Evident Success
ANKYLOS®-Implant-System
Modern prosthetics ...

... inconceivable without implants
Modern high-quality prosthetics can no longer be achieved without implants

An implant has to withstand comparison with a natural tooth

An implant has to suit the individual patient

ANKYLOS® - from Degussa Dental
Your requirements:

Safety
Reliability
Surgical and prosthetic flexibility
Cost-effectiveness

photo: Dr. G. Romanos, University Frankfurt
The superior qualities of the ANKYLOS design concept

- Extremely reliable prosthetics
- Submucosal and transmucosal healing
- Immediate loading
- Cemented restorations
- Tooth implant supported prosthetics
- Stable soft tissue without peri-implant irritation
- Minimally invasive implant recovery
- Integration with conventional prosthetic designs
- High-quality yet economical prosthetics

See for yourself!
Patient satisfaction must be the aim of every implant treatment. The extreme diversity of patient diagnoses places great demands on an implant system and its prosthetic concept. From its inception the objective in developing the Ankylos system was to produce an implant which could be used extensively both surgically and prosthetically. The fact that this objective has been met is substantiated by many years of clinical data ... and satisfied patients.
This 27 year-old patient had to have tooth 12 extracted due to failed endodontic treatment. An Ankylos B11 implant was inserted in the space. Prosthetic treatment was carried out using a custom-made abutment from the Anterior Balance range. The illustration shows the aesthetic crown after cementation.
This 45 year-old patient had a unilateral free-end saddle in the second quadrant. Due to extensive fillings, teeth 12 - 22 also had to be crowned.

After insertion of two Ankylos A14 und B11 implants in the region of teeth 23 and 24 the superstructure was fabricated on Balance Posterior abutments which can be customized.

The bridge, which had been cast in Degunorm and veneered using Duceragold porcelain, was then cemented. The bridge was extended distally to the 25 region using a cantilever pontic.
This 50 year-old patient had an edentulous upper as well as greatly reduced and periodontally compromised residual lower dentition. Following thorough oral rehabilitation treatment, four A11 Ankylos implants were placed in the upper and two A14 Ankylos implants were placed in the 43 and 45 regions to provide multiple abutments.

After allowing three months for the implants to osseointegrate, four Balance Posterior abutments were placed in the upper and a telescopic denture fitted on high-gold content primary crowns.

A telescopic restoration was also fabricated for the lower and retained on the standard abutments of the implants and on the natural teeth.

clinical photos: Dr. E. Eisenmann, FU Berlin
This 65 year-old patient wanted a fixed restoration in the upper.

A total of 6 A8 to A11 Ankylos implants were placed. The flat Base Abutment of the Balance system was used because it proved impossible to parallel the axes of the implants.

Initially, a temporary restoration with composite facings was fabricated to ascertain whether the patient would have any difficulty becoming accustomed to a fixed restoration. The long-term temporary restoration was screwed onto the abutments occlusally. The aesthetics are not impaired at all as the patient’s lips conceal the restoration when closed.

clinical photos: Dr. E. Eisenmann, FU Berlin
This 59 year-old patient wanted the best possible fixed restoration for her edentulous upper. At the same time the contours of the soft tissue and lips were to be restored aesthetically.

By placing 6 Ankylos implants it was possible to reduce the denture base considerably. A custom-milled bar was screwed onto six Balance abutments. Swinglocks are incorporated bilaterally as additional retainers for the removable bridge.

The integrated denture base supports the pleasing shape of the lips and ensures natural-looking interdental aesthetics.

clinical photos: Dr. E. Eisenmann, FU Berlin
Standing still is like stepping back.

The ANKYLOS system...

... goes in new directions
... breaks with conventional thinking
... impresses with its clinical success
... creates new possibilities
The innovative, practice-orientated ANKYLOS®-implant-system was developed by Prof. Dr. G.-H. Nentwig and Dr. W. Moser in 1985 with the stated purpose of reproducing as closely as possible the prosthetic characteristics of the natural tooth. Making use of the latest scientific findings and many years of clinical experience, a new implant was developed with a structure which uses the physiological conditions in the alveolar bone for optimal load transmission during functional loading. The conical connector prevents microbial and mechanical irritation and stabilises the peri-implant hard and soft tissue. Its clinical use since 1987 is impressive proof of the validity of this concept.

- Endosseous implant made from pure titanium
- Progressive special design
- Precision-blasted surface
- Smooth cervical collar
- Conical connection
- Anatomical and rotationally symmetric abutments
- Straight and angled abutments

... with the surface
... with the thread design
... with the transmucosal design
... with the prosthetic components
Functional – the surface

Smooth cervical collar
- Reduced stress transfer to the cortical bone
- Easily cleaned in case of acute peri-implantitis
- Ancylotic healing

Precision-blasted surface
- Grit-roughened surface
- Bone to implant contact of over 70%
- No particle loss
- Short healing period - 3 months for both the lower and upper jaws
- Clinically proven and tested since 1987

photo: Prof. Tenenbaum, University Straßburg
Gives you handling advantages
- Excellent initial stability even in D3 and D4 bone
- Simple and atraumatic implant placement
- ONE system for ALL indications
- Can be used in combination with augmentation procedures

Ensures long-term clinical success
- Excellent stability of the peri-implant bone after functional loading
- Long-term stable soft tissue
- Lasting aesthetics
- High patient satisfaction

Proven
- In clinical use since 1987
- Bone stability after functional loading
- Very high success rate even in difficult cases
- Results independent of indications - even in the upper jaw

Offers new possibilities
- The first implant with a clinically verified recommendation for tooth/implant supported restorations
- Shorter treatment period
- Optimal prerequisites for immediate and early loading
- Subcrestal implant placement for improved gingival aesthetics
Structure-orientated - the implant design

The anatomy
- Heterogeneous structure of the alveolar bone
- Heterogeneous mechanical properties

The consequence
Stress concentration in the cortical bone

The solution - The concept of spongious load-transmission

The principle:
- Reduced load-transmission in the cortical bone due to smooth cervical geometry
- Continually increasing depth of thread transfers the load to the spongious bone

Uniform trapezoidal thread
ANKYLOS-thread
Clinical consequences

Optimal placement

- Gentle and easy implant placement
- Maximum bone/implant contact only in final position
- Excellent initial stability

The result

- No bone loss one year after loading (>90%)
- No increased bone loss in the upper jaw
- Bone stability above the implant shoulder

22.05.1993
30.05.1995
30.10.1998

Photos: Prof. Dr. G.-H. Nentwig, University Frankfurt
Conclusive - the conical connector

The requirements are well known ...

- bacteria-proof connector
- rotationally secure abutment placement
- excellent mechanical stability

The technically unavoidable mobility associated with the fit of parallel-sided connectors (hexagon, tube in tube) prevents the abutment being fitted to the implant without forming a gap. Disadvantages for normal clinical practice:

- Gap development
- Loosening of abutments and screws
- Abutment fractures due to load concentration around the screws and abutments
- Limited options for positioning of the abutment
- Highly invasive second stage surgery
... the solution is also well-known

The accurate precision surface fit of the conical connector at the implant/abutment interface. The conical connector is familiar from mechanics, among other things for transferring high permanent loading without loss of friction (see Dubbel, Taschenbuch für den Maschinenbau, Springer Verlag).

The very precise fit of the conical surface also literally eliminates the microgap, with the associated risk of inflammation, and provides the optimal prerequisites for a strong and permanently stable implant-abutment connector.

Advantages for the clinical treatment of patients:

- Extreme functional loads, for instance in the molar region, are transferred effectively
- Excellent reliability prevents screw and abutment loosening
- Superstructure can be cemented without risk

clinical photos: Dr. S. Rinke, Hanau
Minimally invasive - second stage surgery

Precise abutment assembly without tissue trauma

- No extensive flap required
- No periosteum has to be removed from the peri-implant bone
- No mechanical recovery of the implant shoulder

Conclusion

- Less surgery
- Less treatment time
- Less treatment trauma

clinical photos: Prof. Dr. G.-H. Nentwig, University Frankfurt

clinical photos: Dr. Dr. M. Stiller, FU Berlin
Transmucosal healing - an option

Treatment option for:

- Immediate implantation
- Immediate loading
- Predictable aesthetics
- Cases without GBR

It is your choice!

Submerged healing
Transmucosal healing
Immediate loading

photo: Dr. S. Rinke, Hanau
photo: Dr. M. Soares, São Paulo
photo: Dr. D. May, Lünen
Attractive - the conical connector appeals

Functional design provides long-term aesthetics

- Epithelial apposition distant from the bone due to the guide plane effect of the conical surfaces
- Permanent connective tissue coverage of the bone/implant interface

Double benefit of the conical transmucosal surface

- Greatly increased volume of soft tissue
- The abutment and superstructure function like pontics

The results are:

- Stability and protection of the soft tissue attachment
- Optimal concealment of the abutments in the aesthetic zone

photo: Dr. K. Döring, Dr. Dr. M. Stiller, FU Berlin, Implant regio 22
Effective - without the side effects

Microgap and peri-implant reaction

The problem of peri-implant bacteria colonization in connection with the numerous joints (= microgap) between the implant and the abutments is illustrated in the “Schweizer Monatsschrift für Zahnmedizin 11/96” (Swiss monthly dental magazine).
As early as 1995 Ericsson et al proved that apparently healthy peri-implant tissue always had an increased concentration of inflammatory infiltration at the microgap level.

No submucosal gap

the conical connector produces a very accurate and tight fit resulting in:

- Unimpeded apposition of the soft tissue
- Reduced risk of infection
- No secondary infection with the screw retained superstructure

photo: Dr. K. Döring, Dr. Dr. M. Stiller, FU Berlin
Endosseous parts

ANKYLOS implants are made from non-coated pure titanium. The implants are sealed in sterile double glass vials to allow contact-free handling. The cover screw is incorporated in the implant and is only removed prior to winding in the abutment.

ANKYLOS implants are supplied in three diameters and in different lengths. The implants are graded according to size making them practice-orientated and suitable for all indications in dental implantology where a definite number of individual implants is required.

Nomenclature

The code for each implant comprises a capital letter representing the diameter and a number indicating the length of the implant in millimetres. The different diameters of the implants can be distinguished by the color coding on the lid.

<table>
<thead>
<tr>
<th>Diameters</th>
<th>8 mm</th>
<th>9.5 mm</th>
<th>11 mm</th>
<th>14 mm</th>
<th>17 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 mm</td>
<td>A8</td>
<td>A9.5</td>
<td>B11</td>
<td>B14</td>
<td>B17</td>
</tr>
<tr>
<td>4.5 mm</td>
<td>B8</td>
<td>B9.5</td>
<td>B11</td>
<td>B14</td>
<td>B17</td>
</tr>
<tr>
<td>5.5 mm</td>
<td>C8</td>
<td>C9.5</td>
<td>C11</td>
<td>C14</td>
<td>C17</td>
</tr>
</tbody>
</table>
**Freely interchangeable**

Abutments for the ANKYLOS® system are available in different sizes and shapes providing the best solution for various prosthetic situations both functionally and aesthetically.

The geometry of the conical connector provides for a precision fit of the implant/abutment interface and is identical for all implant diameters and abutment sizes. This makes each abutment freely interchangeable with each implant.

The freely interchangeable design greatly extends implant-prosthetic treatment options. The diameter of the abutment is independent of the diameter of the implant.

- The implant is selected in diameter and length according to the amount of bone available.
- The abutment is selected to suit the prosthetic requirements.
Custom - prosthetic abutment systems

Standard system

Selecting the abutment: Chairside

Transferring the abutment position to the laboratory

- Easy handling
- Fabricating superstructures on analogs
- Fabricating superstructures using prefabricated parts
- Straightforward provision of temporaries
- Any type of restoration can be used:
  - Single crowns
  - Bridges
  - Bar-borne dentures
- Special abutments for:
  - Magnet dentures
  - Ball and socket retained dentures
  - Telescopic bridges and dentures
  - Primarily thin mucosa (Permador abutments)

As all the abutments are freely interchangeable with all implants, relatively few individual components are required to provide a large variety of superstructures

Refer to the brochures:
- Standard abutment system
- Magnet attachments/ball and socket attachments
- Conical abutments
- Permador abutments
Balance system

Selecting the abutments: in the laboratory

- For aesthetically demanding restorations
- Fabricating superstructures on original abutments
- Can be customised
- Transferring the abutment position with an overcast
- Any type of restoration can be used: Single crowns, Bridges, Full dentures
- Special abutments (base abutment) for: Cost-effective superstructures Bar-retained dentures

As all the abutments are freely interchangeable with all implants, relatively few individual components are required to provide a large variety of superstructures

Refer to the brochures: Balance abutment system Balance substructures
A successful concept - backed up by clinical data and research

### Long-term success, regardless of the indication

<table>
<thead>
<tr>
<th>Recall data</th>
<th>10/91 - 4/99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implants (total)</td>
<td>2094 (97.2%) 62 (2.8%)</td>
</tr>
<tr>
<td>Implants upper</td>
<td>942 (97.7%) 22 (2.3%)</td>
</tr>
<tr>
<td>Implants lower</td>
<td>1152 (96.7%) 40 (3.3%)</td>
</tr>
</tbody>
</table>

Poliklinik für Zahnärztliche Chirurgie des ZZMK der Universität Frankfurt a. M. (Carolinum)

### Bone stability

Recall data: 1987 - 1997

- Patients: 162
- ANKYLOS implants: 312
- Average functional loading: 6.78 years
- No vertical bone loss: 82%

Klinik und Poliklinik für Mund-, Kiefer- und Gesichtschirurgie, LMU München

### Successful osseointegration in compromised bone quality

- Implant type: ANKYLOS
- Number: 1,427
- Recall time scale: at least 18 months
- Bone quality: D4
- Survival probability: 95.1%

Survival of an Innovative Screw Implant: Mobile and Not Mobile at Placement.
H. F. Morris, S. Ochi, J. W. Olson (Univ. of Louisville and DVA Medical Center, Ann Arbor, MI, USA)

### The conical connector - No gaps

“... the fitting surfaces were closest together with the ANKYLOS system (mean 0.71 μm) and furthest apart with the Impla-System (63 μm). The other systems ranged between 2.4 (IMZ and Friadent-II) and 7.4 μm (Astra). The conical fit was airtight with the ANKYLOS system and exhibited the widest gap with the ITI system. ...”


### The conical connector - stable and rotationally secure

- Single implants replacing molars
  - n (total): 233
  - t (maximum): 7.33 Jahre
  - Failures: 1 0.5%
  - Loosening of abutment: 3 1.3%
  - Abutment fracture: 0 0%

Poliklinik für Zahnärztliche Chirurgie des ZZMK der Universität Frankfurt a. M. (Carolinum)

### The conical connector - reliable and aesthetic

62 Balance abutments involving 35 patients

- no mechanical complications (loosening screws, screw fracture, abutment fracture)
- stable hard and soft tissue conditions
- good to excellent aesthetics

**Tooth/implant supported prosthetics**

“...The results of our tests over four years confirm that the ANKYLOS implant system with its special threaded design can clearly compensate for the different resilient reactions of implant and tooth and ensure that the masticatory loading is transmitted to the bone without overloading the peri-implant bone. An earlier clinical study on the same subject also produced similar results (Nentwig et al 1992). ANKYLOS enables cemented or screw-retained one-piece superstructures to become part of standard treatment ...”

Die Versorgung von Freiendsituationen mit Rekonstruktionen auf der Basis des Ankylos-Systems.
R. E. Klaus, G. E. Romanos, C. Egerer, G.-H. Nentwig
Zahnärztl. Implantol. IV (1997)

**The conical connector - inflammation-free**

“...Another explanation of our clinically free of inflammation aspect and the histologic mild inflammation in the connective tissue could be the absence of a microgap in the ANKYLOS® System. ...”

Histological analysis of the Ankylos peri-implant soft tissues in a dog model
Tenenbaum H., Schaaf J. F. and Cuisinier F. J. G.
(Department of Periodontology, Dental Faculty and Federation de Recherches Odontologiques)
Unité INSERM U 424, Strasbourg, France

**The conical connector - The soft tissue**

“...After being subjected to loading for a year, the implant abutments with a conical connector exhibited significantly higher values for the marginal soft tissue level as well as the width of the protective connective tissue zone. The conical gingival emergence stabilised the peri-implant soft tissue and influenced the establishment of the biological width in favour of a wider connective tissue zone ...”

J. Salcedo
Department of Restorative Dentistry, Harvard School of Dental Medicine Boston, Massachusetts, USA

**View the implant as a natural tooth**
Degussa Dental - your reliable Partner

Our expertise in prosthetics
For 100 years Degussa Dental has been providing its customers with dental treatment concepts, i.e. co-ordinated products and systems for conservative, restorative and orthodontic treatment.

Degussa Dental International
The operations of our international group are directed from our Degussa Dental Centre in Hanau near Frankfurt/Main, Germany. From here we manage not only our dental sales and service centres in Germany but also companies which are part of our group world-wide.
Our research

In cooperation with research institutes and universities, Degussa Dental develops biologically safe products which meet the most stringent demands of patients, dentists and dental technicians.

Goodwill vs guarantee

Each case is different and that is why osseointegration cannot be guaranteed, but we will show our goodwill by replacing the implant component, should it be necessary.

Our manufacturing facilities

Our computer-aided manufacturing procedures for micromechanical components for implants and precision attachments concentrate on outstanding precision.