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2008 TERMIS CONFERENCES

TERMIS-EU: Porto, Portugal
Conference Dates: 22-26 June 2008
Meeting Chair: Rui Reis
Venue: Porto Congress Center, Alfandega
Website: www.termis.org/eu2008

TERMIS-AP: Chinese Taipei
Conference Dates: November 6-8, 2008
Meeting Chair: Professor Jing-Ho Hsue
Program Chair (Contact): Hsing-Wen Sung
hwsung@chem.nthu.edu.tw
Venue: Chien Tan Overseas Youth Activity Center, Taipei,
Taiwan, ROC
Website: www.termis.org

TERMIS-NA: San Diego, California
In conjunction with the California Tissue Engineering Meeting (CTEM)
Conference Dates: December 7-10, 2008
Meeting Chairs: Bill Tawil, Bob Sah
and Anthony Ratcliffe
Venue: Hyatt Regency La Jolla
Website: www.termis.org

2009 TERMIS CONFERENCE

2009 WORLD CONGRESS: Daejeon, South Korea
Conference Dates: August 31 - September 3, 2009
Meeting Chair: Shin-Yong Moon
Venue: Daejeon International Convention Center
Website: www.termis.org/wc2009

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Calcium phosphate cements (CPCs) represent feasible synthetic bone substitution and regeneration materials. To facilitate degradation, composites of CPC and degradable, polymeric microparticles have been developed. In addition to the creation of porosity within the implant after microparticle degradation, these microparticles can be loaded with appropriate biologicals (e.g. growth factors) to direct biological responses.

The current study focused on the in vivo effects of injectable composites consisting of CPC with microspheres, either or not loaded with transforming growth factor-β1 (TGF-β1). Bone augmentation properties of an injectable CPC/PLGA composite were evaluated using an in vivo rat model, in which the composite was injected onto the skull for implantation periods of 2, 4, and 8 weeks. Histological and histomorphometrical analyses showed that microsphere loading with TGF-β1 significantly increased initial bone-implant contact. Moreover, TGF-β1 loading significantly enhanced bone formation after prolonged implantation periods. Alternatively, an injectable CPC/gelatin composite was implanted in a cylindrical femoral condyle defect in rabbits for 4, 8, and 12 weeks. Irrespective of TGF-β1-loading, all implants showed an increase in mechanical strength with implantation time. Further, TGF-β1-loading significantly accelerated implant degradation, whereas no effects on bone-implant contact or bone formation were observed compared to composites containing non-loaded gelatin microspheres. These results demonstrate the applicability of CPC/microsphere composites for bone augmentation and substitution, and demonstrate that growth factor loading of the microspheres can further direct biological responses.

(158) In Vivo Engraftment Potential of Human Bone Marrow and Amniotic Fluid Stem Cells Cultured Under Osteogenic Conditions

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The potential immune privilege presented by mesenchymal stem cells (MSCs) makes them a promising population in tissue engineering and regenerative medicine. In this study, we investigated the effect of culture medium (expansion versus osteogenic media) over the in vivo potential of adult stem cells derived from human bone marrow (hBMSCs) and amniotic fluid (hAFSCs). To this end, we isolated hAFSCs from day 6 supernatant of the cultures of amniotic fluid obtained from amniocentesis, and hBMSCs were a kind gift from Biopredic. Cells were maintained in culture until confluence either in expansion or in osteogenic media (7 days), and then transplanted into 58 to 62 day-old foetal sheep at a concentration of 1 x 10^6 cells/foetus. Pregnant ewes were fasted for 24 hours. General anaesthesia was induced with thiopental sodium and maintained by inhalation anaesthesia with isoflurane and oxygen. After general anaesthesia, the ewes were positioned in dorsal recumbency and prepared in a sterile surgical environment for a ventral midline celiotomy. The abdomen was exposed through a ventral midline incision and the gravid uterus located. After the identification of the foetus inside the uterus and their gentle handling contention against the inner epithelium layer of the uterus, cells were transplanted into the intraperitoneal foetus cavity by injection through the intact uterus walls. The animals were euthanized sixty days after transplant, and samples from various tissues were collected. The engraftment and phenotype of human-derived cells was evaluated by flow cytometry and immunocytochemistry analysis.

(159) In Vivo Evaluation of Fibrin-Based Tissue Engineered Heart Valves in a Sheep Model

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Objective: Our group has previously demonstrated the synthesis of dynamically-conditioned tissue-engineered heart valves based on an autologous fibrin scaffold. The present study aims to evaluate the structure and mechanical stability of fibrin-based heart valves following implantation in a sheep model.

Methods: Autologous tissue-engineered heart valves were moulded using a fibrin scaffold, ovine carotid artery-derived myofibroblasts and endothelial cells, before subjection to 28 days of mechanical conditioning in a bioreactor. Following conditioning, tissue-engineered valves were implanted in the pulmonary trunk of the same animals (n = 4) from which the cells had been harvested; identical valves conditioned in parallel served as controls. Valves were explanted after 1 and 2 months and analysed using routine histology, immunohistochemistry, electron microscopy (EM) and extracellular matrix (ECM) assay.

Results: Explanted valve conduits had excellent tissue consistency after 2 months in vivo. Routine histology showed excellent tissue development and cell distribution, functional blood vessel ingrowth in the conduit wall, with no evidence for inflammation. Immunohistochemistry and ECM assay demonstrated almost complete resorption of fibrin gel components and replacement with ECM proteins. A monolayer of vWF-positive endothelial cells lined the valve surface, and was shown to be completely confluent using scanning EM. The resident valve tissue cells were in excellent health, as evidenced by transmission EM.

Conclusions: Preliminary results of implanted fibrin-based tissue engineered heart valves are encouraging, with remarkable