Osteology Foundation

PRESS RELEASE

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OSTEOLOGY GRANT STUDY: RESEARCH PRIZE FOR YUELIAN LIU

A study funded by a Research Grant from the Osteology Foundation is the winner of EAO's 2014 Basic Research Competition. Yuelian M. Liu received the prize for her work on an osteoinductive bone substitute material.

"Osteoinductive biomimetic calcium phosphate bone substitute for bone regeneration" is the title of the outstanding study for which Yuelian Liu, Research Group Leader at the Academic Centre for Dentistry at the University of Amsterdam (ACTA), Netherlands, received the Prize for Basic Research in Implant Dentistry at the EAO Annual Congress in September 2014 in Rome.

Yuelian Liu, who collaborated on this project with researchers from the University of Berne, Switzerland, and Zhejiang University, China, prevailed over a large number of excellent international competitors, and was excited to receive the prize. "It is wonderful to see that our research and the hard work has been recognized in this way", she said after the awards ceremony.

Developing an alternative to autogenous bone grafts

When presenting her research at the Basic Research Session of the EAO Congress, Yuelian Liu explained that the aim of her research was "to develop osteoinductive bone substitutes that can be used as an alternative to autogenous grafts in bone regeneration".

To achieve this goal, she and her collaborators have developed a Biomimetic Calcium Phosphate (BioCaP) with two different delivery methods for the growth factor BMP-2: an internally incorporated and a coating-incorporated method.

They compared the two delivery methods with each other as well as with other materials and delivery methods, first in a subcutaneous ectopic bone induction model in rats, and then in a second study in critical-sized defects in sheep.

Incorporation of BMP-2 in biomaterial better than adsorption

In the rat model, in which the materials were implanted subcutaneously, the volume of bone, bone marrow, and blood vessel was significantly higher in samples in which BMP-2 was incorporated internally or in the coating, compared to granules with absorbed growth factor.

It is known that the adsorption of BMP-2 on materials is always associated with a high-dose burst release, which results in a poor osteoinduction – an effect that was also observed by Yuelian Liu and her co-workers in the rat model. The incorporation of BMP-2 in the biomaterials leads to visibly better bone formation than adsorption.

“Autogenous bone transplantation will not be needed anymore”

In the sheep model, both delivery methods accelerated bone formation and showed efficacy equal to that of autologous bone. In addition, it was observed that BioCaP with the coating-incorporated BMP-2 was degraded more slowly.

Based on these findings, the researchers concluded that both delivery methods of BMP-2 enhance bone formation. “Benefiting from these two delivery modes, BioCaP can be a promising alternative to autografts for bone regeneration”, said Yuelian Liu stated in her presentation.

“An osteoinductive BioCaP bone substitute”, she added, “is ideal for bone tissue augmentation and critical-sized bone-defect repair. Autologous bone transplantation will not be needed anymore.”

“At home” in the Osteology Foundation

Yuelian Liu also thanked the Osteology Foundation for its support of the project. Immediately following the awards ceremony, she rushed to the Osteology booth at the exhibition to share her excitement about the prize. “I feel at home in the Osteology Foundation”, Yuelian Liu said.

Among the first to congratulate her was Reinhard Gruber, Board Member of the Osteology Foundation. “The competition for the Basic Research Prize was very tough”, he said, “and it was really not easy to win. The researchers have done great work, and the study definitely deserves to win”.

More information on Osteology Research Grants

Literature:

- Liu Y, et al.: Biomimetic coatings for bone tissue engineering of critical-sized defects. J R Soc Interface 2010; 7 Suppl. 5: S631-47.
- Wu G, et al.: Functionalization of deproteinized bovine bone with a coating-incorporated depot of BMP-2 renders the material efficiently osteoinductive and suppresses foreign-body reactivity. Bone 2011: 49: 1323-30.
- Hunziker EB, et al.: Osseointegration: The slow delivery of BMP-2 enhances osteoinductivity. Bone 2012; 51; 98-106.
- Liu T, et al.: Deproteinized bovine bone functionalized with the slow delivery of BMP-2 for the repair of critical-sized bonedefects in sheep. Bone 2013; 56: 110-18.

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SHORT CV OF YUELIAN LIU

Dr. Yuelian Liu (Maria) is an Associate Professor at the department of Oral Implantology and Prosthetic Dentistry, Academic Centre for Dentistry Amsterdam (ACTA), VU University and University of Amsterdam in the Netherlands. She completed her study as a maxillofacial surgeon in 1991 in Shanghai 9th hospital, Jiaotong University, Shanghai, China.

After 9-year clinical practice, from 1995 to 1998 Yuelian Liu worked as a research fellow at the department of Maxillofacial surgery, Dental School of KU Leuven, Belgium and obtained her Master degree in medical science in 1997. She received her PhD degree in the Faculty of Medicine, University of Leiden, the Netherlands in 2003. After that, she worked as a research scientist at ITI research institute, Bern University in Switzerland and Tweete University in the Netherlands.

From 2006, Yuelian Liu has been working at ACTA as a research group leader and a supervisor for PhD students . She has got three patents and received 9 internationally recognized scientific awards, such as: Toshi Nakao fellowship award from IADR (2003) (www.iadr.org); Andre Schroeder Prize from ITI (2003); winner of the scientific competition of the ITI world symposium (www.iti.ch) (2005) and the best PhD thesis 2003-2005 from Netherlands Society for Biomaterials and Tissue Engineering (NBTE) (www.biomaterialen.nl/).

Recently, Yuelian Liu was honoured by the European Prize of the Basic Research in Implant Dentistry in the 23rd annual scientific meeting of Europe Association of Osteointergration (EAO) in Rome, Italy (2014) (www.eao.org). She has obtained more than 20 international research grants and authored and co-authored more than 60 papers.

Yuelian Liu is an ITI fellow and IADR member. She is an honorary Professor of School/Hospital Stamatology, Zhejiang University, Hangzhou, China. She lectures widely at national and international conferences. Her research is focused on bone regeneration and osteointergration. She developed and patented a slow and local drug release system by using biomimetic calcium phosphate coatings on biomaterial surface and an osteoinductive bone substitute for bone tissue engineering.

ABOUT THE OSTEOLOGY FOUNDATION

The Osteology Foundation's motto is „Linking Science with Practice in Regeneration". The foundation was established in 2003 and its core activities include funding of research projects and organisation of national and international symposia throughout the world. In recent years, the Foundation has expanded its focus. Today, it also offers courses and textbooks specifically for researchers in the field of oral tissue regeneration.

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