A study into the feasibility of obtaining the ideal implant design: Results based on scientific studies and their implementation through to prototype manufacturing (September 2003 – April 2008). (S)

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Objective: Implant design and construction has never been based only on scientific studies but rather refined according to experience or hypothetical approaches.

Methods and procedures

The author conducted studies of scientific literature to provide a comparison and evaluation of key implant properties. This analysis resulted in a scientifically based model of the "perfect" implant, similar to a modular system.

The following criteria were used to evaluate implant properties:
- Choice of materials with regard to osseointegration
- Design and/or functional aspects with regard to osseointegration
- Choice of materials with regard to gingival integration
- Design with regard to gingival integration
- Short- and long-term periodontal aspects with regard to:
  a) stability  b) bacterial contamination  c) biological width
- Surface treatment according to the functional requirements of tissue portions
  a) gingival attachment  b) osseointegration

Result of scientific studies

The biological, aesthetic implant that follows the model of nature.

1 The Ceramic-Abutment:
- Aesthetics in soft tissue
  - No display of the dark titanium through the gingiva.
- Soft-tissue barrier
  - Superior gingival integration.
  - Connective tissue attachment.
- Preservation of biological width and aesthetics
  - due to the individual preparation of the ceramic in harmony with the shape of the gingiva.
- No heat generation
  - and no necrosis of bone during the preparation.

2 The Lotus-Effect of the Abutment: (patent.)
Graph a) No adhesion of plaque and microorganisms as in the natural tooth.
Graph b) Self-Cleansing biologic surface due to a special combination of micro- and nano-structure.

3 The Connection: (patent.)
- Long-term connection free of microorganisms
  - Stable connection of the ceramic to the underlying titanium when exposed to the oral cavity due to isostatic pressing technique.
- No micro-gap-effect:
  - No horizontal and vertical bone-loss caused by microorganisms as found in the micro-gap of conventional two-piece systems.

4 The Titanium-Screw:
- solid with long term proven stability
- surface for a safe osseointegration
- conical shape as the natural tooth
- surface for a safe osseointegration
- self-cleansing biologic surface due to a special combination of micro- and nano-structure.
- no adhesion of plaque and microorganisms as in the natural tooth.
- preservation of biological width and aesthetics
- self-cleansing biologic surface due to a special combination of micro- and nano-structure.
- no adhesion of plaque and microorganisms as in the natural tooth.

Study 1: The One Piece Ceramic-Titanium Implant.

The natural model

- Primary stability and immediate function
- Absolute symmetry of rotation
- Conical shape as the natural tooth
- Surface for a safe osseointegration
- Solid with long-term proven stability

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Studies and sources

Study 1
- Soft-tissue reaction
  - "Positive tissue reaction to zirconium-oxide ceramic".

Study 2
- Methods and procedures
  - "Plaque adhesion to ceramic abutments is significantly less than aluminum oxide and titanium in the presence of bacteria."
  - "Exhibits a basal lamina and hemidesmosomal layer".
  - "Attachment complex of gingiva and abutments made of aluminium-oxide ceramic is similar to that to the tooth."
  - "The phenomenon of self-cleansing has been scrutinized and offers possibilities of application to implantology."
  - "Studied biofilm adhesion to ceramic abutments and found a similar attachment to the tooth."
  - Xin Xie; Universität Köln. 2004 Mai.
  - "Sealing Materials to fill up the inside of an implant e.g. wax offer best nutrition to the bone.
  - "This leads to an inflammation of the marginal mucosa."
  - "With the two-piece system, it is impossible to keep the micro-gap free of bacteria."
  - "Two-piece implants show significant potential for inflammation and bone resorption at the micro gap."
  - "Two-piece implants show the least bone resorption when the surface is roughened."
  - Nentwig G H, Psenicka H; Göttingen. 2003 Nov.
  - "One-piece implant show the least bone resorption when the surface is roughened."

Study 3
- The Lotus-Effect of the Abutment:
  - No adhesion of plaque and microorganisms as in the natural tooth.
  - Preservation of biological width and aesthetics
  - No horizontal and vertical bone-loss caused by microorganisms as found in the micro-gap of conventional two-piece systems.

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