



International College of Prosthodontists
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Program Speaker – Pekka K. Vallittu

Title

Bioactive Fiber-Reinforced Composite Implants in CMF Implantology

Abstract

Development of medical biomaterials has been limited to use only isotropic bulk materials until recently, when first clinically applicable fiber-reinforced composites (FRC) have become to the clinical use in late 1990s. Present applications of FRC can be found in all disciplines of clinical dentistry and in certain applications of bone reconstructive surgery. All of these applications are having reinforcing and toughening fibers of glasses in resin-based matrix of FRC. Mechanism of action of a recently introduced bioactive glass (BG) containing FRC implant for cranio-maxillo-facial (CMF) reconstruction is based on implant induced ossification. In the ossification calcium and phosphate ions which can be leached e.g. from bioactive glass precipitate on implant surface which turn the implant surface osteoconductive. Simultaneously the ions promote osteogenic cells for bone formation. When the healing and osteogenic process of large cranial FRC-BG implant was analyzed in vivo, noninflammatory mesenchymal tissue with newly formed mineralized woven bone with capillaries and larger bone vessels were found already one month postoperatively. Longer term positron emission tomography (PET) and radiological investigations have confirmed induction of bone formation by the FRC-BG implant. In vitro studies demonstrated osteogenic potential of host mesenchymal stromal cells by presence of certain types of BGs in the implant. This lecture will give an insight to BG containing FRC CMF implants from the present status to future perspectives.

Biography

Pekka Vallittu has earned his degrees in Dental Technology in 1988, Doctor of Dental Surgery and Doctor of Philosophy in 1994, received Adjunct Professorship in 1995 and specialized in prosthodontics and stomatognathic physiology in 2000 (EPA Recognized Prosthodontist). Presently, he is a Full Professorship and Chair of Biomaterials Science in the Faculty of Medicine, University of Turku, Finland and works as Dean of the Institute of Dentistry at the University of Turku and as the Director of Turku Clinical Biomaterials Centre. He holds Honorary Professorship at the University of Hong Kong, Pokfulam and Visiting Professorship at the King Saud University in Riyadh, Saudi Arabia.

His predominating research activity on fiber-reinforced composites has lasted over 30 years since 1980's. The first clinical applications of fiber-reinforced composites were found in clinical dentistry and thereafter in combination with bioactive component in bone surgical applications as non-metallic bioactive implants.

Pekka Vallittu has over 630 ISI Web of Science Index publications. He has established two companies for getting developed composite materials clinical use in dentistry and bone surgery.