‘Oral tissue contains a kind of powerful stem cell’

Tissue engineering is based on the concept that the human body, or parts of it, can be regenerated using stem cells. Since the 1980s, several types of tissue and organs have been generated worldwide using cultured living cells.

Dental Tribune Asia Pacific, in cooperation with FDI’s Worldental Daily, spoke with Dr. Minoru Ueda from Nagoya University in Japan about key tissue-engineering strategies and their potential for dentistry.

Dr. Ueda, tissue engineering is a relatively new approach in regenerative medicine. How did it find its way into dentistry?

The basic concepts and strategies for tissue regeneration are general. To regenerate any tissue, we need stem cells, growth factors and a scaffold.

In the field of dentistry, we have made much scientific progress in terms of materials, which gives us an advantage over other fields of medicine. We began with developing high-quality materials and then expanded to using stem cells.

What are the key tissue-engineering strategies that are currently being developed for dentistry and how do they work?

The most important tissue for dentistry is bone. We are establishing technologies for bone tissue engineering and apply these clinically to implant surgery. Secondly, we are focusing on stem cell science.

Oral tissue contains a kind of powerful stem cell that can be used to treat systemic diseases, such as brain infarction or heart infarction. The dental pulp stem cell is one of the most important cells derived from oral tissue.

Complete maxillary implant prosthodontic rehabilitation with a CAD/CAM-fixed prosthesis

The authors explain the use of high-strength zirconium oxide restorations in the prosthodontic management of an edentulous maxilla with a failing implant.

‘You’ve taken implant training; what do you do next?’

By Lynn Mortilla, RDH

Integrating implants into a practice is a job for the whole team as much as it is for the dentist. It is critically important to focus on the “other” skills necessary after clinical competencies are learned. A necessary step is to be sure not only the clinician but the entire team is trained for implant dentistry. Everyone in the practice plays an integral role for successful incorporation of systems, strategies and techniques to enhance the success of implant dentistry. These techniques should be built into daily protocols. Standardized forms and tools can also aid the implant-focused practice.

Dr. Minoru Ueda, Japan

Which dental conditions will be the first to be treated or cured by tissue engineering?

Atrophied alveolar bone and severe periodontitis.
Is it possible to reconstruct complex tissue defects made up of multiple cell types? Yes, it is. We have succeeded in reconstructing the structures that make up periodontal tissues, which are cementum, bone and periodontal ligament in humans.

There is different legislation around the world regarding stem cell research. Would you please explain how the situation in Japan differs from other parts of the world and its effect on your research? We can do basic research using animal cells and human stem cells, but research using embryonic stem cells [ES] and induced pluripotent stem cells [iPS] must be performed under the control of the ethical committees of each university. In order to use ES or iPS, we require approval from our university and government.

What is your opinion on this matter? Dentists should not be allowed to inject any cells by themselves for non-dental reasons. However, for cosmetic reasons, dentists can inject stem cells into the oral and maxillofacial areas, especially into the face because cosmetic problems such as wrinkles are not a disease. The surface structures of an implant are very important, but this is not a main factor for enhancing the living cell around the fixture.

What effect will tissue engineering have on dental practice during the next 20 to 25 years? Tissue engineering could provide a new treatment method for diseases that have not been treatable thus far, such as severe periodontitis and atrophied alveolar ridges. Also, cosmetic therapy using tissue engineering in the oral and maxillofacial regions will become commonplace in the dental practice.

This interview was published with permission by the FDI World Dental Federation.)

Tell us what you think!

Do you have general comments or criticism you would like to share? Is there a particular topic you would like to see more articles about? Let us know by e-mailing us at feedback@dental-tribune.com. If you would like to make any change to your subscription (name, address or to opt out) please send us an e-mail at database@dental-tribune.com and be sure to include which publication you are referring to. Also, please note that subscription changes can take up to 6 weeks to process.

'...Tissue engineering could provide a new treatment method for diseases that have not been treatable thus far.'

To assist with the next steps as a team, I published ‘Incorporating Implants Into Your Practice — Team Strategies for Success.’ The resource guide helps practices learn how to get the most out of implant training and start booking more treatments through staff education, identification of implant candidates, documentation forms, case presentation techniques, patient financial forms and more. The resource guide was printed as a courtesy of ChaseHealthAdvantage financing options.

I was working as a surgical assistant and dental hygienist in a practice that was starting to become involved in implant dentistry almost 20 years ago. I had no idea of how the procedures were performed or how to educate patients about implants. Through some research, I found the ADIA (Association of Dental ImplantAuxiliaries) and attended a symposium. The ADIA enhanced my overall knowledge of implant dentistry, and in 1996 I accepted the responsibility of becoming the executive director of the ADIA.

It is goal of the ADIA to educate each member of the team in the clinical techniques and communication skills necessary to provide excellence in patient care and to educate the team as a whole to enhance the practice and each team member’s career. We focus on the coordination and management responsibilities related to implant dentistry.

As the number of implant practices in the world grows and develops, there is a need for auxiliaries to do the same. Our society is dedicated solely to the purpose of educating dental team members about implants and associated procedures. The ADIA’s main purpose is to establish educational criteria and training for certification and provide an organized vehicle for auxiliaries to contribute to the field of oral implantology/implant dentistry. Implant dentistry can be a dynamic and productive part of your practice. If you have completed clinical implant training, how are you going to continue to evolve with current trends, techniques and technology in implant dentistry? Have you developed the systems, strategies and techniques to incorporate implants successfully into your practice? Have you included educating your team in your professional development? What is the ADIA committed to constant development of our programs to keep current with the evolving realm of implant dentistry?

I encourage you and your team to look into membership with the ADA and ICOI at www.ICOI.org and www.aaduoonline.org. I hope the resource guide will give you tips and tools to simplify incorporating implant dentistry into practices for the entire team.