by Dr. Stefan Holst, Germany

Nobel Biocare does not develop individual products but entire solutions that provide fully functional, natural looking, long-lasting results. In order to ensure long-term clinical performance, safety and cost-efficiency for everyone involved in the treatment process, each Nobel Biocare component has been designed to fit and function perfectly with its related components. Together, they produce a finely tuned system.

When assessing any implant-supported restorative solution for a patient, one has to keep in mind that the entire system under consideration is only as strong as its weakest link. The performance of each specific component depends not only on the quality and design of the component itself but also on its interface with the rest of the restorative system. Consequently, each component should not be evaluated on its own. Clinically relevant conclusions can only be reached when a component is tested within the system it is a part of. Nobel Biocare therefore conducts testing and research on both individual components, such as implants, abutments and screws—and how they work together—as well as the entire system that constitutes the implant system.

We at Nobel Biocare study systems from their initial design to long after delivery to the end-user, the patient. We develop and scrutinize engineering and manufacturing processes, and we carry out quality assurance, clinical research and post-market surveillance. Only with this approach can we be certain that the system will function safely and reliably for many years to come.

Precise fit ensures long-term performance. For conical connection implants, joint compression (p) depends on a number of variables, such as preload (tensile force, FA), friction angle (θ) and contact length (d).

Mismatching components can have severe consequences. Improper fit leads to uncontrolled peak forces, which may result in implant fracture.

Avoid substitutes, minimize patient risk

If substitute components are used, the parameters governing system performance are no longer controlled. Consider maximum joint compression—which defines the load that the implant collar can bear—as an example. A substitute may result in a force that is higher than the allowed maximum, causing the implant to fracture. To prevent such catastrophic results, the peak forces have to be distributed in a controlled way. This can only be achieved by using high-quality, precision-manufactured components that have been designed and tested both individually and as part of the system for which they have been designed.

Precise fit for joint stability

The interface between the implant and abutment is critical for joint stability. Manual adjustment of a cast or the use of a substitute abutment can alter the contact angle and contact length. Such an undefined contact situation entails a risk of system failure.

Optimized to the last detail

Nobel Biocare abutments are delivered with a dedicated clinical screw that has been optimized for the implant-abutment system it is a part of. Depending on the abutment, connection type and platform size, screws come with or without a surface coating.

The absence or presence of the coating and the coating type all affect the preload. For example, with a diamond-like carbon coating, screws marketed under the Torque brand show higher preload values compared with screws that have a standard titanium surface.

Preload, the force that holds the components together

Preload is defined as the tensile force applied to an implant system to ensure a tight and stable fit for long-term performance. Precise fit ensures long-term performance. For conical connection implants, joint compression (p) depends on a number of variables, such as preload (FA), friction angle (θ) and contact length (d). Small changes in any of these parameters can lead to extreme load and stress conditions that result in system failure.

To account for this major loss of torque, and to ensure that the system is sufficiently held together, the screw has to be inserted at the recommended torque. Fully manual screw insertion is likely to result in lower torque and, consequently, suboptimal preload.

Avoiding insufficiency in preload leads to increased relative motion between the system components, and this can contribute to screw loosening and/or component failure. Conversely, preload values that are too high can result in component fracture.