

## Osseoperception: Can implant-mediated sensibility becomes a reality

Sir,

Osseoperception is the capability of osseointegrated titanium implants to transmit certain sensibility, and the term was given by Prof. P-I Branemark.<sup>[1]</sup> A lot of research was done in the past to find out the mystery whether osseoperception is really associated with dental implants. Today much scientific evidence was present to support the concept of osseoperception. A systematic review by Mishra *et al.* evaluated the published articles and presented the histological, neurophysiological and psychophysical evidence and also the role of mechanoreceptors to prove the presence of osseoperception in dental implants.<sup>[2]</sup> Li *et al.* investigated the biological behavior of periodontal ligament stem cells induced to differentiate into Schwann cells (SCs) on the surfaces of titanium discs. Sandblasted and acid etched titanium surfaces show good biocompatibility for the SC-like cells, which is important for the application of these cells in peri-implant nerve tissue engineering, through which they are expected to improve the osseoperception of dental implants.<sup>[3]</sup>

The decrease osseoperception of dental implants is due to the absence of periodontal ligaments and Ruffini-like endings around implants. The peripheral nerve fibers which were damaged during surgery were not regenerated properly. Ma *et al.* studied the calcitonin gene-related peptide- $\alpha$  ( $\alpha$ CGRP), a neuropeptide widely distributed throughout the central and peripheral nervous systems. They are capable of promoting local SCs proliferation, which is critical for peripheral nerve regeneration. They found that  $\alpha$ CGRP is a potent vasodilator and a physiologic activator of bone formation. Local application of  $\alpha$ CGRP may promote peripheral nerve fibers regeneration and improve the osseoperception of dental implants.<sup>[4]</sup> Corpas Ldos *et al.* studied the nerve fibers around osseointegrated implants in humans. Failed implants were retrieved from patients, and the light microscopic study of peri-implant bone was done. They observed both myelinated and unmyelinated nerve fibers inside the Haversian canals of the osteonal bone near the implant threads. However, no differentiated nerve endings could be observed around the implants. This study shows the presence of nerve fibers in human peri-implant bone.<sup>[5]</sup>

Huang *et al.* did a systematic review on the innervation of peri-implant tissues and the influence of implant placement and loading protocols. They concluded that higher density of nerve fibers was confirmed around loaded dental implants when compared to unloaded implants or extraction sites without implantation.<sup>[6]</sup> Mishra *et al.* found in their study that clinical outcomes of patients with dental implant-supported restorations indicate the presence of sensory perception after some time. The evidence available on the plasticity of the central nervous system provides a possible neural basis for our understanding of the accommodation of patients to these changes in dental status. With the loss of teeth and periodontal structure, other peripheral receptors dominate and transmit the afferent projections to the sensorimotor cortex and compensate by providing stimulation to the area of bone-anchored implant restorations.<sup>[2]</sup>

Animals and human studies had shown that there exist osseoperception and to increase the sensibility of dental implants further research on implant surface coating is required so that implant can be a better alternative to natural tooth in all aspects in near future.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

**Sunil Kumar Mishra, Ramesh Chowdhary<sup>1</sup>**

Department of Maxillofacial Prosthodontics and Implantology,  
Peoples College of Dental Sciences and Research Centre, Bhopal,  
Madhya Pradesh, <sup>1</sup>Branemark Osseointegration Centre in India,  
Bengaluru, Karnataka, India

### Address for correspondence:

Dr. Sunil Kumar Mishra,  
Department of Maxillofacial Prosthodontics and Implantology,  
Peoples College of Dental Sciences and Research Centre,  
Bhopal, Madhya Pradesh, India.  
E-mail: drsunilmishra19@gmail.com

## References

1. van Steenberghe D. From osseointegration to osseoperception. *J Dent Res* 2000;79:1833-7.
2. Mishra SK, Chowdhary R, Chrcanovic BR, Brånemark PI. Osseoperception in dental implants: A systematic review. *J Prosthodont* 2016;25:185-95.
3. Li X, Liao D, Gong P, Dong Y, Sun G. Biological behavior of neurally differentiated periodontal ligament stem cells on different titanium implant surfaces. *J Biomed Mater Res A* 2014;102:2805-12.

4. Ma L, Xiang L, Yao Y, Yuan Q, Li L, Gong P. CGRP-alpha application: A potential treatment to improve osseoperception of endosseous dental implants. *Med Hypotheses* 2013;81:297-9.
5. Corpas Ldos, Lambrichts I, Quirynen M, Collaert B, Politis C, Vrielinck L, *et al.* Peri-implant bone innervation: Histological findings in humans. *Eur J Oral Implantol* 2014;7:283-92.
6. Huang Y, Jacobs R, Van Dessel J, Bornstein MM, Lambrichts I, Politis C, *et al.* A systematic review on the innervation of peri-implant tissues with special emphasis on the influence of implant placement and loading protocols. *Clin Oral Implants Res* 2015;26:737-46.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

#### Access this article online

##### Quick Response Code:



##### DOI:

10.4103/2347-4610.207368

##### Website:

[www.eurjprosthodont.org](http://www.eurjprosthodont.org)

**How to cite this article:** Mishra SK, Chowdhary R. Osseoperception: Can implant-mediated sensibility becomes a reality. *Eur J Prosthodont* 2016;4:62-3.

