Osstell ISQ

Your guide to
Predictable surgical and restorative protocols
Increased need for implant diagnostics

- Demand for reduced treatment time
  One stage, immediate- early provisionalization

- Implants at risk
  Smokers, bruxism, diabetic patients, compromised bone, grafted sites, extraction sockets etc

- New implant designs and surfaces
  Implant performance?
  Improved initial mechanical stability?
  Faster osseointegration?
Avoiding micromovement:
A key parameter for implant success

"The achievement and maintenance of implant stability”* 

Resonance Frequency Analysis (RFA) has a perfect correlation to micromovement.

Micro movement could jeopardize the treatment outcome.

- RFA measures resistance to lateral micro movement.
- Torque measures resistance to shear forces.
Which technique should be used?

Resonance Frequency Analysis (RFA)
- Repeatable, objective and non-invasive.
- Measures stability in all directions.
- Could be used at placement and before final restoration to monitor the degree of osseointegration.

Torque/tactile feeling
- Only at placement.
- Does not measure lateral stability.
- Torque test at second stage could be invasive.

Percussion test
- Not optimal for implants.
- Operator dependent, low sensitivity.
Resonance Frequency Analysis (RFA) and ISQ

RFA uses the principle of a tuning fork. The stiffer the interface between the bone and the implant, the higher the frequency.

The ISQ scale is derived from frequency (kHz) and ranges from 1 to 100. The higher the stability, the higher the ISQ.
Osstell ISQ

- 1991: First human trials
- 1999: Osstell AB was formed
- 2001: First generation Osstell instrument introduced
- 2004: Osstell Mentor introduced
- 2009: Osstell ISQ introduced
- 2010: Osstell Scientific Forum established

Gradually becoming a global standard in daily practice.
How does it work?

Magnetic pulses activate the SmartPeg attached to the implant.

The vibration frequency of the SmartPeg is measured.

The more stable the implant, the higher the frequency (ISQ).

By measuring on two different occasions, you can verify not only the initial mechanical stability, but also determine the degree of osseointegration.
Measurement procedure

1. Attach the SmartPeg (4-6 Ncm)

2. Aim for the magnet on top of the SmartPeg in order to get the ISQ value. *Repeat the measurement at a different angle (90°)*
Why several measurements?

Normally, the implant stability is the same in all directions. However, sometimes the bone varies around the implant causing the implant stability to be different in different directions.

Osstell is designed to provide the highest and the lowest ISQ values in such situations. When the stability is high, this difference is less important, but if implant stability is very low in one direction it might require a more conservative approach.

The graph above illustrates different stability in different directions, ISQ 81 and 53.
Stability development over time

As a result of osseointegration, initial mechanical stability is supplemented and/or replaced by biological stability, and the final stability level for an implant is the sum of the two.

Stability does not generally remain constant after implant placement. For example, there is likely to be an initial decrease in stability, followed by an increase as the implant becomes biologically stable.
When to measure?

At implant placement

- Initial mechanical stability
- Baseline ISQ.
- Surgical protocol: 1-stage, 2-stage?
- Immediate-, early-, traditional-, delayed loading?

Before loading/final prosthesis

- To determine the degree of osseointegration
- Compare with baseline ISQ.
- Temporization?
- Modified prosthesis?
- Add time and take a new measurement?

Tactile feeling or torque will not serve as a baseline for future comparisons and could potentially destroy ongoing osseointegration at second stage.
Stability development in different bone quality

High initial stability (ISQ values 70 and above) tends to not increase with time, even if the high mechanical stability will decrease to be replaced by a developed biological stability.

Lower initial stability will normally increase with time due to the lower mechanical stability being enforced by the bone remodeling process (osseointegration).

Values such as ISQ 55 or lower should be taken as a warning sign and actions to improve the stability might be considered (larger implant diameter, prolonged healing time etc.)*

Early warning!

The overall average value of all implants over time is approximately 70 ISQ.

If the initial ISQ value is very high, a small drop in stability normally levels out with time. A big drop in stability or a continuing decrease should be taken as a warning sign.

Lower values are expected to be higher after the healing period. The opposite could be a sign of an unsuccessful implant and actions should be considered.
> 500 Osstell articles – the model

- **Indication**
  - Implant at risk - monitor ISQ
  - ref. 3, 5

- **Surgical protocol**
  - Full Splint Imm
  - 2-stage
  - Traditional
  - ref. 3, 4, 5

- **Restorative protocol**
  - Partial
  - 1- or 2-stage
  - Early
  - ref. 1, 2

- **High Stability**
  - Single
  - 1-stage
  - Immediate
  - ref. 1, 2

- **Low Stability**

- **Medium Stability**

- **ISQ**

- 60

- 65

- 70
> 500 Osstell articles – a selection

RFA is a proven scientific method with more than 500 scientific publications. A searchable database can be found at: www.osstell.com/scientific-forum

![ISQ Indication Low Stability.svg](https://www.osstell.com/sites/default/files/ISQ_Indication_Low_Stability_512.png)

1) Early Loading of Nonsubmerged Titanium Implants with a Chemically Modified Sand-Blasted and Acid-Etched Surface: 6-Month Results of a Prospective Case Series Study in the Posterior Mandible Focusing on Peri-Implant Crestal Bone Changes and Implant Stability Quotient (ISQ) Values

Michael M. Bornstein, Dr. med. dent.; Christopher N. Hart, DMD; Sandro A. Halbritter, Dr. med. dent.; Dean Morton, BDS, MS; Daniel Buser, Prof. Dr. med. dent.

Clin Implant Dent Relat Res 2009

These studies support the ISQ/RFA method to be a useful tool for the clinician in daily practice, if the concept of immediate or early loading is applied. For early loading, a consecutive measurement of ISQ values seems important to compare the values at implant placement and at the day of anticipated loading.

If the ISQ value at day to load is < 65, an additional healing period is recommended, and the ISQ values is measured again 3 weeks later until the required level is reached. This approach is practical and well understood by patients. (Prof. Daniel Buser prefers > 70 ISQ, single teeth, early loading/Straumann, otherwise add three weeks, according to an oral presentation given at the Osstell Scientific Symposium in connection to the of the EAO 2010.)

2) The Predictive Value of Resonance Frequency Analysis in the Surgical Placement and Loading of Endosseus Implants

Baltayan, Serge; Mardirosian, Martin; El-Ghareeb, Moustafa; Aghaloo, Tara; Pi-Anfruns, Joan; May, Peter

AADP Poster 2011

One-stage placement of implants with ISQ values greater than 66 can be performed. Implants with ISQ values less than or equal to 66 should be placed using the two-stage protocol, which shows a higher survival rate. The computed ISQ = 66 cut-off value used to select between one-stage and two-stage placement is validated in this study. Moreover, early loading of implants with ISQ values less than 64 can be performed. Implants with ISQ values less than 64 should utilize traditional loading, which shows a higher survival rate. The computed ISQ = 64 cut-off value used to select between early and traditional loading is validated in this study. Higher ISQ values at osseointegration correlate with higher survival rates.


Stefan Peep, DMD.

Inside Dentistry, September 2007, Special Issue 2

Two or more splinted implants were used as co-abutments for all of the implants included in the research. Limits for ISQ at placement was at least 60 ISQ and changes in ISQ are used to secure the clinical outcome. If the registered ISQ dropped below 50, the implant was unloaded by replacing the abutment with a short cover screw.
Osstell ISQ, a guide to:
Predictable surgical and restorative protocols

- Reduce treatment time
  Surgical protocol: 1-or 2-stage?
  Restorative protocol: Immediate- or early loading?

- Manage implants at risk
  Surgical protocol: 2-stage
  Restorative protocol: Traditional or delayed loading?

Is the implant performing as expected?
Decreasing ISQ value/ early warnings
Prevent costs due to premature loading
Treat more patients with risk factors in a safer way/increase income
More than 500 articles has been published, validating the concept.

References are available at: www.osstell.com
Osstell ISQ, a guide to:
Predictable surgical and restorative protocol

- Reduce treatment time
- Managing implants at risk
Osstell Scientific Forum

The interest for RFA has increased dramatically and to better serve this interest the “Osstell Scientific Forum” has been launched, sponsored by Osstell AB. Gradually more information and new functions will be added during 2012.

Key elements

1. www.isqforum.com
   A basis as a communication tool (database, case reports, forum, publications)

2. Annual Symposium
   Monaco 2009, Glasgow 2010, Athens 2011 and next meeting will be at EAO in Copenhagen 12 October, 2012.

3. Research support
   Donation of ISQ instruments and SmartPegs to researchers doing studies that include implant stability measures in the protocols.

4. Scientific Advisors
   The Scientific Forum will be governed by a group of Scientific Advisors who will review and structure scientific documentation of ISQ and RFA.
"As scientific advisors to the Osstell Scientific Forum, we would like to welcome you to make use of it. We have all been using RFA technology and the ISQ scale for many years – in our daily practice as well as in our research.

We want to encourage you to explore this useful technology and scale, and to share your data and clinical experience with the ISQ Forum. Together, we can develop a substantial scientific and clinical database that will help all of us optimize the clinical outcome for our patients.”
Thank you!

www.osstell.com