

Project 5

In Vitro Method to Characterize Resorption of Calcium Phosphate-Based Ceramic Scaffolds

Objectives

The objective of this project is to propose suitable methodologies that will lead to internationally accepted test methods for measuring dissolution rate of calcium phosphate-based ceramic scaffolds for predicting the extent of in vivo resorption. It is envisaged that these will form the basis of a new international standard.

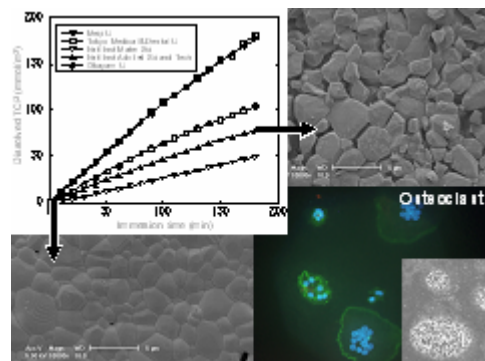
Background

Resorbable calcium phosphate-based ceramic scaffolds include porous bodies of β -tricalcium phosphate (β TCP), α -tricalcium phosphate, carbonated hydroxyapatite, low crystalline hydroxyapatite, and a certain range of biphasic hydroxyapatite and β TCP. Resorption of these ceramic scaffolds in bone tissue is substantially a process of dissolution in an extracellular fluid inside the resorption pits underneath osteoclasts or in a phagosome fluid of phagocytic cells both with acidic pH that is maintained by the activities of these cells. Some of dissolution assays of calcium phosphates have been found to be predictive of their resorption behavior in vivo.

Animal experiments can be reduced by well-defined dissolution assays predictive of in vivo resorption.

Standardization Needs

Different dissolution assays of calcium phosphates have been carried out under various conditions depending on different disciplines, including the constant composition method, the constant pH method and other electrode-using methods as continuous measurement techniques, and the pharmacopoeia methods and other intermittent sampling-and-analysis methods as discontinuous measurement techniques. These dissolution assays do not necessarily aim to predict in vivo resorption.



Call for Participation

Work Programme

1. The initial phase of the programme will provide a forum for discussion about the guideline of methodology proposed on the basis of previous preliminary round-robin and in vivo results.
2. Within this forum the testing protocol for the international round-robin will be established.
3. Dissolution rate measurements will be performed for porous bodies of β TCP with three different porosities that will be supplied by the National Institute of Advanced Industrial Science and Technology (AIST), Japan.

Deliverables and Dissemination

The dissemination will be through the VAMAS web-site, VAMAS report, international conferences and international standards committees

Funding

Participation is based on in-kind contributions from the partners.

References

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For more information on participation, please contact:

Dr. Atsuo Ito

National Institute of Advanced Industrial Science and Technology (AIST)
Central 6, 1-1-1 Higashi, Tsukuba,
Ibaraki 305-8566, Japan
Email: atsuo-ito@aist.go.jp

Dr. Kazuo Takakuda

Chair, TWA30 - Tissue Engineering
Institute of Biomaterials and
Bioengineering, Tokyo Medical and
Dental University
2-3-10 Kanda-Surugadai, Chiyoda-ku,
Tokyo 101-0062, Japan
Email: takakuda.mech@tmd.ac.jp