ORS
Orthopaedic Research Society

2017 ANNUAL MEETING

POSTER SESSIONS

Mon–Wed, March 20–22, 2017 • San Diego Convention Center • San Diego, California

2017 POSTER SESSIONS—SAILS PAVILION
MONDAY–WEDNESDAY

ORS WILL HAVE TWO POSTER SESSIONS

Poster Session1 (PS1):

Posters will be displayed Monday and Tuesday morning

Poster Session 2 (PS2):

Posters will be displayed Tuesday afternoon and Wednesday

MONDAY, MARCH 20 10:00 AM – 5:30 PM

10:15 AM – 11:15 AM Poster viewing
12:15 PM – 2:15 PM Lunch and Poster Session 1 viewing

Authors at posters to answer questions

EVEN-number poster presenters 1:15 PM – 1:45 PM
ODD-number poster presenters 1:45 PM – 2:15 PM

TUESDAY, MARCH 21
9:00 AM – 11:30 AM; 2:00 PM – 5:00 PM

9:30 AM – 10:30 AM Poster viewing
11:30 AM – 12:00 PM Poster Session 1 Dismantle
1:00 PM – 1:30 PM Poster Session 2 Set-Up
3:45 PM – 4:45 PM Poster viewing

WEDNESAY, MARCH 22 10:00 AM – 4:00 PM

10:15 AM – 11:15 AM Poster viewing
12:15 PM – 2:15 PM Lunch and Poster Session 2
3:15 PM – 3:45 PM Poster viewing

Authors at posters to answer questions

EVEN-number poster presenters 1:15 PM – 1:45 PM
ODD-number poster presenters 1:45 PM – 2:15 PM

POSTER CATEGORIES	POSTER SESSION 1 #'S	POSTER SESSION 2 #'S
American Academy of Orthopaedic Surgeons (AAOS) Best Posters	*AAOS1–AAOS7*	*AAOS1–AAOS7*
Biomaterial	353–420	1310–1379
Board of Specialty Society (BOS) Best Posters	BOS1–BOS10	BOS1–BOS10
Bone	666–780	1627–1744
Cartilage and Synovium	421–514	1380–1473
Diagnostic Imaging	1272–1299	2231–2246
Foot and Ankle	1175–1200	2136–2160
German Society for Orthopaedics and Trauma (DGOU)	*Germany*	*Germany*
Guest Nation - China	*CHINA1–CHINA3*	*CHINA1–CHINA3*
Hand and Wrist	1156 –1174	2117–2135
Hip	966–998	1933–1961
Hip and Knee Arthroplasty	999–1101	1962–2061
Infection and Inflammation	1201–1226	2161–2187
International Combined Orthopaedic Research Society (ICORS) Best Posters	*ICORS1–ICORS12*	*ICORS1–ICORS12*
Knee	898–965	1866–1932
Late Breaking Poster Session	2275–2355	2356–2436
Meniscus	515–533	1474–1490
Muscle	642–665	1602–1626
NIRA Finalists	25–33, 43–51, 70–77, 102–109	25–33, 43–51, 70–77, 102–109
Osteoarthritis and forms of Arthropathy	534–585	1491–1540
Poster Teasers	116–160	287–331
Shoulder and Elbow	1102–1155	2062–2116
Spine	781–897	1745–1865
Tendon/Ligament	586–641	1541–1601
Trauma and Fracture	1227–1271	2188–2230
Tumors	1290–1309	2247–2265
Women's Health Issues Board (WHIAB) Best Poster	*WHIAB*	*WHIAB*

POSTERS

Poster No. 389
Tuning Alginate Bioinks to Modulate Their Printability and Stiffness in Order to Spatially Direct MSC Fate Within Bioprinted Tissues
Fiona E. Freeman, Daniel J. Kelly

Poster No. 390
Spinal Fusion Using a Novel BioGlass Fiber Combined with Autograft
William R. Walsh, Rema A. Oliver, Chris Christou, Tian Wang, Emma R. Walsh, Vedran Lovric, Matthew H. Pelletier, Shrikar Bondre

Poster No. 391
A Trisulfated Glycosylated Peptide Amphiphile Nanofiber Scaffold for Spinal Arthrodesis
Gurmit Singh, Sungsoo S. Lee, Timmy Fyrner, Mark T. McClendon, Karina K. Katchko, Andrew D. Schneider, Danielle S. Chun, Joseph A. Weiner, Ralph W. Cook, Justin T. Smith, Sameer Singh, Chawon Yun, Samuel I. Stupp, Erin L. Hsu, Wellington K. Hsu

Poster No. 392
WITHDRAWN

Poster No. 393
Magnesium Ion Enriched Bone Allograft for Large Bone Defect Management
Wenhao Wang, Hoi Man Wong, Paul K Chu, Frankie K.L. Leung, Kenneth M.C. Cheung, Kelvin Yeung

Poster No. 394
Mesenchymal Stem Cell Proliferation and Osteogenic Differentiation in 3D Printing Polycaprolactone-Hydroxyapatite(pcl/ha)scaffolds Combined with Marrow Clot
Fengyong Mao, Pengfei Zheng, Yue Lou, Kai Tang, Liming Wang, Qingqiang Yao

Poster No. 395
Plasma Enhanced Biocompatible and Photocatalytic Antibacterial Degradable Magnesium Alloy for Bone Fracture Fixation
Zhengjie Lin, Ying Zhao, Kenneth M.C. Cheung, Paul K . Chu, Kelvin Yeung, Frankie Leung

Poster No. 396
Efficacy of Wp9qy Peptide (w9) for Bone Formation in a Rat Delayed Union Model
Mikiya Sawa, Shigeyuki Wakitani, Nobuo Adachi, Yuriko Furuya, Mitsuo Ochi

Poster No. 397
Novel Biofunctional Material for Orthopedic Implants: Surface Chemistry, Corrosion and Biocompatibility Aspecs
Luciana Daniele Trino, E.S. Bronze-Uhle, A. Ramachandran, Paulo Lisboa-Filho, Mathew Thoppi Mathew, Annie George

Poster No. 398
Poly(lactic-co-glycolic acid) Scaffold Coated with an Antioxidative Fullerene Derivative for Bone Tissue Engineering
Xinlin Yang, Guojun Ma, Yongfei Guo, Fuai Cui, Yazhou Li, Xiaodong Li, Quanjun Cui

Poster No. 399
Nell-1 Combined with Bone Marrow Aspirate Concentrate in a Polyelectrolyte Complex Based Construct Enhances Posterolateral Spinal Fusion in Rabbits
Ling Liu, Wing Moon Lam, Ming Wang, Mathanapriya Naidu, Felly Ng, Xia Fei Ren, Ting Kang, Chia Soo, James Goh, Hee Kit Wong

PS1 Biomaterials—Cartilage

Poster No. 400
Chondrocytes Produce Native-Like ECM Organization Using the MatriTek TissueSpec™ Cartilage Hydrogel Kitas a Scaffold for Cartilage Tissue Engineering When Nutrient Channels and CAGE Strategies are Employed
Wing-Sum A. Law, Krista M. Durney, Robert J. Nims, Gordana Vunjak-Novakovic, Clark T. Hung, Gerard A. Ateshian

Poster No. 401
Bone Bonding Double-Network Hydrogel for Cell-free Cartilage Regeneration: Influences of the Gel Thickness on the Regeneration Process In Vivo
Susumu Wada, Nobuto Kitamura, Takayuki Nonoyama, Ryuji Kiyama, Keiko Goto, Takayuki Kurokawa, Jian Ping Gong, Kazunori Yasuda

Poster No. 402
Bone Marrow-Mesenchymal Stem Cell Embedded Collagen-Based Chondroprogenitor Scaffold for the Treatment of Early Osteoarthritis in a Porcine Animal Model
Wo-Ran Tzeng, Shu-Wei Huang, Jui-Sheng Sun, Chih-Yu Chen, Chih-Hsiang Fang, Pei-I Tsai, Hsin-Hsin Shen, San-Yuan Chen, Feng Huei Lin

Poster No. 403
Acellular Cartilage Matrix Combined with Chitosan Cellulose Hydrogel for Cartilage Regeneration: Cell-Compatibility and Gene Expression Analysis
Chih-Hung Chang, Yu-Chun Chen, Ruo-Yu Chen, Yuan-Ming Hsu

Poster No. 404
Non-Destructive Vibrational Spectroscopic Assessment of Developing Chondrocyte-Seeded Hyaluronic Acid Constructs
Farzad Yousefi, Minwook Kim, Yusra Nahri, Robert L. Mauck, Nancy Pleshko

Poster No. 405
Arthritic Human Cartilage Molecular Engineering Using Biomimetic Proteoglycans Shows Infiltration Thoughout the Cartilage Extracellular Matrix Ex Vivo
Evan Phillips, Nicholas Bertha, Brandon Shallop, Katsiaryna Prudnikova, Michele Marcolongo, Mary Mulcahey

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2017 ANNUAL MEETING

PROGRAM BOOK

Sun–Wed, March 19–22, 2017 • San Diego Convention Center • San Diego, California

Magnesium Ion Enriched Bone Allograft for Large Bone Defect Management

Wenhao Wang[1,2], Hoi Man Wong[1], Paul K. Chu[3], Frankie K.L. Leung[1,2], Kenneth M.C. Cheung[1], Kelvin W.K. Yeung[1,2]

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[2]Shenzhen Key Laboratory for Innovative Technology in Orthopaedic Trauma, the University of Hong Kong Shenzhen Hospital, Shenzhen, China
[3]Department of Physics and Materials Science, City University of Hong Kong, Kowloon, Hong Kong, China

Disclosures: Wenhao Wang (N), Hoi Man Wong (N), Paul K. Chu (N), Frankie K.L. Leung (N), Kenneth M.C. Cheung (N), Kelvin W.K. Yeung (OrthoSmart Ltd.

INTRODUCTION: Bone allograft is the most widely accepted approach in treating patients suffering from large segmental bone defect regardless of the advancement of synthetic bone substitutes. However, the long-term complications of allograft application in term of delayed union or even nonunion were reported due to the stringent sterilization process prior to clinical implantation. Our previous studies demonstrated that the incorporation of magnesium ions (Mg^{2+}) into biomaterials could significantly promote the gene up-regulation of osteoblasts and new bone formation in animal model. Hence, our group has proposed to implant Mg^{2+} into bone allograft by using plasma ions immersion implantation and deposition (PIII&D) approach.

METHODS: The decellularization and gamma irradiation process were performed on bovine bone allograft prepared in 1 x 1 x 0.1cm. Subsequently, a thin layer of magnesium coating was prepared by using magnesium PIII&D technique. The surface morphology, elemental chemical and depth of the samples were examined by scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDS) and x-ray photoelectron spectroscopy (XPS), respectively. The cytotoxicity, cell morphology, proliferation and alkaline phosphatase (ALP) expression of magnesium-enriched bone allografts were evaluated by culturing human immortalized mesenchymal stem cells (hTMSC). The Mg PIII treated bone allografts were implanted to rats for 2 months in order to evaluate the bone regeneration ability in situ.

RESULTS: With the adjustment of implantation parameters e.g. voltage and time, the magnesium composite layer had been successfully established on the surface of allogenic bone. The thickness of the composite layer ranged from 500nm to ~800nm. The surface topography of allograft flattened and the microstructure of collagen fibers structure was also changed after plasma treatment. The cells elongated on the surfaces of plasma treated and untreated samples though. The cell viability in magnesium plasma modified allograft was significantly higher than that of the control. The ALP gene expression of hTMSCs in the group of PIII&D treated samples was highly up-regulated. Though no significant difference between plasma treated group and the control in terms of cell proliferation rate was found. The bone regeneration ability of Mg modified bone allograft implanted in animal model was significantly superior than the control after 2-month post-operation.

DISCUSSION: The concept of the use of magnesium ions to regulate local bone formation is new. The *in vitro* results suggested that the modified allografts could not only up-regulate the osteogenic genes and proteins of htMSCs and MC-3T3 cells, but also stimulated bony in-growth significantly in animal model post-op 2 months. Furthermore, the magnesium PIII&D technique has been first applied to bone allograft. This well-developed technology is able to alter the surface properties of biomaterials, while the bulk mechanical properties maintained. Hence, it is believed that the original mechanical properties of bone allograft can be maintained, while the elevated magnesium content promotes the osteogenic capability of allograft.

SIGNIFICANCE: The osteogenic capability of bone allograft can be enhanced by elevating magnesium content in bone matrix via plasma surface treatment approach. The bony in-growth of modified allograft is significantly higher than that of the controls.

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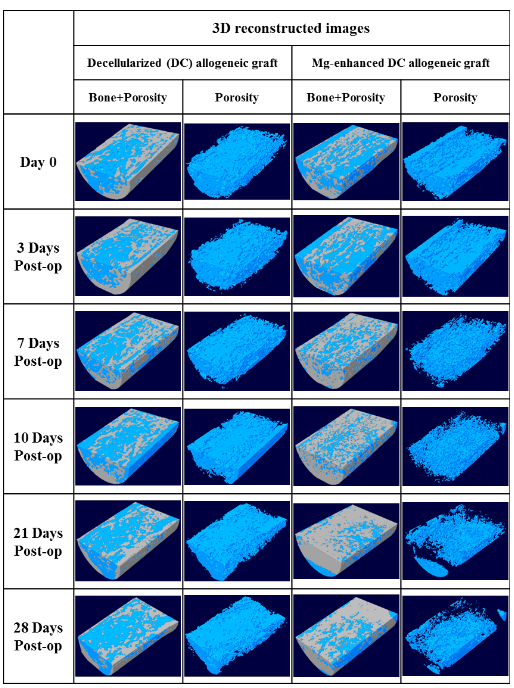

Figure 1: Micro-CT 3D images of reconstructed longitudinal section demonstrating bone tissue (grey) and porosity (blue) at defect sites over time. Decreased porosity, compared to the controls, was found in the magnesium-enhanced, decellularized allogeneic grafts.