

Straumann® Original  
Clinical Review

Perfect, precise components  
match

Proven mechanical performance

Long-term clinical effect

## PROVEN MECHANICAL PERFORMANCE

A number of studies have investigated the difference between original and non-original abutments and came to interesting conclusions.

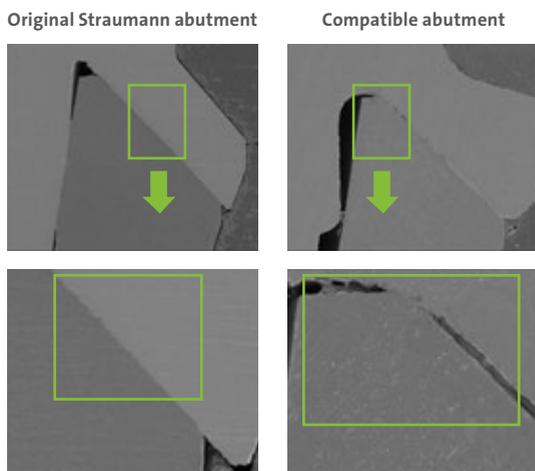
In a study by **Kim et al.**, screw loosening was assessed by comparing three different non-original abutments with the *originals* manufactured by Straumann. All abutments were mounted onto Straumann® Tissue Level Implants and then tested in an *in vitro* fatigue test environment. In two of the three *non-original* systems, the test resulted in fractures of either the implant or the abutment. Only one of the *non-original* abutment systems survived the test, although with significant lost torque. Only the *original* Straumann abutment did not show any loosening or fracture of the abutment in this test environment. Therefore, the authors recommended the use of both implant and abutment manufactured by the same company so as to prevent abutment screw fracture (**Kim et al., 2012**).

In another study, **Gigandet et al.** evaluated the rotational misfit of *original* implant-abutment connections compared to *non-original* abutments. CAD/CAM-manufactured *original* and *non-original* abutments from two manufacturers were tested, each connected to the Straumann reduced-diameter implants. The study demonstrated a significantly higher rotational misfit for the abutments of one of the tested third-party manufacturers on Straumann implants compared to the original Straumann implant-abutment system. The test could not be performed on the abutments of the second third-party manufacturer since all abutments were oversized and did not fit properly into the Cross-Fit® connection of the Straumann implants. The authors further concluded that *non-original* abutments differ from *originals* with regards to the design of the connecting surface, shape, dimensions and material. *Non-original* abutments also present a higher rotational misfit that may eventually lead to fracture of the implant or the abutment (**Gigandet et al., 2014**).

The micro-mobility of the implant-abutment interface for *original* and *non-original* abutments was recently evaluated (**Keilig et al., 2013**). Standard CAD/CAM Straumann abutments and abutments from two third-party manufacturers were mounted on Straumann implants and subjected to a fatigue test. The

authors demonstrated that the mobility of the implant-abutment interface varied significantly in *non-original* abutments compared to *original* components. While in the best case, *non-original* abutments demonstrated micro-mobility comparable to the *original*, in some micro-mobility was higher. Thus, the authors concluded that the use of *original* components offers higher predictability in precision fit.

The subject of non-original abutments was also studied by **Mattheos et al.** The authors investigated the morphological micro-features of three commercially available abutments (one original and two from systems claiming compatibility) loaded on the Straumann regular neck implant. They reported that, although the tight contact in the implant shoulder was similar in all three investigated abutments, the engagement of the internal connection as well as the anti-rotation elements were compromised in the compatible abutments. Such differences may in fact lead to serious consequences in the long-term stability of the prosthesis (**Mattheos et al., 2015**).



**Fig. 1** Examples of an area of tight (left) and non-tight (right) contact between abutment and implant shoulder. The abutments were torqued on original Straumann RN implants. Courtesy of Dr N. Mattheos

In addition, there are case reports of situations where patients with *non-original* components sought help following technical and biological complications with their implant-borne prosthesis that had been made elsewhere in the world. Very often, third-party components showed visible morphological differences compared to *original* components. The mechanical properties and clinical performance can be significantly affected by these differences (**Mattheos et al., 2012**).

The studies presented above point to higher rotational misfit, stronger effect of screw loosening and greater variance in precision fit of non-original components when compared to the corresponding original components. All these differences may result in unexpected failure and can even have an adverse effect upon clinical performance.

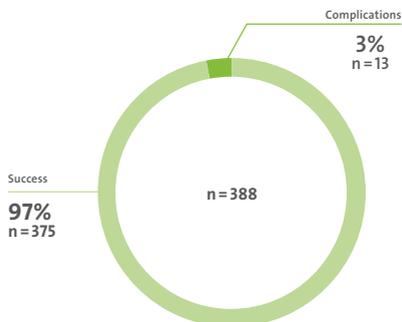
## DID YOU KNOW?

No long-term clinical data exist for the non-original components and therefore, their long-term performance has not been proven.

## LONG-TERM CLINICAL EFFECT

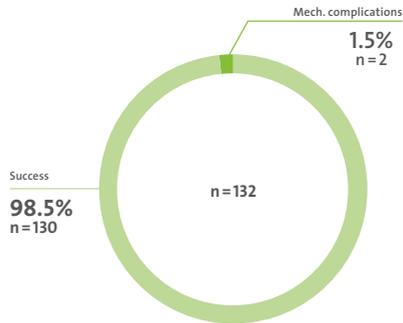
Although most long-term clinical studies in dental implantology assess the performance of the endosteal implant itself, there are a number of studies that have documented the performance of the prosthetic components including the abutments.

**Wittneben et al.** presented a 10-year retrospective analysis of the rate of mechanical complications in prosthetic restorations. The authors assessed prosthetic restorations in all 388 surviving Straumann® Tissue Level Implants. They found that after 10 years, only 3% (n = 13) of the secondary prosthetic components showed complications (Fig. 2). These reported complications included: loosening of the occlusal screw in 2.5% (n = 10) of cases and fracture of the occlusal screw or loosening/fracture of the abutments in less than 1% (n = 3) of cases (**Wittneben et al., 2014**).



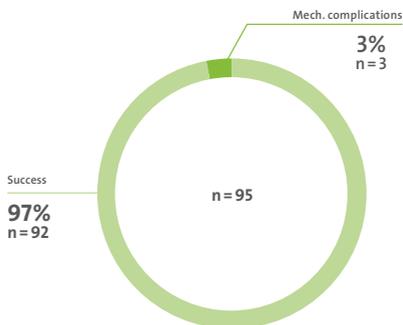
**Fig. 2** 97% success rate for Straumann original secondary prosthetic components (**Wittneben et al., 2014**).

Another prospective 10-year clinical study reported only 1.5% (n = 2) mechanical complications of the prosthetic parts in 132 dental implants (one loose assembly screw which was observed twice in one patient (Fig. 3)). No fractures of abutments, abutment screws, or assembly screws were documented during the 10 years of functioning (Fischer et al., 2013).



**Fig. 3** 10-year success rate of 98.5% for Straumann prefabricated prosthetic secondary components (Fischer et al., 2013).

Finally, in a 20-year study, in partially edentulous patients, the performance of 95 Straumann implants was documented by Chappuis et al. Mechanical complications related to prefabricated components were observed in only 3% (n = 3) of cases (Fig.4). These included a fractured abutment in a fixed dental prosthesis with cantilever in one patient, and screw loosening in two patients (Chappuis et al., 2013).



**Fig. 4** 20-year success rate of 97% for Straumann prefabricated prosthetic secondary components (Chappuis et al., 2013).

As presented above, use of original prosthetic components provides reproducible high stability of the implant - abutment connection. It also minimizes a risk of any mechanical complications and guarantees long-term clinical performance of the implant.

# PERFECT, PRECISE COMPONENTS MATCH

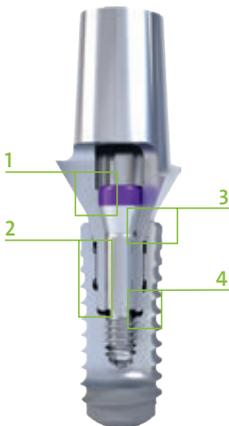
## DID YOU KNOW?

In recent years, an increasing number of third-party manufacturers have copied prosthetic components and claim compatibility with those of the original implant systems.

At first glance, the design of non-original abutments seems to be equivalent to the corresponding originals. In fact, however, there are differences that cannot be seen, but that can only be perceived in a cross-section examination of the implant-abutment system. Moreover, there are parameters that demonstrate why these non-original abutments are never 100% identical to the originals. Every manufacturer defines the exact dimensions and tolerances for the production of its implants, abutments as well as for the implant-abutment connection. These tolerances are not known to any of the manufacturers of non-original abutments, therefore they need to determine the dimensions of the original implant-abutment interface by measuring the individual parts. This may lead to serious consequences as regards the performance of non-original abutments.

## DID YOU KNOW?

An abutment which does not match perfectly into the implant can potentially lead to loosening of the screws of the abutment and, subsequently, to fracture of the abutment, screw or even the implant (Kano et al., 2006).



## Features of the original implant – abutment interface that contribute to long lasting therapeutic success.

### Features

- 1 Conical screw head
- 2 Radial contact surfaces
- 3 Tight conical implant-abutment interface
- 4 Deep implant-abutment engagement

### Benefits

- ▶ No peak stresses
- ▶ Precise guidance
- ▶ Sealed connection
- ▶ High stability

## REFERENCES

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