Editorial

Biohybrid Implants - A Substitute for Natural Tooth in Future

Biological cooperation of the surrounding tissues is responsible for the functions of any organ. Today there are alternative treatment modalities with artificial organs to support organ function *in vivo*, but presently this treatment options are not able to entirely replace organ function.[1] Today in medical sciences, implant treatment is one of the most successful treatment modalities. Prof PI Branemark coined the term "Osseoperception" and described it as the capability of osseointegrated titanium implants to transmit certain sensibility. The absence of periodontal ligaments and Ruffini-like endings around implants is responsible for the decrease in osseoperception of dental implants.[2] Sonoyama et al,[3] used periodontal ligament stem cells and stem cells obtained from apical papilla with tooth root-shaped hydroxyapatite tricalcium phosphate to develop the "bioroot". When it was transplanted in swine, they showed the formation of periodontal ligament (PDL) tissue on the surface of the "bioroot".

In next generation for tooth loss, biohybrid implant can act as a future bio-hybrid artificial organ replacement therapy. Autologous dental progenitor cells (DPCs) have the ability to form organized periodontal tissues on titanium implants and can lead to significant improvement in current implant therapies. Oshima et al,[1] developed the 'biohybrid dental implant, a hydroxyapatite-coated titanium implant covered by murine dental follicle tissue at embryonic day 18.5, which was obtained from developing tooth germ. There was formation of functional cementum PDL tissue complex along with the innervation and development of the Sharpey's fibers around this implant. Lin Y et al,[4] in their *in vivo* study on rat's maxillary molar implant model, used rat PDL-derived DPCs to bioengineer PDL tissues on titanium implants. When implants were recovered and analyzed, they revealed organized PDL tissues surrounding titanium implant. Nakajima K et al,[5] in their study showed a novel bioengineering method for functional biohybrid implant. The implant was combined with adult-derived periodontal tissue and attached with bone tissue as a substitute for cementum. There was successful engraft of biohybrid implant with the help of the bioengineered periodontal ligament. The physiological function such as orthodontic movement through bone remodeling and appropriate responsiveness to noxious stimuli were well restored.

Further, animal and human research is required to find out the potential of biohybrid implant, so that they can be used successfully clinically as a next generation dental implant at the site of previously lost teeth.

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