台灣再生醫學學會

2016年度台灣再生醫學學會學術研討會暨會員大會
2016 Annual Meeting of Formosa Association of Regenerative Medicine

論文摘要 & 大會手冊

2016 年 03 月 12 日

台大醫學院 103 講堂

台北市仁愛路一段一號

目　錄

Consent

2016 年度台灣再生醫學學會學術研討會暨會員大會
2016 Annual Meeting of Formosa Association of Regenerative Medicine

Scientific Program

Time	Topic	Speakers & Authors	Institute	Moderator
08:30	**Registration 報 到** **開幕致詞**			
08:50~09:50 Oral Presentation Competition (Ⅰ)				
S-1 08:50~09:00	Infected Animal Model for Artificial Joint Replacement	方志翔[1] 黃書葦[1] 陳志偉[1,2] 孫瑞昇[3] 林峰輝[1]	台灣大學醫學工程研究所[1] 台大醫院新竹分院骨科[2] 台大醫院骨科[3]	陳敏慧 王至弘 方旭偉
S-2 09:00~09:10	Self- Assembled Peptide-Based Hydrogels as Scaffolds for Proliferation and Multi-Differentiation of Mesenchymal Stem Cells	王勇力[1] 林詩蓓[1] Srinuvasa Rao Nelli[5] 詹富凱[5] 鄭勛[5] 林欣杰[5] 洪士杰[1,2,3,4]	國立陽明大學臨床醫學研究所[1] 臺北榮民總醫院醫學研究部[2] 中央研究院生物醫學研究所[3] 中國醫藥大學附設醫院整合幹細胞中心[4] 國立交通大學材料科學與工程學系所[5]	
S-3 09:10~09:20	Preservation of Human Limbal Epithelial Progenitor Cells on Carbodiimide Cross-Linked Amniotic Membrane Via Integrin-Linked Kinase-Mediated Wnt Activation	李志鴻[1] 馬惠康[2*] 賴瑞陽[1*]	長庚大學生化與生醫工程研究所[1] 長庚醫院眼科部[2]	
S-4 09:20~09:30	Evaluation the Anti-inflammation and Anti-Apoptosis Abilities of Mesenchymal Stem Cell by Chondrocyte/ Wharton's Jelly Mesenchymal Cells (WJMC) Co-culture System	沈宜珊[1,2] 陳郁君[1] 林峯輝[2] 張至宏[1]	亞東紀念醫院骨科部[1] 國立台灣大學醫學工程學研究所[2]	
S-5 09:30~09:40	Water-Based Polyurethane 3D Printed Scaffolds with Controlled Release Function for Customized Cartilage Tissue Engineering	洪堃哲[1] 曾清秀[2] 戴念國[3] 徐善慧[1*]	國立臺灣大學高分子科學與工程學研究所[1] 國立中央大學機械工程學系 臺北醫學大學雙和醫院骨科[3]	
S-6 09:40~09:50	Gelatin-Hydroxyapetite/beta-tricalcium phosphate Hybrid Scaffold as a Type 2 Bone Morphogenetic Protein Carrier to Enhance Supra-Alveolar Osteogenesis	張豪傑[1] 楊寬寧[1] 林峯輝[2] 張博鈞[1]	國立臺灣大學臨床牙醫學研究所[1] 國立臺灣大學醫學工程學研究所[2]	
09:50~10:20 Coffee Break				

Time	Topic	Speakers & Authors	Institute	Moderator
10:20~12:00 Symposium：細胞治療及再生手術之現況 & 未來發展 Ⅰ				
I-1 10:20~10:40	The Immunomodulatory Effects of Mesenchymal Stem Cells in Vascularized Composite Allotransplantation	郭耀仁 教授	高雄醫學大學附設中和紀念醫院整形外科	顏伶汝 鄭乃禎
I-2 10:40~11:00	整形外科細胞治療及再生手術之現況 & 未來發展	戴浩志 主任	台大醫院外科部	
I-3 11:00~11:20	Role of Integrin/Integrin-Linked Kinase (ILK)/Wnt Signaling Cascade in Conveying Surviving Signals from Epithelial Basement Membrane to Corneal Epithelial Stem Cells	馬惠康 主任	林口長庚紀念醫院眼科	
I-4 11:20~12:00	Cell and Gene Therapy of Congenital and Acquired Cornea Diseases	Prof. Winston Whei-Yang Kao	University of Cincinnati USA	楊台鴻
12:00 會 員 大 會				
12:00-13:30 Lunch Break				
13:30~14:50 Symposium：細胞治療及再生手術之現況 & 未來發展 Ⅱ				
I-5 13:30~13:50	The Gap Between the Academic Research and Industrialization of Cellular Therapeutic, SBI Experience	吳怡萍 博士	仲恩生醫科技	侯連圍 徐善慧
I-6 13:50~14:10	異體間葉幹細胞的新藥開發	葉嘉新 博士	台宝生醫科技	
I-7 14:10~14:30	體外增生造血幹細胞之臨床應用	黃濟鴻 博士	台灣尖端先進生技醫藥	
I-8 14:30~14:50	The Isolation, Enrichment and Differentiation Mechanism for a Type of Pulmonary Stem/ Progenitor Cells	林泰元 教授	台大醫學院藥理學系	
14:50-15:20 Coffee Break				

Time	Topic	Speakers & Authors	Institute	Moderator
15:20~17:00 Oral Presentation Competition (Ⅱ)				
S7 15:20~15:30	Vascular Endothelial Responses to Disturbed Flow in Arteriovenous Fistula	楊東霖[1,2] 林致源[3] 林維文[4] 裘正健[1]	國家衛生研究院[1] 中央大學生科所[2] 三軍總醫院[3] 台中榮民總醫院[4]	陳敏慧 王至弘 方旭偉
S8 15:30~15:40	Adipose Stem Cell Sheet Transduced with Baculovirus GDNF Expression Vector Enhance Sciatic Nerve Regeneration	許慕農 胡育誠	國立清華大學化工系	
S9 15:40~15:50	Human Pluripotent Stem Cell (PSC)-Derived Mesenchymal Stem Cells (Mscs) Show Potent Neurogenic Capacity Which is Enhanced with Cytoskeletal Rearrangement	彭凱彥[1,2] 李雨薇[2] 林佳樺[3] 顏伶汝[2] 嚴孟祿[3]	國立中央大學生命科學系[1],國家衛生研究院細胞及系統醫學所再生醫學研究組[2], 國立臺灣大學附設醫院婦產部及臺灣大學醫學院醫學系[3]	
S10 15:50~16:00	An Injectable, Self-Healing Hydrogel to Repair the Central Nervous System	曾庭箴[1] 謝馥羽[1] 陶磊[2] 危岩[2] 徐善慧[1,*]	國立臺灣大學高分子科學與工程學研究所[1] 北京清華大學化學系[2]	
S11 16:00~16:10	Synergistic Protection of Hypoxic-Ischemic Brain Injury by Endothelial and Neural Lineage Cells Induced from Adipose-Derived Stem Cells	黃家葳[1] 張雅茹[1] 薛元毓[2,3] 吳佳慶[1,4]	國立成功大學基礎醫學研究所[1] 臨床醫學研究所[2] 國立成功大學附設醫院整形外科[3] 細胞生物與解剖學研究所[4]	
S12 16:10~16:20	Bone Marrow-Mesenchymal Stem Cell Derived Chondroprogenitor Scaffold for the Treatment of Osteoarthritis	黃書葦[1] 曾渥然[2] 徐麗遠[3] 孫瑞昇[4] 林峰輝[1]	台灣大學醫學工程研究所[1] 台大醫院新竹分院骨科[2] 工業研究院生物醫學研究所[3] 台大醫院骨科[4]	
S13 16:20~16:30	Optimization of Porous Structure, Mechanical Strength and Cell Affinity of Novel 3D Printing Silica Bioceramics for Custom-made Bone Scaffold	林致揚[1] 張志豪[2] 劉福興[3] 廖運炫[1]	國立臺灣大學機械工程學系[1] 國立臺灣大學醫學系骨科[2] 龍華科技大學機械工程學系[3]	
S14 16:30~16:40	Non-Regenerative Hind Limb Ischemia Model on Diabetic Mice	鄭紫妃[1] 簡崇美[1] 陳振偉[1] 黃玲惠[1,2,3,4]	國立成功大學生物科技研究所[1] 生物科技與產業科學系[2] 臨床醫學研究所[3] 再生醫學卓越研究中心[4]	
S15 16:40~16:50	The Critical-Size Calvarial Defect Repair Using Baculovirus-Engineered Ascs Co-Express BMP-2 and SDF1 within Gelatin Scaffold	羅士鈞 胡育誠	國立清華大學化學工程研究所	
S16 16:50~17:00	Investigation of Overrun-Processed Porous Hyaluronic Acid Carriers in Corneal Endothelial Tissue Engineering	羅麗娟[1] 賴瑞陽[2*]	長庚大學化工與材料工程學系[1] 生化與生醫工程研究所[2]	
頒 獎 閉 幕				

Invited Lectures

10:20-10:40

I-1

The Immunomodulatory Effects of Mesenchymal Stem Cells in Vascularized Composite Allotransplantation

Yur-Ren Kuo, MD, PhD, F.A.C.S.
Professor, Division of Plastic Surgery, Department of Surgery,
Kaohsiung Medical University Hospital, Taiwan

Mesenchymal stem cells (MSCs) are attractive cell sources in regenerative medicine. Studies indicated that bone marrow-derived mesenchymal stem cells (BM-MSCs) and adipose-derived stem cells (ASCs) are equally capable of differentiating into various lineages of the mesenchyme and rendering immunosuppressive and immune modulatory effect *in vitro* and *in vivo.* In this presentation, we present our work and focus on the bio-mechanisms of immune modulatory effects of MSCs. We used the rodent or swine hind-limb models as the vascularized composite allotransplantation (VCA) model for *in vivo* study.

Our study indicated MSC/ASCs exert immunomodulatory effects including suppressing T cell proliferation and increasing the expressions of CD4+/CD25+/Foxp3+ regulatory T cells *in vitro.* Matured dendritic cells (DCs) are strong antigen presenting cells (APC) and highly potent immuno-stimulatory cells to induce allograft rejection. Our study revealed ASCs suppressed the effect of DCs induction of $CD4^+$ T-cell proliferation. DCs co-cultured with ASCs showed significant inhibition of DCs differentiation by the decreasing MFI of MHC class II and CD86 expressions. Recent study revealed that ASCs combined with short-term immunosuppressant have a positive effect in prolongation of rodent and miniature swine hind-limb allograft survival *in vivo*. ASCs suppressed DCs maturation is correlated with indoleamine 2, 3-dioxygenase (IDO) expression in mature DCs *in vitro.*

Results obtained from this review provided important information of MSCs regarding the immune-modulation in composite tissue allotransplantation.

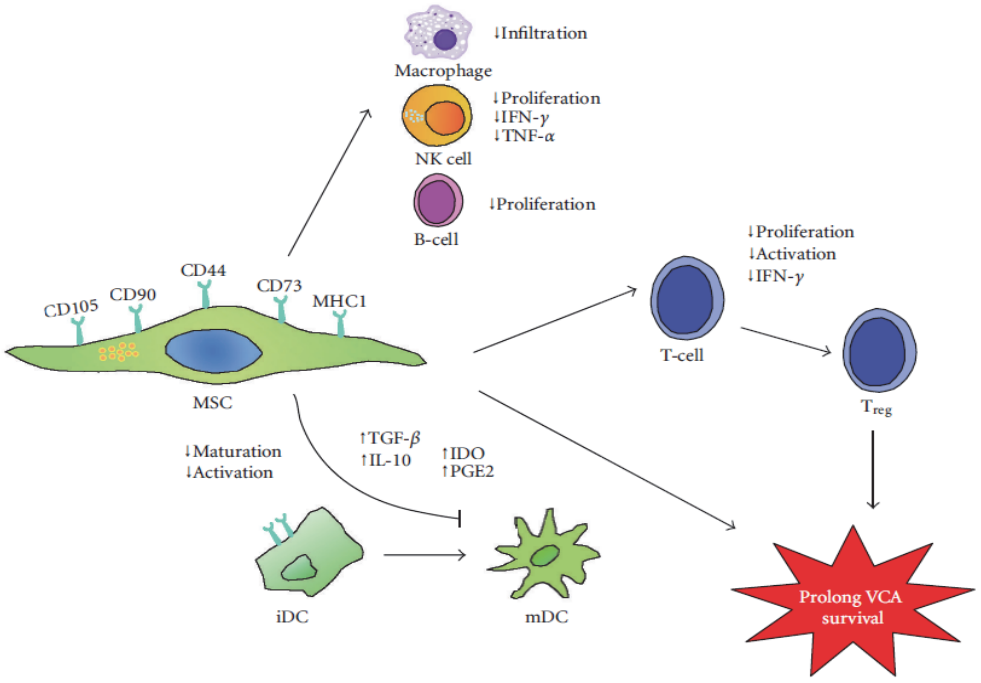

Figure 2: Proposed immunomodulatory mechanisms of MSCs in a vascularized composite allotransplantation (VCA). MSCs mediate their immunomodulatory effects by interacting with cells from both the innate (DCs, macrophages, NK cells) and adaptive immune (T cells and B cells) systems, particularly through the regulation of T-cell proliferation and the inhibition of DC differentiation. MSC inhibition of TNF-α and IFN-γ secretion, promotion of IL-10 and TGF-β secretion, and IDO and PGE2 expression may affect the maturation states and functional properties of DCs, resulting in skewing of the immune response toward the prolongation of VCA survival. DC: dendritic cells; IFN-γ: interferon (IFN)-γ; IDO: indoleamine-2,3-dioxygenase; NK: natural killer; PGE2: prostaglandin E2; T_{reg}: regulatory T-cells; TGF-β: transforming growth factor-β; TNF-α: tumor necrosis factor (TNF)-α.

10:40-11:00

I-2

整形外科細胞治療及再生手術之現況 & 未來發展

戴浩志醫師　臺大醫院 整形外科

2015 年 6 月 27 日發生的八仙樂園粉塵爆燃事故，至目前為止，共造成 15 死 484 傷，是繼 1999 年 921 大地震以來臺灣受傷人數最多的意外。臺大醫院收治之八仙樂園粉塵爆燃的燒傷病人有 34 位，住院病人有 33 位，收治之 20%以上大面積燒傷病人有 28 位，平均燒傷面積是 43%。臺大醫院接受衛生福利部採購的大體皮膚，用於覆蓋大面積燒傷之傷口、或是清創手術後之傷口，在燒傷初期覆蓋於傷口，可以穩定病人生命徵象，在燒傷後期覆蓋於傷口，可以減少傷口感染與降低敗血性休克。此外，也接受日本紅十字會捐贈之人工真皮 500 片，用於覆蓋清創手術後之傷口。至於日本 J-Tech 公司透過衛生福利部捐贈、首次在臺灣使用之自體培養表皮細胞(JACE; autologous cultured epidermis)產品，也用於 1 位大面積燒傷之傷口。對於部分清創後之傷口植皮手術中，也有 4 位使用澳洲 Avita 公司捐贈之 ReCell 自體細胞移植術。

自體脂肪移植已有上百年的歷史，由於其來源豐富、取材容易、操作簡單、無排斥反應等優點，倍受整形外科醫生的重視，早期用於充填顏面部的凹陷畸形，近期自體脂肪移植也用於隆乳。早期自體脂肪移植的的脂肪細胞的存活率較低，隨著醫療科技進步，改變早期傳統脂肪移植方式，目前自體脂肪移植技術更為安全與有效。脂肪移植後，影響脂肪存活的主要因素有：(1)、脂肪移植體血液循環的重建；(2)、移植脂肪的損傷；(3)、移植數量與接受區面積；(4)、接受區血液運輸及全身營養狀況；(5)、脂肪組織的處理及移植的方法；(6)、感染等。目前自體脂肪移植是從身體(例如腹部、側腰、臀部、大腿)的脂肪，以抽脂的方式取得直徑相當小的脂肪球(半徑小於 2 mm)或脂肪細胞，經過離心及純化後，再用細小針頭注射入外觀凹陷的部位。自體脂肪移植可用來做豐臉、豐胸及豐臀。臉部凹陷者，可以使用純化後之自體脂肪作填充，可填充凹陷之額頭、顳部、眼窩、淚溝、蘋果肌、臉頰、法令紋、木偶紋等，因為材質柔軟，填補到凹陷處會呈現自然外觀。在 2010 年後，很多自體脂肪隆乳的治療技術，用於增加乳房上圍。幹細胞輔助自體脂肪移植（Cell-Assisted Lipotransfer；CAL）之隆乳，混合由脂肪抽取液分離出之自體脂肪，分離出之萃取液 SVF（Stromal Vascular Fraction；）（含有自體脂肪幹細胞（Autologous Adipose-derived Stromal cell；ASC），及 Cytokine），注入乳房組織中。使用幹細胞輔助自體脂肪移植進行隆乳後，脂肪存活率提高到 6 至 8 成。

附註：

1、 自體培養表皮細胞(JACE; autologous cultured epidermis)產品的製作，是取下病人 2 乘 2 公分的皮膚，送至日本 J-Tech 公司，再分離出表皮細胞，然後在 GMP 純無塵室內做體外培養增生。三週之後，將自體培養表皮細胞(JACE)由培養室取出，儘速將鮮活自體表皮細胞送至本院，覆蓋在病人清創後之傷口。

2、 ReCell 自體細胞移植術(4 例)，是取下患者的自體表皮細胞，經由酵素分解後，噴灑於燒燙微植皮手術處，以促進微植皮手術成功率與加速皮膚新生。ReCell 自體細胞移植術中之酵素轉化過程只要 30 分鐘，取皮面積小。

3、 自體培養表皮細胞(JACE)與 ReCell 自體細胞移植術的使用，可以減少燒傷病人正常皮膚的取用。

11:00-11:20

I-3

Role of Integrin/Integrin-Linked Kinase (ILK)/Wnt Signaling Cascade in Conveying Surviving Signals from Epithelial Basement Membrane to Corneal Epithelial Stem Cells

馬惠康　林口長庚眼科

It has been well known that stem cell differentiation is heavily influenced by the microenvironment, so called the stem cell niche. For epidermal keratinocytes, epithelial basement membrane (EBM) is the major component of the niche. However, to date little is known about how the surviving signal is transmitted from the extracellular matrix (ECM) to the progenitor cells. Previously, using EDC/NHS cross-linked denuded amniotic membrane (CLDAM) as a surrogate EBM, we were able to observed that progenitor cells of human limbo-corneal epithelial (HLE) cells were better preserved on CLDAM than on natural DAM (*Biomaterials, 2010; J. Biomed. Nanotechnol., 2013*). Recently, we have identified integrin-linked kinase (ILK) may play a key role in conveying surviving signals from ECM and cross-talk with the Wnt pathway so as to promote the proliferation and inhibit differentiation of HLE cells (*Acta Biomaterialia, 2016*). Because non-organic material with adequate surface complexity can relay survival or differentiation signals to cells, the three-dimensional configuration of the stem cell niche might be more important than previously recognized.Understanding the topographic features of individual SC niches may enable the fabrication of artificial SC niches using synthetic biomaterials to replace more expensive natural basement membrane proteins.

11:20-12:00

I-4

Cell and Gene Therapy of Congenital and Acquired Cornea Diseases

Dr. Winston Whei-Yang Kao
Professor, University of Cincinnati
USA

Abstract

Umbilical cord mesenchymal stem cells (UMSCs) have unique immunosuppressive properties enabling them to evade host rejection and making them valuable tools for cell therapy for treating congenital and acquired cornea diseases. We previously showed that human UMSCs can modulates the host immune response enabling them to survive xenograft transplantation via the expression of a glycocalyx. *In vitro*, UMSCs inhibit the adhesion and invasion and cell death of inflammatory cells, and also the polarization of M1/M2 macrophages and maturation of T-regulatory cells. Moreover, UMSCs exposed to inflammatory cells synthesize a rich extracellular glycocalyx composed of the chondroitin sulfate proteoglycan versican bound to a heavy chain (HC, heavy chains of inter alpha trypsin inhibitors) modified hyaluronan (HA) matrix (HC-HA), which contains TNFα-stimulated gene 6 (TSG6), the enzyme that transfers HCs to HA, and pentraxin-3. Our results, both *in vivo* and *in vitro*, show that this glycocalyx confers the ability for UMSCs to survive the host immune system and to regulate the inflammatory cells. Administration of antibodies against the constituents of the glycocalyx, digestion of hyaluronidase and Chondroitinase ABC abolish the UMSC ability to modulate immune responses. Furthermore, treatment anti-CD44 antibodies also greatly diminishes the UMSC ability in modulating formation of M2 macrophages, suggesting that cell surface CD44 is required for the correct assemble of the UMSC glycocalyx for modulating inflammatory cells. Use of CRSIPR genome editing, we also show the feasibility of treating lysosomal storage diseases, e.g., MPS VII (mucopolysaccharidosis type VII).

Key words:

Cell Therapy, Mesenchymal Stem Cells, Congenital and Acquired Cornea Diseases, Glycocalyx, Immune Suppression, CRISPR genome editing

13:30-13:50

I-5

The Gap between the Academic Research and Industrialization of Cellular Therapeutic, SBI Experience

吳怡萍 博士 仲恩生醫科技

Abstract

As one of the clinical stage biotechnology company focused on the development and commercialization of regenerative medicine and cell therapy technologies, SBI echoes many struggles of the industrial pioneers. The efforts have been engaged in

1. Adaption and maintenance of the quality system and principle of pharmaceutical manufacturing practice.
2. Scaling up and tuning the consistency of production
3. Transport and package of product warranting the product stability
4. Strengthen the product safety for clinical usage

(www.steminent.com)

13:50-14:10

I-6

異體間葉幹細胞之新藥開發
New Drug Development of Allogenic Mesenchymal Stem Cells

葉嘉新 博士　台宝生醫科技

間葉幹細胞(mesenchymal stem cells, MSCs)可以自我複製更新(self-renewal)，並能誘導分化為骨頭、脂肪及軟骨細胞，其作為再生醫學策略的潛力，已經在動物實驗及人體臨床試驗被證明。現今間葉幹細胞治療可採自體移植或異體移植，安全性已經被確認，部分療效也已經在第三期臨床試驗證實。2012 年加拿大與紐西蘭核准全世界第一個異體間葉幹細胞治療新藥，即美國 Osiris 公司的 Prochymal®產品上市，用以治療 GvHD，目前也進行其他適應症的臨床試驗，包括 Crohn's disease (Phase III), type 1 Diabetes (Phase II)，Cardiac and chondrogenic repair (Phase II)等。本演講除簡介目前國際間異體間葉幹細胞新藥產品的最新研發進展與臨床開發外，更以台宝生醫目前以具全球專利之低氧低密度增植骨髓 MSCs 技術，成功發展醫療級異體間葉幹細胞產品，進行嚴重下肢血管缺血(Critical Limb Ischemia, CLI)，與其他具未被滿足醫療需求(unmet medical need)適應症之臨床試驗新藥開發為例，分享我國在此一領域新藥開發的優勢與潛力。

14:10-14:30

I-7

體外增生造血幹細胞之臨床應用

黃濟鴻 博士　台灣尖端先進生技醫藥

造血幹細胞(Hematopoietic stem cells; HSCs)是人體血液細胞與免疫細胞主要來源，造血幹細胞移植(Hematopoietic stem cells transplantation; HSCT)被廣泛應用於常規血液移植及各種疾病治療，如：血液惡性腫瘤、重度再生不良貧血與先天性遺傳疾病等。而成功的移植與可供移植的幹細胞數目及細胞植入率有關，如何有效的增加各種來源的 HSCs 且提高植入率成為 HSCT 研究的重要課題，台灣尖端發展一利用重組蛋白體外培養造血幹細胞方法，可以同時增加長期造血幹細胞(Long-term HSCs)數目並提高細胞植入率。

14:30-14:50

I-8

The Isolation, Enrichment and Differentiation Mechanism for a Type of Pulmonary Stem/ Progenitor Cells

林泰元 教授　台大醫學院藥理學系

The lung is a complex organ consist of many functional gas-exchanging units, named alveoli. There are approximately 300 million alveoli in adult lung. The type-I and type-II pneumocytes contribute to the maintenance of the epithelial layer for alveoli formation. Type-I pneumocytes are large, thin cells stretched across a large surface area, and cover a majority of the alveolar surface area (>95%), and are responsible for gas exchange. However, the knowledge about Type-I pneumocyte was quite rare because the difficulty of purification of the Type-I pneumocyte in past, as well as, the main function of Type-I pneumocyte: blood-air barrier for oxygen transportation was also quite hard to study. In previous studies, we have reported the enrichment of mouse pulmonary stem/progenitor cells (mPSCs) by using serum-free primary selection culture followed by FACS isolation using the coxsackievirus/ adenovirus receptor (CAR) as the positive selection marker. Our results demonstrate that lung stem/progenitor cells could promote angiogenesis as well as the differentiation of alveolar pneumocytes.

Oral Presentations

08:50-09:00

S-1

人工骨關節置換感染動物模式實驗
Infected Animal Model for Artificial Joint Replacement

方志翔[1] 黃書葦[1] 陳志偉[1,2] 孫瑞昇[3] 林峰輝[1]
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Introduction：Osteomyelitis is the infection of the bone perse. The bacteria could travel to the infection site through bloodstream, or inoculate directly, such as surgery, invasive procedure or open wound. Both conditions need a long period of treatment and high recurrent rate. In this study, we are going to test the hyperthermia effect of nanoparticles on treating osteomyelitis by use the previously established rat osteomyelitis model with implanting the frequently used metallic pin (stainless, titanium, and CoCrMo).
Materials and Methods：We used 300±50g rat to develop an Osteomyelitis model, knee joints were subjected to inserted a stainless steel pin and inject 107CFU/0.5ml of Staphylococcus. Aureus of the bacterial suspension. It took about 21 days to develop Osteomyelitis.
In this study, we would going to test the hyperthermia effect of nanoparticles on treating osteomyelitis. The animals would be 4 groups: SA-, SA+, SA+ with nanoparticle, and SA+ with nanoparticle treated by hyperthermia.
Results：In this study, for example, as an additional infection with histological assessment Congo Red, H & E and Gram stain and other objective indicators of the extent and degree of restoration.

The therapeutic results show that magnetic heat treatment can reduce the amount of bacteria in vivo in rats; if the magnetic heat treatment and Vencomycin administered simultaneously, can effectively reduce the amount of bacteria was more than 10 times. But the number is slightly less because of the subject, the statistics yet there are significant differences can, in the hope of future plans by the continuation of treatment outcomes to make a more complete show.
Discussion：This study found that taking 21 days after infection can be detected more complete model of the biofilm, more suitable for subsequent thermal parameters and magnetic therapy and other tests; in addition to the 23G needle as the femur fixator its length to 20mm is most appropriate. Currently biofime validation to the main sections were stained by the needle out when biofilm may cause decalcification biofilm is washed off and can not detect other factors, follow-up will consider ways undecalcified frozen sections and stained verification.
Conclusions：Take 21 days of infection mode not only makes high biofilm integrity, for subsequent magnetic heat treatment is obvious; and after 21 days the mice both in terms of recovery of appetite and ability to act more complete, more in line with animal ethics. In this study, for example, as an additional infection with histological assessment Congo Red, H & E and Gram stain and other objective indicators of the extent and degree of restoration.

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09:00-09:10

S-2

以自組裝胜肽水膠為支架下間葉幹細胞的生長和多重分化情形

Self-Assembled Peptide-Based Hydrogels as Scaffolds for Proliferation and Multi-Differentiation of Mesenchymal Stem Cells

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中國醫藥大學附設醫院整合幹細胞中心[4] 國立交通大學材料科學與工程學系所[5]

Introduction：Fluorenyl-9-methoxycarbonyl (Fmoc)-diphenylalanine (Fmoc-FF) and Fmoc-arginine-glycine-aspartate (Fmoc-RGD) peptides self-assemble to form a 3D network of nanofibrous hydrogel (Fmoc-FF/Fmoc-RGD), which provides a nanofibrous hydrogel network that uniquely presents bioactive ligands at the fibre surface for cell attachment.

Materials and Methods：Fmoc-FF, Fmoc-RGD and Fmoc-RGE were synthesized. The immortalization of human primary MSCs were tested by cell proliferative, live-dead assay, histochemistry and immunohistochemistry after *in vitro* and *in vivo* differentiation or not.

Results：In the present study, the proliferation and differentiation of mesenchymal stem cells (MSCs) encapsulated in Fmoc-FF/Fmoc-RGD hydrogel were investigated and compared to that in Fmoc-FF/Fmoc-RGE (a chemical analogue of RGD but does not promote cell adhesion) hydrogel. MSCs in Fmoc-FF/Fmoc-RGD hydrogel increased in proliferation and survival compared to that in Fmoc-FF/Fmoc-RGE hydrogel. Moreover, MSCs encapsulated in Fmoc-FF/Fmoc-RGE hydrogel and induced in each defined induction medium underwent *in vitro* osteogenic, adipogenic and chondrogenic differentiation. The optimal cell density for differentiation is 2.5×10^6 per 200 μl cell-gel mixture for each differentiation. For *in vivo* differentiation, MSCs encapsulated in Fmoc-FF/Fmoc-RGD hydrogel or Fmoc-FF/Fmoc-RGE hydrogel were induced in each defined medium for 1 week, followed by injection to gelatin sponges and transplantation into immunodeficient mice for 4 weeks. MSCs in Fmoc-FF/Fmoc-RGD hydrogel increased in differentiation into osteogenic, adipogenic and chondrogenic differentiation, compared to that in Fmoc-FF/Fmoc-RGE hydrogel.

Discussion：Many kinds of hydrogels had been explored as scaffolds for tissue engineering and regeneration medicine. Although Fmoc-FF/Fmoc-RGD hydrogel has been investigated for delivering anchorage-dependent cells (Zhou, Smith et al. 2009), its application for tissue engineering using MSCs has not been demonstrated. This is the first study to demonstrate the suitability of Fmoc-FF/Fmoc-RGD hydrogel for serving as scaffolds for multi-differentiation of MSCs both *in vitro* and *in vivo*.

Conclusions：These data conclude that nanofibers formed by self-assembly of Fmoc-FF and Fmoc-RGD are suitable for the attachment, proliferation, and multi-differentiation of MSCs and can be applied for musculoskeletal tissue engineering.

09:10-09:20

S-3

以碳二亞胺交聯羊膜保存人類角膜輪部上皮前驅細胞之作用機轉探討

Preservation of Human Limbal Epithelial Progenitor Cells on Carbodiimide Cross-Linked Amniotic Membrane Via Integrin-Linked Kinase-Mediated Wnt Activation

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Introduction：Given that the Wnt pathway is a major signaling pathway regulating corneal epithelial stem cells, this study aims to investigate the mechanism of preservation of human limbal epithelial (HLE) progenitor cells on carbodiimide cross-linked amniotic membrane (CLDAM) via integrin-linked kinase (ILK)-mediated Wnt activation.
Materials and Methods：HLE cells were cultured on dishes (HLE/dish), AM (HLE/DAM) or CLDAM (HLE/CLDAM). BrdU label retention, CFE assay, immunoconfocal microscopy, real-time quantitative RT-PCR, Western blot, and effect of ILK silencing or over-expression on Wnt activation and HLE cell differentiation were performed to study the influence of matrix ultrastructure on Wnt activity.
Results：Compared with HLE/dish or HLE/DAM cultures, HLE/CLDAM cultures showed greater BrdU retention and colony formation efficiency and expressed higher levels of p63, ABCG2, integrin β1, and ILK. Nuclear β-catenin and TCF-4 levels were higher in HLE/CLDAM cultures compared with HLE cells cultured on collagen IV, laminin, Matrigel, or DAM. Silencing of ILK in HLE/CLDAM cultures led to decreased levels of nuclear β-catenin, TCF-4, and deltaNp63α, whereas cytokeratin 12 expression increased. Over-expression of ILK in HLE/dish cultures had the opposite effects.
Discussion：Carbodiimide cross-linked AM can potentially serve as an artificial corneal epithelial stem cell niche. For the first time, the CLDAM was used as a simulated substrate to investigate this mechanism. We proposed that the CLDAM with its higher rigidity and rougher ultrastructure better preserved HLE progenitor cells in vitro, possibly by activating integrin β1/ILK, which indirectly activated Wnt/β-catenin and subsequently deltaNp63α.
Conclusions：Crosstalk between integrin β1/ILK and Wnt/β-catenin pathway plays a role in HLE cell cultivation.

09:20-09:30

S-4

以軟骨細胞/華通氏膠間質幹細胞共培養系統評估幹細胞之抗發炎及抗凋亡能力

Evaluation the Anti-inflammation and Anti-Apoptosis Abilities of Mesenchymal Stem Cell by Chondrocyte/Wharton's Jelly Mesenchymal Cells (WJMSC) Co-culture System

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亞東紀念醫院骨科部[1] 國立台灣大學醫學工程學研究所[2]

Introduction：Due to mesenchymal stem cell is easily expanded in culture, generally not tumorigenic, and can be readily obtained from patients, they have become an ideal cell source for osteoarthritis (OA) therapy. Here, we tried to use human Wharton's Jelly MSC (WJMSC) as a cell source for OA treatment. Chondrocyte was induced inflammation by hydrogen peroxide (H_2O_2) incubation first, and then co-cultured with WJMSC or WJMSC-conditioned medium to evaluate the anti-inflammatory and anti-apoptosis ability.
Materials and Methods：Four kinds of culture conditions were evaluated in the study including (I) H_2O_2-chondrocyte, (II) H_2O_2-chondrocyte/WJMSC co-culture system, (III) WJMSC-conditioned medium system and (IV) chondrocyte control group. In system II, chondrocyte and WJMSC was cultured on the bottom layer of the wells and the transwell, individually. In system III, WJMSCs was cultured for 1 day and collected the medium to prepare the WJMSC-conditioned medium. Cells were all collected after 1-day incubation for further analysis by real-time PCR.
Results：The cell viability was decreased, and the morphology was changed in H_2O_2 treated chondrocyte groups, especially when the H_2O_2 concentration was higher than 300 M. In system I, we found H_2O_2 can up-regulated COX-2 expression. Besides, we also found when chondrocyte/WJMSCs ratio was decreased, the inflammation-related genes such as COX-2, MMP13 and iNOS were up-regulated (system II). In system III, we found the inflammation genes were up-regulated in 10X WJMSC-conditioned medium treated group, and the anti-inflammation related gene IGF-1 was also increased. However, the inflammation and apoptosis genes were significantly decreased in 10X WJMSC-pass through medium group.
Discussion：Summarized the cell viability, cell morphology and gene expression results, chondrocyte treated with 200 μM H_2O_2 was the optimal concentration to induce the cell damage. We found 10X WJMSC-pass through medium possess better anti-inflammation and anti-apoptosis ability. It not only reduce the inflammatory level of COX-2, MMP13, iNOS, TNF- but also decrease the apoptosis level of Caspase 3, TNF-R1, Caspase 8, and assist chondrocyte repair.
Conclusions：Compared to all of the co-culture systems, the 10X WJMSC-pass through medium could effective reduce the inflammation and apoptosis of the chondrocyte.

09:30-09:40

S-5

具控制釋放功能之水性三維列印聚胺酯支架於軟骨組織工程之應用
Water-Based Polyurethane 3D Printed Scaffolds with Controlled Release Function for Customized Cartilage Tissue Engineering

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Introduction：3D printing is a rapid prototyping and fabrication technology. Scaffolds can be fabricated by the 3D printing method. However, non-toxic biodegradable materials available for 3D printing are relatively limited. Transforming growth factor family is the most frequently used bioactive factor to induce chondrogenic differentiation but is expensive and can cause the hypertrophy through the sustained high content. Y compound is an inhibitor for ROCK and is under clinical trials for treating heart failure. Y compound increases the differentiation of chondroprogenitors, but its effect on mesenchymal stem cells (MSCs) depends on cell density and morphology. Here we develop 3D printed scaffolds with cell aggregation capacity and controlled release function based on polyurethane (PU) and hyaluronan (HA) for cartilage tissue engineering applications.

Materials and Methods：The biodegradable PU elastomers were synthesized from a water-based process. The soft segment was poly(-polycaprolactone) diol and polyethylene butylene adipate diol. The hard segment was isophorone diisocyanate, 2,2-bis(hydroxymethyl) propionic acid and ethylenediamine. 3D scaffolds were printed from a feed containing PU, HA, and Y compound. The expression levels of chondrogenic, hypertrophic, and fibrotic marker genes for MSCs grown in the 3D printed scaffolds were analyzed by qRT-PCR. The contents of glycosaminoglycan were determined by dimethylmethylene blue assay. The capacity for chondral regeneration of the 3D printed scaffolds was evaluated in a rabbit chondral defect model.

Results：A 3D scaffold was successfully fabricated by the 3D printing process from PU dispersion mixed with HA and Y compound. MSCs seeded in the scaffolds were aggregated and underwent chondrogenesis effectively. Transplantation of the MSC-seeded PU/HA/Y scaffold in a rabbit chondral defect significantly improved the cartilage regeneration.

Discussion：Scaffolds are printed from the PU dispersion with the aid of high viscosity HA. The PU/HA/Y scaffolds promote the self-aggregation of MSCs and, with timely release of the Y compound, induce the chondrogenic differentiation of MSCs and produce matrix for cartilage repair.

Conclusions：The 3D printing composite scaffolds with controlled release bioactivity may have potential in customized cartilage tissue engineering.

09:40-09:50

S-6

明膠-氫氧基磷灰石及雙相磷酸鈣複合支架作為第二型骨成形蛋白質之載體促進齒槽上骨生成之成效探討

Gelatin-Hydroxyapetite/Beta-Tricalcium Phosphate Hybrid Scaffold as a Type 2 Bone Morphogenetic Protein Carrier to Enhance Supra-Alveolar Osteogenesis

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國立臺灣大學臨床牙醫學研究所[1] 國立臺灣大學醫學工程學研究所[2]

Introduction：The aim for this study is to evaluate preclinical efficiency of a novel gelatin-hydroxyapatite/beta-tricalcium phosphate (gelatin-HA/ß-TCP) hybrid scaffold as a type 2 bone morphogenetic protein (BMP-2) carrier in promoting supra-alveolar osteogenesis.

Material and Methods：Thirty-two rats were utilized and were divided into four groups: gelatin-HA/ß-TCP scaffold alone, scaffold infused with BMP-2, scaffold infused with poly-(D,L) lactide (PDLLA) microspheres encapsulating BMP-2, and no scaffold (control) groups. The hybrid structure of gelatin-HA/ß-TCP was fabricated by freeze-drying and crosslinking with glutaraldehyde, and the PDDLA microspheres were fabricated using co-axial elecrohydrodynamic atomization. The scaffold (5X2 mm) was fixed on the buccal surface of rat mandible using a 1.2X6 mm mini-screw for 28 days. The treatment outcome was evaluated by bone flurochrome staining using calcein and Alizarin red, micro-CT imaging, and histology.

Results：The crosslinked gelatin-HA/ß-TCP scaffold was successfully fabricated with a pore size of 439±56 m and a porosity of 81.7±1.2 %. The PDLLA microsphere was 7±3 m in diameter, with an encapsulation efficiency of 64.9%±4.59 % and controlled release capability over 2 weeks. Osteogenesis to augment the ridge height was evident, and newly-formed bone was well integrated with HA/ß-TCP particles. Stronger bone flurochromatic signals was noted in the specimens infused with BMP-2 and microspheres with BMP-2. On the micro-CT imaging, the groups treated with gelatin-HA/ß-TCP scaffold showed significant greater supra-alveolar osteogenesis relative to the control, and no significant difference was noted among these three groups in the percentage of new bone formation between three scaffold groups.

Discussion：Supra-alveolar osteogenesis was promoted according to great space maintanence and osteoconductive capabilities of the gelatin-HA/ß-TCP scaffold, and the osteogenic potential was apparently greater with BMP-2 treatment. However, no further significant improvement by BMP-2 was presumably associated with the radiopaque nature of HA/ß-TCP that the newly-formed was not entirely distinguishable from residual HA/ß-TCP.

Conclusion：The novel gelatin-HA/ß-TCP scaffold was able to enhance supra-alveolar osteogenesis. Further investigation to evaluate the additional benefit of carrying BMP-2 is still needed.

15:20-15:30

S-7

動靜脈廔管所生擾流對血管內皮之影響
Vascular Endothelial Responses to Disturbed Flow in Arteriovenous Fistula

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Introduction：Although the Autogenous arteriovenous fistula (AVF) was the preferred form of permanent hemodialysis access, it still had significant problems such as thrombosis, stenosis.

Materials and Methods：Human sample was collected from hemodialysis patients. We used the rat AVF model to mimic the human AVF condition. The flow pattern and shear stress in the AVF was measured by Doppler ultrasound imaging system. The cultured Human saphenous vein endothelial cell (HSVEC) was subjected to shear stress in a parallel-plate flow chamber to mimic the flow pattern in the human AVF.

Results：We found that the abnormal disturbed flow with high and oscillatory shear stress (HOS) was generated in the anastomosis site of AVF by Doppler ultrasound. The expression pattern of high HDAC-1/2/3 and low TM was shown in ECs exposed to HOS on both human patients and AVF rat model. In order to confirm the change of HDAC-1/2/3 and TM in AVF, we developed the in vitro flow system to generate the HOS with 30 ± 100 dyne/cm^2 and laminar shear stress (LSS) with 5 dyne/cm^2 to mimic flow pattern in the physiological environment of human AVF. Application of ECs with HOS induced the association of HDAC-3 with KLF2 to deacetylate KLF2, and resulted in down-regulation of TM protein. Transfection of ECs with HDAC-3 specific siRNAs eliminated HOS-induced TM downregulation in ECs. In rat AVF model, intraperitoneal administration of the class I-specific HDAC inhibitor valproic acid (VPA) into AVF rats inhibited the increased stenosis at anastomosis sites.

Discussion：An important limitation of this study is the use of anesthetized animals to obtain the hemodynamic data, which could have altered flow rates compared with non-anesthetized animals. However, we previously demonstrated that the flow pattern in our rat AVF model is similar to human AVFs.

Conclusions：Taken together, our findings demonstrate the HOS induces HDAC3 to deacetylate KLF2 and repress TM and its contribution to stenosis in AVF failure.

15:30-15:40

S-8

運用桿狀病毒在片狀脂肪幹細胞長效表現外源性神經生長因子 GDNF 改善神經修復
Adipose Stem Cell Sheet Transduced with Baculovirus GDNF Expression Vector Enhance Sciatic Nerve Regeneration

許慕農　胡育誠
國立清華大學化工系

Introduction：Peripheral nerve regeneration is often suboptimal after nerve injury, with poor functional recovery because peripheral nerve regeneration is slow and usually incomplete. In this study, we developed a baculovirus-transduced, glial cell line-derived neurotrophic factor (GDNF)-expressing adipose-derived stem cell sheet and then applied this sheet to accelerate nerve regeneration.
Materials and Methods：ASCs were isolated from the adipose tissue of Sprague-Dawley rats and seeded on 6 well then transduced with baculovirus GDNF Expression Vector to create a transduced cell sheet. ASCs sheet were wrapped around sciatic nerve defect (end-to-end repair) in Sprague-Dawley rats (group LEGW). The control groups were a non-transduced cell sheet transplantation group (group Mock); direct repair without cell sheet (group NC), nonoperative group (group Sham). Eight weeks after surgery, gait analysis, electrophysiological recordings, gastrocnemius muscle wet weight, and myelinated axon counts were measured to evaluate the repair of peripheral nerve defects.
Results：The gait analysis, nerve conduction velocity, compound muscle action potentials, gastrocnemius muscle wet weight, and myelinated axon counts in the LEGW group were significantly higher than in the other groups.
Discussion：Transwell migration assay demonstrated the GDNF transduced ASCs did not directly differentiate into Schwann cell phenotype but facilitating the migration of Schwann cells in vitro. The effects of GDNF transduced ASCs on migration and anti-inflammation in nerve defect promote axon regeneration through trophic functions, acting on Schwann cells, and promoting angiogenesis.
Conclusions：The combination of adipose-derived stem cell sheet and exogenous glial cell line-derived neurotrophic factor exhibited a synergistic effect in promoting nerve regeneration, and could provide an alternative cell therapy for nerve repair.

15:40-15:50

S-9

源自人類多功能幹細胞之間質幹細胞透過細胞骨架重組增進神經分化能力
Human Pluripotent Stem Cell (PSC)-Derived Mesenchymal Stem Cells (Mscs) Show Potent Neurogenic Capacity Which is Enhanced with Cytoskeletal Rearrangement

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Introduction： Mesenchymal stem cells (MSCs) are multilineage somatic paraxial mesodermal progenitors with potent immunomodulatory properties. Reports also indicate that MSCs can undergo neural-like differentiation, which offers much hope for the use of these versatile stem cells in neurodegenerative & ischemic diseases. However, MSCs are generally isolated from primary organs and tissues, and can undergo replicative senescence during in vitro expansion to reach the cell volumes needed for therapeutic use. A new source of renewable MSCs can be derived from pluripotent stem cells (PSCs) such as embryonic stem cells (ESCs) and induced pluripotent stem cells (iPSCs). These PSC-derived MSCs (PSC-MSCs) can offer the 'best-of-both-worlds' scenario, by differentiating PSCs to a somatic progenitor, which then abrogates teratoma formation—a concern for all PSCs—while preserving the proliferative capacity of the parental PSCs. Moreover, PSC-MSCs are an earlier developmental stage than any post-natal MSCs, which may bring additional advantages in terms of broader differentiation capacity. We therefore investigated the neuro-differentiation capacity of these MSCs

Materials and Methods： Real-time PCR and immunofluoresent staining were used to detect the expression of NSC-related genes.

Results： We found that PSC-MSCs express higher levels of neural stem cell (NSC)-related genes and transcription factors than bone marrow (BM) MSCs at baseline. When cultured in standard neurogenic differentiation medium, PSC-MSCs express higher levels of neural-stem cell (NSC)-related genes than BMMSCs. PSC-MSCs also readily acquire a neurogenic phenotype when the cytoskeletal modulator RhoA kinase (ROCK) is inhibited. Interestingly, when standard neurogenic differentiation medium is combined with ROCK inhibition, PSC-MSCs undergo further neural lineage commitment, acquiring characteristics of post-mitotic neurons. This is not only evidenced by elongation of cytoplasmic and growth of dendrite-like processes, but also by nuclear condensation and protein expression of nuclear NeuN as well as neuron-restricted markers including β-III-tubulin and Doublecortin.

Discussion： These findings also implicate the important role of the cytoskeleton in MSC lineage commitment towards neurogenic cell types, as well as the influence of the developmental stages of stem cells on differentiation capacity.

Conclusions： Our data demonstrates that PSC-MSCs have a potent capacity to undergo neural differentiation.

15:50-16:00

S-10

可注射自癒性水膠應用於修復中樞神經損傷
An Injectable, Self-Healing Hydrogel to Repair the Central Nervous System

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Introduction：Neurological disorders are diseases of the body nervous system. Very few treatments can lead to complete recovery, especially for central nervous system disorders. Stem cell-based therapies have emerged as treatment options for repairing neurological disorders. However, transplantation of stem cells to the injured sites shows poor engraftments. Smart hydrogels can serve as promising cell delivery vehicles for therapeutic healing and tissue regeneration. Self-healing materials are a class of smart materials that have drawn much attention, but the biomedical applications of self-healing materials are rarely reported. Therefore, we sought to determine if cells combined with a self-healing gel may offer therapeutic potentials for treating neurological disorders.
Materials and Methods：The self-healing chitosan-based hydrogel was prepared and characterized by rheological measurement. Neural stem cells (NSCs) were then encapsulated in the self-healing gel for 3 and 7 days. Cells encapsulated in alginate gel or poly(ethyleneimine)-based self-healing gel of the same rigidity were used for comparison. The cell-laden constructs were monitored and analyzed for cell viability, cell proliferation, and neural differentiation tendency. They were then injected in zebrafish embryos for assessment of neural repair capacities.
Results：NSC spheroids grew twice faster in self-healing hydrogel compared to conventional alginate gel and had a greater tendency to differentiate into neuron-like cells. In the zebrafish embryo neural injury model, injection of the chitosan-based self-healing hydrogel could partially heal the neural development. Injection of the chitosan-based self-healing hydrogel with NSC spheroids produced a remarkable healing effect on neural development (~81% recovery). In contrast, the stiffer chitosan-based self-healing gel (4.2 kPa) or poly(ethyleneimine)-based self-healing gel (1.5 kPa) did not have any healing function.
Discussion：NSC spheroids proliferated much faster in self-healing hydrogel, which may be associated with the halo formation in self-healing gel. The amine groups on chitosan backbone may interact with NSCs and further induce the neuronal differentiation. The differentiation of NSCs may also be affected by substrate stiffness.
Conclusions：An injectable, self-healing hydrogel (stiffness ~1.5 kPa) was developed for healing central nerve system deficits. Particularly, the chitosan-based self-healing hydrogel encapsulating aggregated NSCs represents a promising strategy for rescuing the neural functions.

16:00-16:10

S-11

分化脂肪幹細胞成內皮與神經前驅細胞對缺血缺氧性腦傷產生協同保護
Synergistic protection of hypoxic-ischemic brain injury by endothelial and neural lineage cells induced from adipose-derived stem cells

黃家葳[1] 張雅茹[1] 薛元毓[2,3] 吳佳慶[1,4]
國立成功大學基礎醫學研究所[1] 國立成功大學臨床醫學研究所[2]
國立成功大學附設醫院整形外科[3] 國立成功大學細胞生物與解剖學研究所[4]

Introduction： Neonatal hypoxic-ischemic (HI) injury disrupts the neurovascular architecture and leads to life-long functional deficits. The devastating outcome can be ameliorated by preserving the endothelial or neural structures, but the source of therapeutic cells were limited. Adipose-derived stem cells (ASCs), an ideal autologous cell source, showed high potential to differentiate toward various lineages. We aim to elucidate the importance of microenvironmental induction for ASCs and evaluate the therapeutic potential of ASC-differentiated cells in neonatal HI injured brain.

Materials and Methods：ASCs, isolated from liposuction aspirates, were differentiated into endothelial lineage cells (ELCs) using combination of biochemical and mechanical stimulations, or induced toward neuronal lineage cells (NLCs) by forming neurosphere on chitosan-coated surface. After neonatal HI brain injury in SD rats, the differentiated cells were transplanted via percutaneous injection and assess the outcome after 7 days of therapy.

Results：As compared to ASCs, the ELCs possessed endothelial characteristics and significantly reduced the infarction area after transplanted to the HI injured brain. The transplanted ELCs can engraft to the brain vessels as well as promote the angiogenesis through the neuropilin 1 (NRP1) and vascular endothelial growth factor receptor 2 (VEGFR2) signals via activation of Akt. We further interested to test the beneficial effect of combine NLCs with ELCs (E+N) to protect both neural and endothelial network. The E+N combination showed an even more significantly decrease of brain infarction and apoptotic area than ELCs transplantation. By observing the neurovascular architectures, we found the transplanted ELCs and NLCs can homing to the injured brain for specific vascular and neural structures as well as the boost-up of endogenous angiogenesis and neurogenesis. In addition, the combine treatment of E+N showed better recovery of memory for long-term cognitive function. To reveal the cell-cell interactions between ELCs and NLCs, we used Boyden chamber to assess the in vitro cell mobility and revealed an interesting synergetic increase of transmigration when combining ELCs and NLCs under hypoxic microenvironment. The interaction signal is involved with NRP1 signaling in ELCs and with the C-X-C chemokine receptor 4 (CXCR4) and fibroblast growth factor receptor 1 (FGFR1) signals in NLCs. Blockage of specific signals in either ELCs or NLCs diminished the beneficial effects of cell migration, homing, and protection of neurovascular structures in the E+N combined treatment.

Conclusions： The microenvironmental cues provide induction factors for ASCs to differentiate into endothelial and neural lineages. The synergistic effect of combine ELCs and NLCs improved both structural and functional recovery for neonatal HI brain injury.

16:10-16:20

S-12

以動物退化性膝關節模型研究人類骨髓間葉幹細胞的軟骨修復功能
Bone Marrow- Mesenchymal Stem Cell Derived Chondroprogenitor Scaffold for the Treatment of Osteoarthritis

黃書葦[1] 曾渥然[2] 徐麗道[3] 孫瑞昇[4] 林峰輝[1]
台灣大學醫學工程研究所[1] 台大醫院新竹分院骨科[2]
工業研究院生物醫學研究所[3] 台大醫院骨科[4]

Introduction：Osteoarthritis (OA) is a degenerative disorder of articular cartilage that limits the mobility of patients and treatments to manage the disease remain symptomatic. Total joint replacement remains the definitive treatment for end-stage OA.

In this study, we explore a new approach to treat OA by implanting in a porcine OA model a chondroprogenitor cell scaffold derived from human bone marrow mensenchymal stem cells (BM-MSCs).

Materials and Methods：To develop an OA model, porcine knee joints were subjected to anterior cruciate ligament transection (ACLT). It took about 4 months to develop OA.

Following BM-MSC expansion, cells were seeded onto a collagen-based scaffold and then underwent chondrogenic induction for 14 days prior to implantation.

OA animals were treated with the chondroprogenitor scaffold plus microfractures in one of rear knees and microfractures alone in the contralateral knee. Histological and histomorphometric evaluations were performed at 6 months after surgery.

The scaffold for chondrogenic induction of BM-MSC is a 2mm thick collagen-based porous membrane with high pore interconnectivity and pore sizes varying between 200~300μm.

1. **Establishment of a porcine OA model**
   ACLT -induced OA model was utilized for the implantation study as the extent of the cartilage damage was more consistent between animals and did not result in subchondral bone remodeling.
2. **Evaluation of the chondroprogenitor scaffold in the OA model**
   At 6 months post-implantation, newly generated tissues were observed at the site of implantation with the cell scaffold. Histological examination of the generated tissue revealed evidence of cartilage-like tissue with lacuna formation.

Discussion：This study shows that BM-MSC derived chondroprogenitor scaffolds can generate new cartilage-like tissue in vivo and have the potential as a useful treatment option for early osteoarthritis.

Conclusions：This study shows that BM-MSC derived chondroprogenitor scaffolds can generate new cartilage tissue in vivo and have the potential as a useful treatment option for osteoarthritis.

16:20-16:30

S-13

Optimization of Porous Structure, Mechanical Strength and Cell Affinity of Novel 3D Printing Silica Bioceramics for Custom-made Bone Scaffold

林致揚[1] 張志豪[2] 劉福興[3] 廖運炫[1]
國立臺灣大學機械工程學系[1] 國立臺灣大學醫學系骨科[2] 龍華科技大學機械工程學系[3]

Introduction：The repair or replacement of injured or defective bone is a critical problem for orthopedic surgeons. Recently, silica bioceramics have been widely used for bone restoration and bone tissue engineering, but silica is insufficient to support the bone structure. In this study, we add $CaCO_3$ into slurry to enhance mechanical property by laser-aided gelling (LAG) method on a self-developed 3D printer.
Materials and Methods：The principal materials used in this study were SiO_2 powder. The SiO_2 sol and SiO_2 powder were mixed at a 20/80 ratio (w/w) to produce a SiO_2 slurry, termed CS0. $CaCO_3$ was another powder additive that served as a filler substance and solid content after sintering. $CaCO_3$ powder was added separately to the SiO_2 slurry at weight ratios of 5% and 9%, termed CS5 and CS9, respectively. In order to assess the scaffold feasibility by compressive test, SEM, XRD and MTT assay.
Results：At 1300°C, the compressive strength of CS5 was obviously improved. The highest compressive strength is 47 MPa, which represents a 30% improvement over CS0 and CS9. Because β-$CaSiO_3$ crystals are observed on the CS5 surface and the needle-like crystals have a lattice structure and can resist stress rupture, resulting in a significant improvement in compressive strength.
Discussion：The optimal material is CS5 which has not cytotoxicity by in vitro test, and the mechanical property is 47.5 Mpa. The optimal material prescription and heat treatment temperature were used to produce an inter-porous bioceramic model for use in bone scaffolds. The inter-porous bioceramic scaffold model, designed using the Solidworks software, has dimensions of Ø 15x6.5 mm, a pore size of 0.8x0.8 mm and a pore distance of 0.8 mm.
Conclusions：The LAG method and a home-made 3DP machine were used to produce bioceramic bone scaffold. The maximum compressive strength of CS5 was 47 MPa and the porosity was increased to 34%. The optimum CS5 scaffold shows no cytotoxicity and good bone cell attachment and growth. The inter-porous silica bioceramic scaffolds with a pore size of 0.8 mm has been successfully fabricated.

16:30-16:40

S-14

糖尿病鼠下肢缺血不可再生之動物模式
Non-Regenerative Hind Limb Ischemia Model on Diabetic Mice

鄭紫妃[1] 簡崇美[1] 陳振偉[1] 黃玲惠[1,2,3,4]
國立成功大學生物科技研究所[1] 國立成功大學生物科技與產業科學系[2]
國立成功大學臨床醫學研究所[3] 國立成功大學再生醫學卓越研究中心[4]

Introduction：Hind limb ischemia is a disease mainly caused by the peripheral arterial disease (PAD), thromboangiitis obliterans and arterial injury. However, the existent murine animal models for evaluation of therapeutic effect have a problem with spontaneously vessel regeneration. The therapeutic effect can't be distinguished medical effect from the vessel regeneration. In our research, we modified and established a hind ischemia mice model to imitate the real ischemic condition.
Materials and Methods：We used C57BL/6 strain male mice age 2~10 months to exclude the confounding effects and ensure the fully developed vascular system. Operating the severe surgery on mice hind limb which ligate and remove the backside vessels such as femoral artery, collateral arteries and so on. Using the table of physical score and laser Doppler-based perfusion measurements to evaluate tissue necrosis level and vascular response.
Results：In this research, we observed that limb blood vessel regeneration occur at young age (2~6 months) limb ischemic mice or the mice performed a general hind limb ischemia surgery. In addition, hind limb ischemia recovery process in non-diabetic condition is better than diabetic condition. These result was different from most limb ischemia animal model.
Discussion：C57BL/6 mice are known to recover quickly from ischemia, so it must be perform the severe surgery to avoid vessel regeneration. Moreover, the result showed that old aged and diabetic mice have worse recovery which is consistent with the actual situation of limb ischemic patients.
Conclusions：Our modified hind limb ischemia model could rational imitate the limb ischemia situation and have the potency to be used as a therapeutic angiogenesis research platform.

16:40-16:50

S-15

以重組桿狀病毒改質脂肪間葉幹細胞共同表現 BMP-2 與 SDF-1 於大範圍頭蓋骨缺陷修復之應用

The Critical-Size Calvarial Defect Repair using Baculovirus-Engineered ASCs co-express BMP-2 and SDF1 within Gelatin Scaffold

羅士鈞 胡育誠
國立清華大學化學工程研究所

Introduction：在大範圍頭蓋骨缺陷上由於成人無法自我修復，導致大面積骨缺損不易進行修復，因此在醫療上一直是個尚待解決的難題。在此篇研究中我們利用重組桿狀病毒使脂肪間葉幹細胞共同長效表現 BMP-2 與 SDF-1，並探討透過 BMP-2 與 SDF-1 共同刺激下是否能促進脂肪間葉幹細胞，後續以動物實驗觀察共同長效表現 BMP-2 與 SDF-1 下頭蓋骨缺損的修復情形，希望增加脂肪間葉幹細胞(ASCs)在頭蓋骨臨床上的應用。

Materials and Methods：我們生產的桿狀病毒皆以 150 MOI 進行轉導脂肪間葉幹細胞，並以 ELISA 分析其表現量。我們後續以 migration assay 分析轉導後的 ASCs 對骨髓間葉幹細胞的吸引效率，並以 qPCR 分析骨分化基因在 ASCs 當中的表現，並以茜紅染色以及鈣沉積定量分析 ASCs 骨分化情況。我們後續將轉導後 ASCs 種入 Gelatin sponges 中並植入 6 mm 的 SD 大鼠頭蓋骨缺陷中，以 μCT 活體影像分析，並且定量其修復的骨體積、骨密度和骨面積。

Result：從 ELISA 結果中可以看到經轉到後的 ASCs 能夠持續同時表現 BMP-2 與 SDF-1 至 7~9 天，最大表現量約在 83 ng/ml 以及 59 ng/ml，而 migration assay 結果也顯示 ASCs 表現 SDF-1 能有效吸引骨髓間葉幹細胞。從 qPCR、茜紅染色和鈣沉積定量結果皆發現在轉導後第 14 天共同表現 BMP-2 與 SDF-1 皆明顯促使 ASCs 往硬骨路徑分化的現象。在 μCT 活體影像分析結果也看到了共同表現 BMP-2 與 SDF-1 明顯修補大範圍頭蓋骨缺陷。

Discussion：當 ASCs 共同受到 BMP-2 和 SDF-1 的刺激時，我們發現 ASCs 比單用 BMP-2 刺激時促骨分化的效果更顯著。同時 SDF-1 本身為趨化素(chemokine)，能夠有效吸引血液或是區域性的間葉幹細胞，使我們能更有效的修復非應力區大範圍頭蓋骨缺陷。

Conclusions：此篇研究利用重組桿狀病毒系統使 ASCs 長效表現 BMP-2 與 SDF-1，促使 ASCs 有效進行硬骨分化，並且修復大範圍頭蓋骨缺陷，而此結果有助於未來 ASCs 在頭蓋骨修復臨床上的應用。

16:50-17:00

S-16

以攪打起泡製程開發多孔透明質酸載體應用於角膜內皮組織工程
Investigation of Overrun- Processed Porous Hyaluronic Acid Carriers in Corneal Endothelial Tissue Engineering

羅麗娟 [1] 賴瑞陽 [2*]
長庚大學化工與材料工程學系 [1] 長庚大學生化與生醫工程研究所 [2]

Introduction：Given that bioengineered corneal endothelial cell (CEC) sheet grafts are fragile, it is necessary to provide supporting structure during surgical handling and tissue reconstruction. Hyaluronic acid (HA) is a well-known ophthalmic biomaterial. For the first time, this study reports development of overrun-processed porous HA hydrogels for CEC sheet transplantation applications.
Materials and Methods：The hydrogel carriers were characterized to examine their structures and functions. Evaluations of air-dried and freeze-dried HA samples were conducted simultaneously for comparison.
Results：Among all the groups studied, the overrun-processed porous HA carriers show the greatest biological stability, the highest freezable water content and glucose permeability, and the minimized adverse effects on ionic pump function of rabbit CECs. Clinical observations showed that the cell-biopolymer constructs can regenerate corneal endothelium and restore tissue transparency at 4 weeks postoperatively.
Discussion：Clinically, the loss of CECs causes corneal opacity and failure and eventually leads to serious vision problems. Here, we propose the use of overrun-processed and freeze-dried HA hydrogels as cell sheet carriers in corneal endothelial tissue engineering. During the fabrication of biopolymer carriers, an additional nitrogen gas injection in HA solutions is beneficial to enlarge the pore structure and prevent dense surface skin formation. Thus, after intraocular delivery of cell-biopolymer constructs, the corneal edema is greatly reduced, suggesting the therapeutic efficacy of bioengineered cell sheets.
Conclusions：Cell sheet tissue engineering using overrun-processed porous HA hydrogels offers a new way to reconstruct the posterior corneal surface and improve endothelial tissue function.

第七屆第一次會員大會

台灣再生醫學學會第六屆理、監事名單
(照筆劃順序排列)

理 事 長　楊台鴻

秘 書 長　洪士杰

常務理事　林峰輝、徐善慧、陳耀昌、嚴孟祿

理　　事　方旭偉、王兆麟、王至弘、江清泉、何美泠、林泰元、張至宏、陳敏慧、黃玲惠、蔡清霖

候補理事　林高田、陳文哲、陳志華、楊俊佑、楊榮森

常務監事　黃義侑

監　　事　侯連圍、孫瑞昇、張瑞根、鄭乃禎

候補監事　顏伶汝

第七屆第一次會員大會議程

時間：民國105年3月12日(星期六) 12:00

地點：臺大醫學院103講堂(台北市仁愛路一段一號)

主席：楊台鴻　理事長

一、大會開始

二、主席致詞

三、理、監事會工作報告

四、討論事項

1. 通過 104 年度工作報告、105 年度工作計劃
2. 通過 104 年度經費收支決算 、105 年度收支預算

五、臨時動議

六、散會

104年度工作報告

理事會報告

一、召開理監事會議計四次。

二、會員實際人數一百八十六人。

監事會報告

一、理事會處理會務均係依據大會章程辦理，遇有重大事項召開理監事聯席會議商討決定。

二、理事會所編財務報告，業經本監事會審核無誤。

三、本屆理事會竭盡全力推展會務。

105年工作計劃

一、招收會員

二、舉行三次理監事會議。

三、舉辦學術交流研討會。

四、隨時通知會員學會相關訊息。

台灣再生醫學學會

收支決算表

中華民國 103 年 1 月 1 日至 103 年 12 月 31 日止

科目				決算數	預算數	決算與預算比較數		說明
款	項	目	科目			增加	減少	
1			**本會收入**	**63,811**	**600,000**			
	1		會費收入	62,500	140,000		77,500	含入會費、常年會費
	2		捐款收入	0	450,000		450,000	廣告攤位收入及贊助會員捐款等
	3		利息收入	1,311	10,000		8,689	郵局、銀行利息
2			**本會支出**	**528,576**	**600,000**			
	1		人事費	244,000	180,000	64,000		員工及加班費
	2	1	文具	575	5,000		4,425	
		2	印刷費	4,319	50,000		45,681	
		3	郵電費	4,812	5,000		188	
		4	雜項	2,738	10,000		7,262	
	3	1	業務費	59,665	40,000	19,665		召開理監事會及辦理相關研討會所需之費用
		2	會議費	64,000	60,000	4,000		
		3	交通費	28,000	20,000	8,000		
			其他業務費	120,476	200,000		79,524	召開 2 月份年會
			提撥基金	0	30,000		30,000	
			本期結餘	-464,765				

理事長：　秘書長：　常務監事：　會計：　製表：

台灣再生醫學學會
收支預算表
中華民國 104 年 1 月 1 日至 104 年 12 月 31 日止

科目				預算數	上年度預算數	本年度與上年度預算比較數		說明
款	項	目	科目			增加	減少	
1			**本會收入**	**530,000**	**600,000**			
	1		會費收入	120,000	140,000		20,000	含入會、費常年會費
	2		捐款收入	400,000	450,000		50,000	廣告攤位收入及贊助會員捐款等
	3		利息收入	10,000	10,000			郵局銀行利息
2			**本會支出**	**530,000**	**600,000**			
	1		人事費	180,000	180,000			員工薪資及加班費
	2	1	文具	3,500	5,000		1,500	
		2	印刷費	12,000	50,000		38,000	
		3	郵電費	5,000	5,000			
		4	雜項	5,000	10,000		5,000	
	3	1	業務費	60,000	40,000	20,000		召開理監事會及辦理相關研討會所需之費用
		2	會議費	60,000	60,000			
		3	交通費	28,000	20,000	8,000		
			其他業務費	150,000	200,000		50,000	
			提撥基金	26,500	30,000		3,500	依收入總額提列 5%作為準備基金

理事長：　　秘書長：　　常務監事：　　會計：　　製表：

台灣再生醫學學會
現金出納表
中華民國 103 年 1 月 1 日至 103 年 12 月 31 日止

收入		支出	
科目名稱	金額	科目名稱	金額
上期結餘	$1,696,754	本期支出	$528,576
本期收入	$63,811	本期結餘	$1,231,989
合計	$1,760,565	合計	$1,760,565

理事長：　秘書長：　常務監事：　會計：　製表：

台灣再生醫學學會
資產負債表
中華民國 103 年 1 月 1 日至 103 年 12 月 31 日止

資產		負債	
科目	金額	科目	金額
庫存現金	$231,989	累計基金	$104,000
定期存款	$1,000,000	本期結餘	$1,127,989
合計	$1,231,989	合計	$1,231,989

理事長：　秘書長：　常務監事：　會計：　製表：

台灣再生醫學學會章程

第一章 總 則

第 一 條 本會名稱為 **台灣再生醫學學會**(以下簡稱本會)。

第 二 條 本會以國內外人士共同發揚再生醫學之研究、教學及應用為宗旨。

第 三 條 本會以全國行政區域為組織區域。

第 四 條 本會會址設於主管機關所在地區。本會得視會員人數及分配與會務進行之需要設分會與各種委員會，其組織簡則由理事會擬訂，報請主管機關核准後實施，變更時亦同。

第 五 條 本會之任務如左：

一、提倡再生醫學之研究並發揚醫學倫理道德。

二、調查國內外再生醫學之發展，徵集有關圖書資訊以供各學術團體之參考及交流。

三、舉辦學術演講及討論會。

四、出版會誌及有關書刊。

五、獎助再生醫學及組織工程學人才及舉辦其他有關事宜。

六、與有關公司、廠商及機構合作，共求再生醫學及組織工程學之發展與應用。

第 六 條 本會之主管機關為內政部。

本會之目的事業應受各該事業主管機關之指導、監督。

第二章 會 員

第 七 條 本會會員申請資格如下：

一、個人會員：凡贊同本會宗旨、取得中華民國醫師執照者或取得與再生醫學、組織工程學相關博士學位者並經理事會通過後得申請為本會個人會員。

二、贊助會員：贊助本會工作之團體或個人。 申請時應填具入會申請書，經理事會通過，並繳納會費後，始得為本會贊助會員。

三、準 會 員：凡贊同本會宗旨的碩、博士班學生、博士後研究員、 住院醫師、研究助理或等同資格者，由會員二人推薦，經理監事會審查通過，得為本會準會員。

第 八 條 會員(會員代表)有表決權、選舉權、被選舉權與罷免權。每一會員(會員代表)為一權。 贊助會員、準會員無前項權利。

個人會員另享有 1. 參加本會年會及本會所舉辦之其他集會之權利。

2. 參加本會所舉辦各種活動或事業之權利。

3. 本會各種書刊訂閱優待之權利。

贊助會員享有 1. 參加本會年會及本會所舉辦之其他集會之權利。

2. 本會出版之資訊及刊物贈閱之權利。

準會員享有　　1. 參加本會年會及本會所舉辦之其他集會之權利。
2. 本會出版之資訊及刊物贈閱之權利。

第　九　條　會員有遵守本會章程、決議及繳納會費之義務。
會員每年年初需繳納會費，以利本會之運作。未繳納會費者，不得享有會員權利；連續二年未繳納會費者，視為自動退會。會員經出會、退會或停權處分，如欲申請復會或復權時，除有正當理由經理事會審核通過者外，應繳清前所積欠之會費。

第　十　條　會員(會員代表)有違反法令，章程或不遵守會員大會決議時，得經理事會決議，予以警告或停權處分，其危害團體情節重大者，得經會員(會員代表)大會決議予以除名。

第 十一 條　會員喪失會員資格或經會員大會決議除名者，即為出會。

第 十二 條　會員得以書面敘明理由向本會聲明退會。

第三章　組織及職權

第 十三 條　本會以會員大會為最高權力機構。
會員人數超過三百人以上時得分區比例選出會員代表，再召開會員代表大會，行使會員大會職權。會員代表任期二年，其名額及選舉辦法由理事會擬訂，報請主管機關核備後行之。

第 十四 條　會員大會之職權如左：
一、訂定與變更章程。
二、選舉及罷免理事、監事。
三、議決入會費、常年會費、事業費及會員捐款之數額及方式。
四、議決年度工作計畫、報告及預算、決算。
五、議決會員(會員代表)之除名處分。
六、議決財產之處分。
七、議決本會之解散。
八、議決與會員權利義務有關之其他重大事項。前項第八款重大事項之範圍由理事會定之。

第 十五 條　本會置理事十五人、監事五人，由會員(會員代表)選舉之，分別成立理事會、監事會。 選舉前項理事、監事時，依計票情形得同時選出候補理事五人，候補監事一人，遇理事、監事出缺時，分別依序遞補之。本屆理事會得提出下屆理事、監事候選人參考名單。

理事、監事得採用通訊選舉，但不得連續辦理。通訊選舉辦法由理事會通過，報請主管機關核備後行之。

第 十六 條　理事會之職權如左：
一、審定會員(會員代表)之資格。
二、選舉及罷免常務理事、理事長。
三、議決理事、常務理事及理事長之辭職。
四、聘免工作人員。
五、擬訂年度工作計畫、報告及預算、決算。
六、其他應執行事項。

第 十七 條　理事會置常務理事五人，由理事互選之，並由理事就常務理事中選舉一人為理事長。理事長對內綜理督導會務，對外代表本會，並擔任會員大會、理事會主席。理事長因事不能執行職務時，應指定常務理事一人代理之，未指定或不能指定時，由常務理事互推一人代理之。理事長、常務理事出缺時，應於一個月內補選之。

第 十八 條　監事會之職權如左：
一、監察理事會工作之執行。
二、審核年度決算。
三、選舉及罷免常務監事。
四、議決監事及常務監事之辭職。
五、其他應監察事項。

第 十九 條　監事會置常務監事一人，由監事互選之，監察日常會務，並擔任監事會主席。常務監事因事不能執行職務時，應指定監事一人代理之，未指定或不能指定時，由監事互推一人代理之。
監事會主席(常務監事)出缺時，應於一個月內補選之。

第 二十 條　理事、監事均為無給職，任期二年，連選得連任。理事長之連任，以一次為限。

第二十一條　理事、監事有左列情事之一者，應即解任：
一、喪失會員(會員代表)資格者。
二、因故辭職經理事會或監事會決議通過者。
三、被罷免或撤免者。
四、受停權處分期間逾任期二分之一者。

第二十二條　本會置秘書長一人，承理事長之命處理本會事務，其他工作人員若干人，由理事長提名經理事會通過聘免之，並報主管機關備查。但秘書長之解聘應先報主管機關核備。前項工作人員不得由選任之職員擔任。工作人員權責及分層負責

事項由理事會另定之。

第二十三條　本會得設各種委員會、小組或其他內部作業組織，其組織簡則經理事會通過後施行，變更時亦同。

第二十四條　本會得由理事會聘請名譽理事長一人，名譽理事、顧問各若干人，其聘期與理事、監事之任期同。

第四章　會　　議

第二十五條　會員大會分定期會議與臨時會議二種，由理事長召集，召集時除緊急事故之臨時會議外應於十五日前以書面通知之。定期會議每年召開一次，臨時會議於理事會認為必要，或經會員(會員代表)五分之一以上之請求，或監事會函請召集時召開之。本會辦理法人登記後，臨時會議經會員(會員代表)十分之一以上之請求召開之。

第二十六條　會員(會員代表)不能親自出席會員大會時，得以書面委託其他會員(會員代表)代理，每一會員(會員代表)以代理一人為限。

第二十七條　會員(會員代表)大會之決議，以會員(會員代表)過半數之出席，出席人數較多數之同意行之。但章程之訂定與變更、會員(會員代表)之除名、理事及監事之罷免、財產之處分、本會之解散及其他與會員權利義務有關之重大事項應有出席人數三分之二以上同意。

本會辦理法人登記後，章程之變更以出席人數四分之三以上之同意或全體會員三分之二以上書面之同意行之。本會之解散，得隨時以全體會員三分之二以上之可決解散之。

第二十八條　理事會、監事會至少每六個月各舉行會議一次，必要時得召開聯席會議或臨時會議。前項會議召集時除臨時會議外，應於七日前以書面通知，會議之決議，各以理事、監事過半數之出席，出席人數較多數之同意行之。

第二十九條　理事應出席理事會議，監事應出席監事會議，不得委託出席。 理事、監事連續二次無故缺席理事會、監事會者，視同辭職。

第五章　經費及會計

第 三十 條　本會經費來源如左：

一、入會費：個人會員新台幣壹仟元，於會員入會時繳納。

贊助會員新台幣壹仟元，於會員入會時繳納。

準會員新台幣五百元，於會員入會時繳納。

二、常年會費：個人會員新台幣壹仟元。

贊助會員新台幣貳仟元。

準會員新台幣五百元。

三、事業費。
四、會員捐款。
五、委託收益。
六、基金及其孳息。
七、其他收入。

第三十一條　本會會計年度以曆年為準，自每年一月一日起至十二月三十一日止。

第三十二條　本會每年於會計年度開始前二個月由理事會編造年度工作計畫、收支預算表、員工待遇表，提會員大會通過(會員大會因故未能如期召開者，先提理監事聯席會議通過)，於會計年度開始前報主管機關核備。並於會計年度終了後二個月內由理事會編造年度工作報告、收支決算表、現金出納表、資產負債表、財產目錄及基金收支表，送監事會審核後，造具審核意見書送還理事會，提會員大會通過，於三月底前報主管機關核備(會員大會未能如期召開者，先報主管機關。)

第三十三條　本會解散後，剩餘財產歸屬所在地之地方自治團體或主管機關指定之機關團體所有。

第六章　附　　則

第三十四條　本章程未規定事項，悉依有關法令規定辦理。

第三十五條　本章程經會員(會員代表)大會通過，報經主管機關核備後施行，變更時亦同。

第三十六條　本章程經本會93年2月7日第一屆第一次會員大會通過。
報經內政部93年5月14日台內社字第0930018951號函准予備查。

台灣再生醫學學會會員名單：

編號	姓　名	編號	姓　名	編號	姓　名	編號	姓　名
001	劉華昌	029	林瑞模	061	鍾瑞嶂	091	李宣書
002	侯勝茂	030	徐郭堯	062	范揚峰	092	楊長彬
003	陳耀昌	032	吳輝傑	063	戴浩志	093	王貞棣
004	楊台鴻	033	蕭逸民	064	洪士杰	095	楊曙華
005	楊榮森	034	李建和	066	劉有漢	096	邱錦輝
006	楊俊佑	036	黃振勳	067	許致榮	097	郭兆塋
007	林峰輝	037	施庭芳	068	黃國淵	098	陳學明
008	林文澧	038	侯連圍	069	李裕滄	099	林柳池
009	王清貞	039	陳志華	070	陳沛裕	100	潘如瑜
010	黃義侑	040	李炫昇	072	林頌然	101	楊維宏
011	王兆麟	041	張瑞根	073	游敬倫	102	劉明偉
012	江清泉	044	李敏旭	075	陳吳坤	103	王文志
013	石朝康	045	江鴻生	076	鄧文炳	104	方旭偉
014	蔡清霖	046	陳昭宇	077	鄭耀山	105	陳敏慧
015	張恆雄	047	張宗訓	079	簡松雄	106	張明熙
017	蘇芳慶	048	釋高上	080	郭繼陽	107	陳興源
018	陳瑞明	050	張至宏	081	王世杰	108	蔡文龍
019	陳全木	051	蔡慶豐	082	蔡友士	109	郭宗甫
020	童瑞年	054	楊治雄	083	王至弘	110	王禎麒
021	殷金儉	055	蔡文基	084	張志豪	111	湯月碧
022	何始生	056	林高田	085	趙建銘	112	黃玲惠
023	孫瑞昇	057	古鳴洲	087	曾鵬文	113	王佩華
026	陳文哲	058	宋信文	088	徐明洸	114	郭源松
027	周正義	059	姚俊旭	089	詹益聖	115	翁文能
028	陳英和	060	呂紹睿	090	吳錫銘	116	徐善慧

編號	姓　名	編號	姓　名	編號	姓　名	編號	姓　名
117	蘇正堯	141	劉席瑋	164	何美泠	187	趙崧筌
118	楊世偉	142	李冠瑢	165	楊宗霖	188	黃柏誠
119	林偉彭	143	胡育誠	166	吳坤佶	189	彭凱彥
120	謝豐舟	144	黃維超	167	趙本秀	190	李奎璋
121	方紀宇	145	陳安泰	168	鄭明德	191	陳崇桓
122	蘇慶華	146	謝清河	169	李源芳	192	朱恆毅
123	曾育弘	147	彭慶安	170	嚴孟祿	193	傅尹志
125	史　中	148	劉滄梧	171	顏伶汝	194	陳達慶
126	鄭乃禎	149	薛敬和	172	林泰元	195	吳順成
127	謝式洲	150	林毅誠	173	陳尹愷	196	陳郁君
128	蘇鴻麟	151	顏君哲	174	許元銘	197	黃惠君
129	曾清秀	152	陳江山	175	鄭有仁	198	洪塋哲
130	劉百栓	153	侯君翰	176	侯添財	199	曾庭箴
131	唐逸文	154	吳俊昇	177	賴文福	200	黃鉉琴
132	王清正	155	廖振焜	178	施子弼	201	許素菁
133	王盈錦	156	傅再生	179	黃鼎鈞	202	嚴勻謙
134	吳信志	157	蔡宗廷	180	陳宣佑	203	歐祖翔
135	簡雄飛	158	羅文政	181	邵宏仁		
136	高國慶	159	王德原	182	徐永康		
137	徐新生	160	賴志毅	183	賴瑞陽		
138	許文明	161	吳佳慶	184	薛元毓		
139	黃鶴翔	162	沈延盛	185	施明光		
140	陳偉勵	163	李一麟	186	曾效參		

台灣再生醫學學會　個人會員入會申請書

姓　　名		性別		出　生 年月日		出生地		身分證 號　　碼	
學　　歷	民國　　年　　月畢業於								
戶籍住址									
現任職務	醫院或單位：			科部：		職稱：			
服務單位 地　　址						專科醫師證書字號： (無者免填)			
電　　話	(公)			(宅)		傳真：			
其他連絡 方　　式	電子信箱(e-mail)：					行動電話：			
審查結果 (由學會填寫)		會員類別 (由學會填寫)			會員證號碼 (由學會填寫)				

本人贊同貴會宗旨，擬加入為會員，嗣後並願意遵守會章，共圖發展

此致　　台灣再生醫學學會　　申請人：　　(簽章)

中　華　民　國　　年　　月　　日

會員資料異動申請書

本單填妥後請回傳至台灣再生醫學學會

Fax: 02-8921-3969

會員姓名：

變 更 為：

郵遞區號：

通訊地址：

服務單位：

聯絡電話：

傳　　真：

e-mail：