What is the study about…?

Dr Nikos Mattheos and collaborators investigated the morphological micro-features of 3 commercially available implant-abutment units/connections, using original and compatible prosthetic components.

3 sliced units in each experimental group were analyzed and the following configurations were tested:

1. Straumann 3.3 RN 10 mm implant + Straumann SynOcta Gold abutment (n=3)

2. Straumann 3.3 RN 10 mm implant + Ostech Pro - Pack RN Eng IL CoCr Str (n=3)
What is the study about...

3. Straumann 3.3 RN 10 mm implant + Medentika GmbH POC abutment, Co/Cr (n=3)

The contact between the implant and abutment was assessed as tight (microgap of 4μm or less) or non-tight (microgap >4μm). Measurements were conducted in the three contact areas of the implant-abutment units where tight contact of the components is expected. The measurements were carried out by two independent observers and then averaged.

- the area of the abutment in contact with the external shoulder of the implant neck (blue)
- the area of the abutment in contact with the internal connection of the implant (red)
- the area of the abutment screw in contact with the internal implant threads (green)
Results

- big discrepancy between the right and left side of the Medentika abutment as well as microroughness and microcracks, both in the areas of tight and non-tight contacts.

- limited one-sided tight contact in the Ostech abutment and no-tight contact at all in the Medentika abutment. This is indicative of the precision required for both internal and shoulder contact areas to engage simultaneously in tight contact.

- The tight contact length is similar in the Straumann and Ostech abutment but is 4x smaller in the Medentika abutment.
While addressing this paper with a customer, we should point out the following:

1. This study, although in-vitro, provides **important and unique scientific evidence** about possible clinical performance of the non-original prosthetic components. Besides focusing only on the rough analysis of the implant-abutment system cross-sections, the authors provided also precise gap measurements in the critical areas, therefore substantially contributed to better understanding the implant-abutment interaction phenomenon.

2. Only the original Straumann abutment presented **consistent and reliable values of measurements in all critical studied areas (both left and right side)**. This assures long-term success of the prosthesis and the prevention of the complications. The tight contact between the components determines the friction, which holds the prosthesis on the implant and prevents micromotion as a result of the occlusal forces.

3. The contact areas of the implant shoulder and the internal connection can counteract each other, unless the abutment is manufactured with very high precision. The microcracks and roughness between the abutment and implant observed in particular in the Medentika abutment can increase risk for settling and screw loosening. This phenomenon was already published before by Kim et al 2011.

4. The engagement of the abutment screw threads is a crucial point as the force which leads to preload of the abutment is applied through them (Cardoso et al. 2012). The deficient engagement seen in Medentika abutment creates a significant risk for deformation or fracture of the screw.

**General info**

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 eventually lead to serious consequences as regards the performance of non-original abutments.

**References:**