

Int Poster J Dent Oral Med 2008, Vol 10 No 04, Poster 425

## C-6-S Levels in PMICF under Orthodontic Forces

**Language:** English

### Authors:

Dr. Imjai Intachai, Assoc. Prof. Dhirawat Jotikasthira, Assoc. Prof. Boonsiva Suzuki, Dr. Eduardo Yugo Suzuki, Department of Orthodontics, Faculty of Dentistry  
 Assoc. Prof. Suttichai Krisanaprakornkit, Department of Odontology and Oral Pathology, Faculty of Dentistry  
 Assoc. Prof. Prachya Kongtawelert, Thailand Excellence Center for Tissue Engineering, Department of Biochemistry, Faculty of Medicine Chiang Mai University, Thailand.

### Date/Event/Venue:

December 14-16, 2007  
 The 6th Asian Implant Orthodontic Conference (AIOC) & TAO Annual Conference  
 Nan Shan Educational & Training Center, Taichung, Taiwan

Poster Award

The second place of the outstanding presentations

### Introduction

Stability assessments of the miniscrew implant were previously based on stability assessments of dental implant. Biochemical assessments were widely used to assess stability of dental implant, but rarely for the miniscrew implant.

### Material and Methods

A total of ten orthodontic patients were included in this study. Twenty miniscrew implants (8.0 mm in length with 1.6 mm in diameter, Sin, Brazil) were used as orthodontic anchorage. This experiment consisted of two parts. Part I was five weeks and Part II was ten weeks.

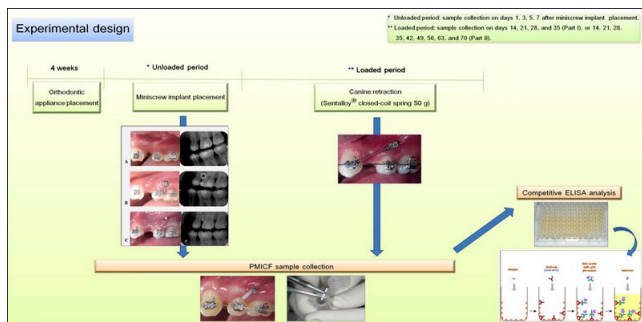


Fig. 1: Experimental design

### Results

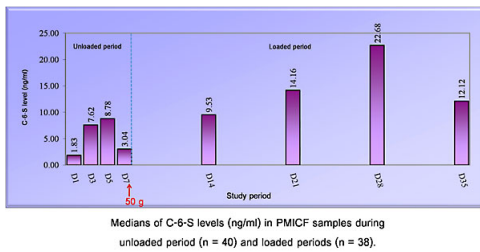
#### Part I

##### I. Clinical observations

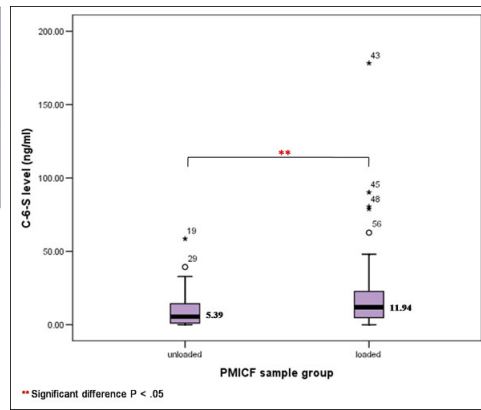
- Unloaded period (1 week) : All miniscrew implants remained clinically immobile.
- Loaded period (4 weeks) : Two miniscrew implants were mobilized.

##### II. Chondroitin sulfate epitope (WF6 epitope) levels in PMICF samples

- The median of CS epitope (WF6 epitope) levels during loaded period was significantly greater than that during unloaded period ( $P < .05$ )



Medians of C-6-S levels (ng/ml) in PMICF samples during unloaded period (n = 40) and loaded periods (n = 38).



\*\* Significant difference P < .05

Fig. 2: Medians of C-6-S levels (ng/ml) in PMICF samples during unloaded period (n = 40) and loaded periods (n = 38).

Fig. 3: The median of C-6-S levels during loaded periods was significantly greater than that during unloaded period (P < .05).

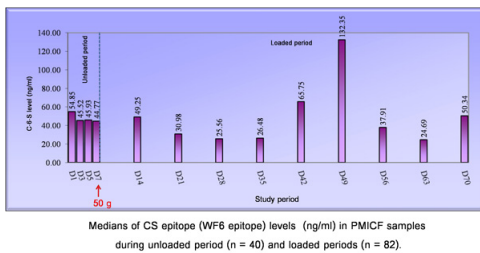
## Part II

### I. Clinical observations

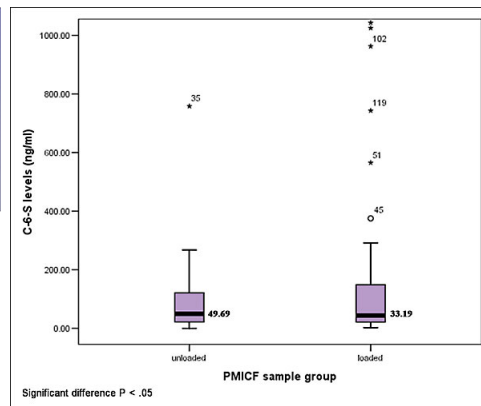
- Unloaded period (1 week) : All miniscrew implants remained clinically immobile.
- Loaded period (9 weeks) : One miniscrew implant was mobilized.

### II. Chondroitin sulfate epitope (WF6 epitope) levels in PMICF samples

- No significant difference was found between the medians of CS epitope (WF6 epitope) level during unloaded and loaded period.



Medians of CS epitope (WF6 epitope) levels (ng/ml) in PMICF samples during unloaded period (n = 40) and loaded periods (n = 82).



Significant difference P < .05

Fig. 4: Medians of CS epitope (WF6 epitope) levels (ng/ml) in PMICF samples during unloaded period (n = 40) and loaded periods (n = 82).

Fig. 5: No significant difference was found between the medians of C-6-S level during unloaded and loaded period.

## Conclusions

- The CS level in peri-dental implant crevicular fluid has been used for monitoring bone resorption and health status of dental implant.(1,2,3)
- In our previous study(4), the CS epitope (WF6 epitope) detected in GCF around canine teeth could be used as biomarker of alveolar bone resorption under orthodontic forces.
- The results of our present study showed that the CS epitope (WF6 epitope) in PMICF both under and without orthodontic loaded could be precisely detected. These findings were coincided with those of Sari and Uçar (5) that IL-1 $\beta$  levels (a peri-miniscrew implant alveolar bone resorption maker) could be precisely detected.
- The ELISA method provides an accurate assessment of CS epitope (WF6 epitope) level with the simplicity of a "chairside" application.
- To draw a reasonable conclusion for using the CS epitope (WF6 epitope) level as a biomarker for assessing alveolar bone remodeling around miniscrew implants, further investigation with an increased sample size is needed.

## Literature

1. Boutros SM, Michalowicz BS, Smith QT, Aeppli DM. Crevicular fluid enzymes from endosseous dental implants and natural teeth. Int J Oral Maxillofac Implants 1996;11:322-330.

2. Beck CB, Embery G, Langley MS, Waddington RJ. Levels of glycosaminoglycans in peri-implant sulcus fluid as a means of monitoring bone response to endosseous dental implants. Clin Oral Implants Res 1991;2:179-185.
3. Last KS, Smith S, Pender N. Monitoring of IMZ titanium endosseous dental implants by glycosaminoglycan analysis of peri-implant sulcus fluid. Int J Oral Maxillofac Implants 1995;10:58-66.
4. Jaito N, Jotikasthira D, Krisanaprakornkit S, Ong-chai S, Kongtawelert P. Monitoring of chondroitin-6-sulfate levels in gingival crevicular fluid during orthodontic canine movement. Biological Mechanisms of Tooth Eruption, Resorption and Movement 2006:289-295.
5. San E, Uçar C. Interleukin 1b Levels around Microscrew Implants during Orthodontic Tooth Movement. Angle Orthod 2007;77:1073-1077.

*This Poster was submitted by [Dr. Imjai Intachai](#).*

**Correspondence address:**

[Associate Professor Dhirawat Jotikasthira](#)

Department of Orthodontics, Faculty of Dentistry

Chiang Mai University

Chiang Mai 50200

Thailand

Tel. +66 53 944465

Fax +66 53 222844

e-mail: [dhirawat@chiangmai.ac.th](mailto:dhirawat@chiangmai.ac.th)



## C-6-S Levels in PMICF Under Orthodontic Forces

Intachai J,<sup>1</sup>Jotkathira D,<sup>1</sup>Suzuki B,<sup>1</sup>Suzuki EY,<sup>1</sup>Krisanaprakornkit S,<sup>1</sup>Kongtawerit P,<sup>2</sup>

Department of Orthodontics, Faculty of Dentistry,<sup>1</sup> Department of Biochemistry, Faculty of Medicine,<sup>2</sup> Chiang Mai University, Thailand



### Introduction

Stability assessments of the miniscrew implant were previously based on stability assessments of dental implant. Biochemical assessments were widely used to assess stability of dental implant, but rarely for the miniscrew implant.

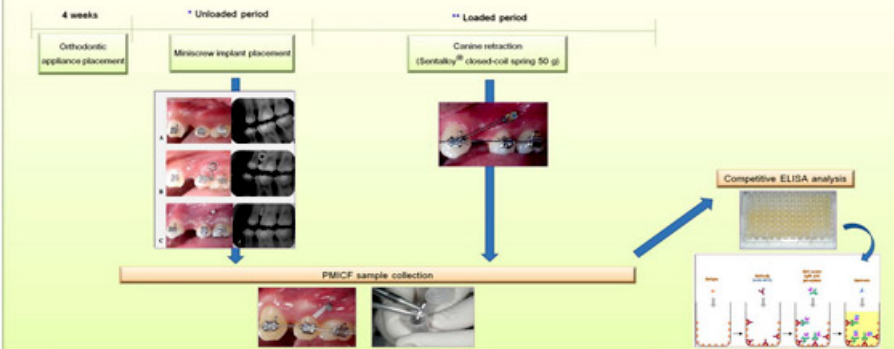
### Objective

This study was directed to detect chondroitin-6-sulfate (C-6-S) in peri-miniscrew implant crevicular fluid (PMICF) which might be used as a biomarker for alveolar bone remodeling under orthodontic forces.

### Materials & Methods

- A total of ten orthodontic patients were included in this study.
- Twenty miniscrew implants (8.0 mm in length with 1.6 mm in diameter, Sin<sup>®</sup>, Brazil) were placed buccally, bilaterally, in the alveolar bone between the roots of maxillary posterior teeth.
- Sentalloy closed-coil springs (50 g) were used to load the miniscrew implant and to move the maxillary canines distally.
- This study consisted of two parts. Part I was five weeks period and Part II was ten weeks period.

### Experimental design



### Results

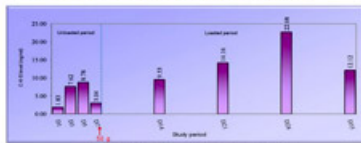
#### Part I

##### I. Clinical observations

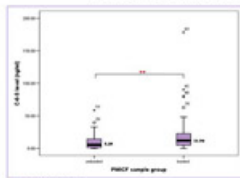
Unloaded period (1 week) : All miniscrew implants remained clinically immobile.

Loaded period (4 weeks) : Two miniscrew implants were mobilized.

##### II. Chondroitin-6-sulfate (C-6-S) levels in PMICF samples



Medians of C-6-S levels (ng/ml) in PMICF samples during unloaded period (n = 40) and loaded periods (n = 38).



The median of C-6-S levels during loaded period was significantly greater than that during unloaded period ( $P < .05$ ).

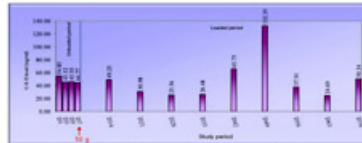
#### Part II

##### I. Clinical observations

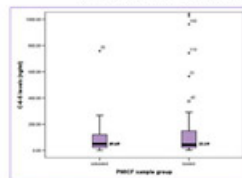
Unloaded period (1 week) : All miniscrew implants remained clinically immobile.

Loaded period (9 weeks) : One miniscrew implant was mobilized.

##### II. Chondroitin-6-sulfate (C-6-S) levels in PMICF samples



Medians of C-6-S levels (ng/ml) in PMICF samples during unloaded period (n = 40) and loaded periods (n = 32).



No significant difference was found between the medians of C-6-S level during unloaded and loaded period.

### Discussion & Conclusion

- The CS level in peri-dental implant crevicular fluid has been used for monitoring bone resorption and health status of dental implant.<sup>1,2,3</sup>
- In our previous study<sup>4</sup>, by using an enzyme-linked immunosorbent assay (ELISA) with a newly developed monoclonal antibody (mAb) WF6, the C-6-S could be precisely detected in GCF during orthodontic canine movement. This suggested that the levels changes of C-6-S might be used as biomarker for alveolar bone resorption during orthodontic movement.
- The results of our present study showed that the C-6-S in PMICF both under and without orthodontic loaded could be precisely detected. These findings were coincide with those of Sari and Uçar<sup>5</sup> that IL-1 $\beta$  levels (a peri-miniscrew implant alveolar bone resorption maker) could be precisely detected.
- To draw a reasonable conclusion for using the C-6-S level as a biomarker for assessing alveolar bone remodeling around miniscrew implants, further investigation with an increased sample size is needed.

### References

- Boutros SM, Michalwetz BS, Smith OT, Appaji DM. Crevicular fluid enzymes from endosseous dental implants and natural teeth. *Int J Oral Maxillofac Implants* 1996;11:322-330.
- Beck CB, Embery G, Langley MS, Waddington RJ. Levels of glycosaminoglycans in peri-implant sulcus fluid as a means of monitoring bone response to endosseous dental implants. *Clin Oral Implants Res* 1991;2:179-185.
- Leit KS, Smith S, Pender N. Monitoring of BMZ titanium endosseous dental implants by glycosaminoglycan analysis of peri-implant sulcus fluid. *Int J Oral Maxillofac Implants* 1995;10:58-66.
- Jato N, Jotkathira D, Krisanaprakornkit S, Ongchai S, Kongtawerit P. Monitoring of chondroitin-6-sulfate levels in gingival crevicular fluid during orthodontic canine movement. *Biological Mechanisms of Tooth Eruption, Resorption and Movement* 2008;289-295.
- Sari E, Uçar C. Interleukin-1 $\beta$  Levels around Miniscrew Implants during Orthodontic Tooth Movement. *Angle Orthod* 2007;77:1073-1077.

### Acknowledgements

The authors acknowledge the Faculty of Dentistry, Chiang Mai University for financial support that made this work possible.