	9001020301
Rasp 40 left	9001020402
Rasp 40 right	9001020401
Rasp 50 left	9001020502
Rasp 50 right	9001020501
Rasp 60 left	9001020602
Rasp 60 right	9001020601
Rasp 70 left	9001020702
Rasp 70 right	9001020701
Rasp 80 left	9001020802
Rasp 80 right	9001020801
firm	HF001004003
drill Ø 10	HF001004001
drill Ø 13	HF001004002
Instrument for horizontal resection - left	HF001005-L
Instrument for horizontal resection - right	HF001005-R
Instrument for insertion	99/500.10

1. UNIBIONIX® (Ti) cementless stem	
UNIBIONIX® (Ti) 30/SX	HR0030L
UNIBIONIX® (Ti) 30/DX	HR0030R
UNIBIONIX® (Ti) 40/SX	HR0040L
UNIBIONIX® (Ti) 40/DX	HR0040R
UNIBIONIX® (Ti) 50/SX	HR0050L
UNIBIONIX® (Ti) 50/DX	HR0050R
UNIBIONIX® (Ti) 60/SX	HR0060L
UNIBIONIX® (Ti) 60/DX	HR0060R
UNIBIONIX® (Ti) 70/SX	HR0070L
UNIBIONIX® (Ti) 70/DX	HR0070R
UNIBIONIX® (Ti) 80/SX	HR0080L
UNIBIONIX® (Ti) 80/DX	HR0080R

2. ATL® cemented stem (High-N)	
ATL® 30/SX	HS70301
ATL® 30/DX	HS70302
ATL® 40/SX	HS70401
ATL® 40/DX	HS70402
ATL® 50/SX	HS70501
ATL® 50/DX	HS70502

3. Biolox forte® ceramic head	
Biolox forte® ceramic head, 12/14, 28mm - S	HB11228U
Biolox forte® ceramic head, 12/14, 28mm - M	HB21228U
Biolox forte® ceramic head, 12/14, 28mm - L	HB31228U
Biolox forte® ceramic head, 12/14, 32mm - S	HB11232U
Biolox forte® ceramic head, 12/14, 32mm - M	HB21232U
Biolox forte® ceramic head, 12/14, 32mm - L	HB31232U

4. MultiCup® Titanium porous-coated pressfit Cups	
MultiCup® pressfit Cup 46mm	HF30146U
MultiCup® pressfit Cup 48mm	HF30148U
MultiCup® pressfit Cup 50mm	HF30150U
MultiCup® pressfit Cup 52mm	HF30152U
MultiCup® pressfit Cup 54mm	HF30154U
MultiCup® pressfit Cup 56mm	HF30156U
MultiCup® pressfit Cup 58mm	HF30158U
MultiCup® pressfit Cup 60mm	HF30160U
MultiCup® pressfit Cup 62mm	HF30162U

5. MultiCup® pressfit Cups - Ceramic Inlays	
Multicup® ceramic inlay 36mm/28mm	HF23628U
Multicup® ceramic inlay 41mm/32mm	HF24132U
Multicup® ceramic inlay 48mm/32mm	HF24832U
Multicup® ceramic inlay 41mm/28mm	HF24128U
Multicup® ceramic inlay 48mm/28mm	HF24828U

6. MultiCup® pressfit Cups - PE Inlays	
MultiCup® - PE Inlay 36mm/28	HF33628U
MultiCup® - PE Inlay 41mm/28	HF34128U
MultiCup® - PE Inlay 48mm/28	HF34828U
MultiCup® - PE Inlay 41mm/32	HF34132U
MultiCup® - PE Inlay 48mm/32	HF34832U
MultiCup® - PE Inlay 36mm/28 - High Wall	HF39628U
MultiCup® - PE Inlay 41mm/28 - High Wall	HF39128U
MultiCup® - PE Inlay 48mm/28 - High Wall	HF39828U
MultiCup® - PE Inlay 41mm/32 - High Wall	HF39132U
MultiCup® - PE Inlay 48mm/32 - High Wall	HF39832U

7. HipBall® Premium Head (CoCrMo)	
HipBall® Premium Head 12/14, 28mm - S	HK11228U
HipBall® Premium Head 12/14, 28mm - M	HK21228U
HipBall® Premium Head 12/14, 28mm - L	HK31228U
HipBall® Premium Head 12/14, 28mm - XL	HK41228U
HipBall® Premium Head 12/14, 28mm - 2XL	HK51228U
HipBall® Premium Head 12/14, 32mm - S	HK11232U
HipBall® Premium Head 12/14, 32mm - M	HK21232U
HipBall® Premium Head 12/14, 32mm - L	HK31232U
HipBall® Premium Head 12/14, 32mm - XL	HK41232U
HipBall® Premium Head 12/14, 32mm - 2XL	HK51232U

8. Müller Standard Cemented Cups	
Müller Standard cup 46mm for head 28mm	HP14428U
Müller Standard cup 48mm for head 28mm	HP14628U
Müller Standard cup 50mm for head 28mm	HP14828U
Müller Standard cup 52mm for head 28mm	HP15028U
Müller Standard cup 54mm for head 28mm	HP15228U
Müller Standard cup 56mm for head 28mm	HP15428U
Müller Standard cup 58mm for head 28mm	HP15628U
Müller Standard cup 60mm for head 28mm	HP15828U
Müller Standard cup 62mm for head 28mm	HP16028U
Müller Standard cup 46mm for head 32mm	HP14432U
Müller Standard cup 48mm for head 32mm	HP14632U
Müller Standard cup 50mm for head 32mm	HP14832U
Müller Standard cup 52mm for head 32mm	HP15032U
Müller Standard cup 54mm for head 32mm	HP15232U
Müller Standard cup 56mm for head 32mm	HP15432U
Müller Standard cup 58mm for head 32mm	HP15632U
Müller Standard cup 60mm for head 32mm	HP15832U
Müller Standard cup 62mm for head 32mm	HP16032U

9. Cement centralizing tip	
Cement centralizing tip Ø 10mm	HS33010U
Cement centralizing tip Ø 12mm	HS33012U
Cement centralizing tip Ø 14mm	HS33014U

10. Cement Restrictor-Bioresorbable	
Cement Restrictor-Bioresorbable Ø 8mm	HE70008U
Cement Restrictor-Bioresorbable Ø 10mm	HE70010U
Cement Restrictor-Bioresorbable Ø 12mm	HE70012U
Cement Restrictor-Bioresorbable Ø 14mm	HE70014U
Cement Restrictor-Bioresorbable Ø 16mm	HE70016U
Cement Restrictor-Bioresorbable Ø 18mm	HE70018U

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