

(Form: Century 11 point, A4 size)

## Report of "Research Award of Oral Sciences"

Major: Oral Sciences

Grade: 4

Department: Stomatognathic Function  
and Occlusal Reconstruction

Name: Resmi Raju

Title: Three-dimensional periodontal tissue regeneration through bone-ligament cell layering in a complex cell sheet

1. Aim of research and results obtained (Approximately 400 words):

Periodontal tissue regeneration requires simultaneous regeneration of 3 different tissues: cementum, periodontal ligament (PDL) and alveolar bone. Here, we developed a new periodontal tissue regeneration technique using cell sheet engineering. The aim of our study is a 3-dimensional regeneration of periodontal tissue by using a complex cell sheet composed of PDL cells as well as osteoblast-like cells. Furthermore, we wanted to check the periodontal tissue regenerative potential of complex cell sheet in ectopic and orthotopic transplantation models.

By cell sheet engineering technology, 3 types of cell sheets were fabricated. Single cell sheets were made by either PDL cells or MC3T3-E1 cells. And a complex cell sheet was fabricated by layering PDL cells over MC3T3-E1 cells. Following ectopic and orthotopic transplantation of cell sheets, transplants were analyzed by histology, immunohistochemistry and micro-CT.

Micro-CT, histology and immunohistochemistry revealed the presence of bone-like tissue and PDL-like fibers in ectopic and orthotopic transplants of complex cell sheet. The results from this study demonstrates the fabrication of a complex cell sheet and regeneration the PDL and bone tissue simultaneously in an ectopic and periodontal tissue defect model.

2. Self-evaluation of research achievement:

I could complete my research and publish the paper in my final year of PhD.  
I believe the research achievements in last year is satisfactory. Thank you for supporting me with Research Award of Oral Sciences, using the money I could attend an international conference.

3. Meeting presentation:

\* Title, conference, venue, date, co-author, presentation (oral/ poster).

(Underline the speaker.)

A double-layered complex cell sheet can regenerate the periodontal tissue in a mice model. Dentisphere, International Scientific Meeting 5<sup>th</sup> Asean Plus Tokushima Joint International Conference. Indonesia, Surabaya, 2019-11-29 to 30. Resmi Raju, Masamitsu Oshima, Miho Inoue, Tsuyoshi Morita, Yan Huijiao, Otto Baba, Masahisa Inoue, Yoshizo Matsuka. (ORAL PRESENTATION)

4. Journal publication:

\* Title, journal, volume, number, paragraph, date, co-author.

(Underline the speaker.)

Three-dimensional periodontal tissue regeneration using a bone-ligament complex cell sheet. Sci Rep. 2020 Feb 3;10(1):1656. doi: 10.1038/s41598-020-58222-0.

Resmi Raju, Masamitsu Oshima, Miho Inoue, Tsuyoshi Morita, Yan Huijiao, Arief Waskitho, Otto Baba, Masahisa Inoue, Yoshizo Matsuka.