*inter*Link

Linking the International Community of TERMIS

In This Issue of *inter*Link

Edited and Compiled by:

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Queensland University of Technology

Sarah Wilburn
TERMIS Administrator

Letter from the Editor

Dear Colleagues & Friends,

I think you all will agree that based on our demanding professional lives and our busy lifestyles we often feel that time flies. This month, I was just reminded that it was two years ago that I moved from the National University of Singapore to the Queensland University of Technology. At NUS, I had a joint appointment between the Division of Bioengineering, Faculty of Engineering and the Orthopaedic Surgery Department, Faculty of Medicine. Based on these appointments, I mentored a multidisciplinary team and I was working on several interdisciplinary interfaces. Similarly at QUT, my research group is based in the Institute of Health and Biomedical Innovation (IHBI); and IHBI itself breathes from all aspects multidisciplinary into its different labs and offices. This is not only reflected by the architecture of the institute and the research areas of the seven domains but from any other angle you can envision of biomedical sciences, too. We all know that interdisciplinarity is the key for success in the field of tissue engineering/regenerative medicine, however the other night I was reminded at a talk at an Art Institute in Brisbane that multidisciplinary and interdisciplinary has penetrated our society in large. The talk was titled "The Cosmopolitan Citizen" and these two words were used many times in the talk.

A different reminder for me to look outside the box; as we are often so engrossed in our own field and it was a visit to an art gallery that reminded me of this. As I settled in the café in the gallery to enjoy a short macchiato I did spot the title "Porosity, Parasites & Public Art" on the front page of the Journal Australian Art Review. This did capture my immediate interest and I was curious to learn more of the use of the word "porosity" in this article. Richard Goodwin, a leading architect from Sydney, was cited in this article stating the following "The term porosity is employed to describe the permeability of the city and/or its building to penetration by the public. The greater the access for the public the more porous a building is…". I looked up the web page of Goodwin. He performs some cool experiments with his students by which they have to go out in teams and explore that porosity of a building by finding their way to different areas in the building. Their paths are put into a custom-made computer programme, which then calculates the porosity of the building based on his definition. I leave it up to you to decide how familiar that sounds to what tissue engineers do to analyze scaffolds!

Enough of the philosophical talk and back to business, in two months we will we have our World Congress in Korea! I look forward to meeting you in Seoul where time might stand still for a moment during the conference and we may discuss some of the points I eluded on above.

Sincerely,
Dietmar W. Hutmacher

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Linking the International Community of TERMIS

2009 TERMIS 2nd WORLD CONGRESS

In Conjunction With: the 2009 Seoul Stem Cell Symposium

August 31 – September 3, 2009
Lotte Hotel World - Seoul, Korea
www.termis.org/wc2009

Latest Developments

The Tissue Engineering and Regenerative Medicine International Society (TERMIS) has convened a committee to monitor the situation in North Korea. Please be assured that the Society will hold its World Congress from August 31 - September 3, 2009 and have taken every precaution to ensure your safety. TERMIS is working very closely with the authorities in Korea and will provide you with the latest information and resources related to the situation.

REGISTER TODAY! There is still time to register for the 2009 TERMIS World Congress. Join your colleagues in Seoul to discuss and collaborate with top researchers in the field. We look forward to seeing you in Seoul!

Plenary Lecturers

- Anthony Atala, M.D.
Professor, Chair, Department of Urology; Director, Institute for Regenerative Medicine
Wake Forest University, USA
: "Regenerative medicine: Current concepts and changing trends"

- Jeffrey A. Hubbell, Ph.D
Professor/Director, Regenerative Medicine and Pharmacobiology Laboratory, EPFL, Switzerland
: "Engineering matrices and morphogens to manipulate cellular behavior *in vitro* and *in vivo*"

- Teruo Okano, Ph.D.
Professor/Director, Institute of Advanced Biomedical Engineering and Science, Tokyo Women's Medical University, Japan
: "Clinical application of cell sheet tissue engineering and future perspectives"

- Xing Dong Zhang, Ph.D.
  Professor, Engineering Research Centre in Biomaterials
  Sichuan University, China
  : Title (TBA)

- Sung Wan Kim, Ph.D.
  Professor, Department of Pharmaceutics & Pharmaceutical Chemistry,
  University of Utah, USA
  : "Designed polymers for therapeutic gene delivery"

- Shin-Yong Moon, M.D.
  Professor, Department of Obstetrics & Gynecology, Seoul National University
  Hospital, Republic of Korea
  : Title (TBA)

- Ronald D.G. McKay Ph.D.
  Senior Investigator, Laboratory of Molecular Biology, National Institute of Neurological Disorders and Stroke, National Institutes of Health, USA
  : "Stem cell signaling in health and disease"

- Dong-Wook Kim, Ph.D.
  Director, Stem Cell Research Center, Korea
  Professor, Yonsei University College of Medicine, Seoul, Korea
  : Title (TBA)

Stem Cell Research Center 2002

kTERMS

HOTEL RESERVATIONS

Click here to complete your hotel reservations. A complete list of hotels is available for you to choose from. The World Congress main hotel (venue) is the Lotte Hotel World, Seoul. To assist you with your travels to Seoul, please review the travel information.

SPONSORSHIP & EXHIBITING INFORMATION

Click here to learn more about sponsorship or exhibiting at this event.

Please contact Prof. Park or Ms. Chun with any of your questions:

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TOUR INFORMATION

The organizers have designed ½ day, full day and night tours to historical locations in Seoul. To learn more about the tours, please visit http://www.termis.org/wc2009/tour.php. There is a fee associated with joining the tours. To reserve your spot on the tour, please complete the tour reservation form.

Questions about the tours should be directed to:

Contact: Ms. Bonny Park
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Homepage : http://www.koreatourplaza.com/

1. Laboratory Feature

National Research Lab Of Cellular and Biomechanical Engineering, Inje Univ., Korea

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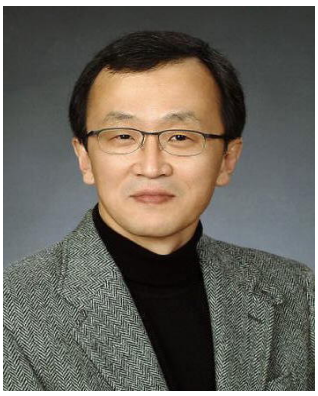


1. Outline of laboratory

Our laboratory develops novel methodologies based on engineering paradigms for applying research outcomes to clinical practice.

Established in 1993 as the Biomechanics Lab, government-funded research projects focused mainly on orthopedic and dental implants were conducted during the first 5–6 years. Since 2000, cellular engineering-related research has been conducted, especially on tissue engineering and the control of adult stem cells in biomimetic environments. The basis of this cellular engineering-based approach is that the true responses of stem cells cultured *in vitro* can be obtained and analyzed only in the same environments as they experience in the human body.

When we were designated a National Research Laboratory in 2008, we made a big step toward extensive research and related methodologies in close collaboration with medical doctors, biologists, and biological microelectromechanical system (Bio-MEMS) and magnetic resonance spectroscopy (MRS) specialists.

To become a leading group in these areas, we are working harder to make contributions to society through valuable research outcomes.

2. Research activities

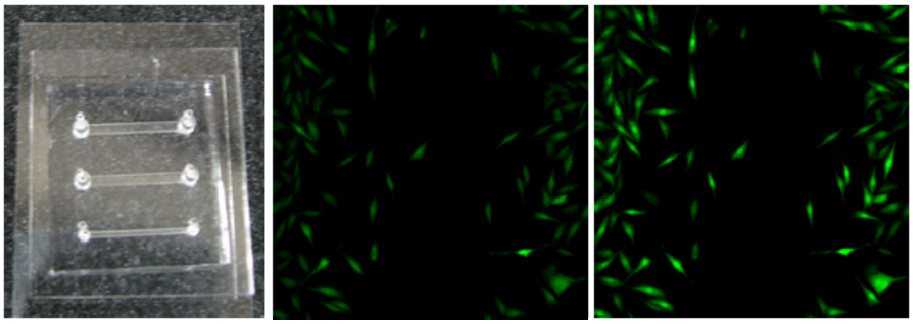
Typical keywords representing our research methods or topics are quantitative measurements, reproducible methods, mechanical stimulation, noninvasive (harvesting) analysis, and high-throughput system.

(1) Microphysical Environments

The microphysical-environment cells experience can be divided into two categories: mechanical and morphological environments. The bottom line is that all cells in the human body experience mechanical stimuli during daily activities. In addition, every cell type resides under specific morphological (spatial) conditions. We must remember that cell morphology may change when cells are isolated outside the human body on culture plates. This implies that they may eventually lose their major characteristics due to the changes in cytoskeletal structure because the cells then exist under two-dimensional rather than three-dimensional conditions.

Therefore, we need to restore the original, biomimetic environment before starting any investigation. To provide biomimetic mechanical stimulation, we have developed and adopted various bioreactors for culturing cells depending on the type of stimuli, some of which have been commercialized in Korea. This idea can be expanded to longtime evaluations of stem cell differentiation. Specifically, although stem cells may appear to differentiate successfully *in vitro*, we cannot be sure that they will function in the human body for a long time, which is one of our motivations for developing bioreactors that can provide biomimetic conditions for training stem cells before they are introduced into the human body. In addition to the mechanical environment, we need to provide biomimetic morphological conditions for culturing the cells *in vitro*. For this, we have adopted bio-MEMS/nanotechnology.

Currently, we are working on a coculturing system that allows mesenchymal stem cells to be cultured and differentiated with other specifically developed cells with or without biochemical reagents under mechanical stimuli in the bioreactors.



(A) (B) (C)

Fig. 1. Miniature flow chambers containing cells of different sizes (A). The expression of intracellular Ca^{2+} before (B) and after (C) fluid flow-induced shear stress.

(2) Noninvasive Techniques for Evaluating Cellular Responses Technology for selecting target cell

The bottom line is to reduce the number of specimens (or plates) used when investigating cellular responses. In addition, we are seeking a methodology that enables researchers to collect data from the same samples. For example, we cannot avoid destroying specimens that are harvested based on an experiment schedule, which results in spending unnecessary time and cost.

For this, we are working on utilizing MRS to measure important parameters in relation to cellular responses, such as the degree of differentiation or other metabolites. Through collaboration with the Samsung Biomedical Research Institute (SBRI), we expect to obtain quantitative, accumulative data from the same samples using high-field MRS equipment at SBRI.

This field is primarily managed by Prof. Chi-Woong Mun.

Fig. 2. Animal magnetic resonance imaging/spectroscopy (MRI/S) system at SBRI and a self-developed high-sensitivity radio-frequency (RF) coil for MRI/S systems.

(3) Quantitative Measurements of Cell Adhesive Forces

This basic tool is based simply on beam deflection theory in mechanics.

The adhesive force of a cell to a substrate is a key parameter in cell studies. Historically, the force of cell adhesion to a substrate was measured by counting the numbers of cells before and after a fluid flow. However, this conventional technique provides qualitative data only. For quantitative measurements of cell adhesive forces, we use a micro-sized beam to detach a cell from a substrate using a micropipette manipulator. On detaching a cell, the beam is necessarily deflected a certain amount. The whole process is recorded and analyzed later in combination with an inverse finite-element approach to calculate the force needed to detach the cell.

This is a very simple, inexpensive system. We may also utilize this technique in other areas, such as in investigating the effect of surface modifying any substrate or cellular surface. Our lab discovered that intermittent hydrostatic pressure acting on some cells increases the adhesive force.

(4) Major Engineering Output for Clinical and Biological Research

Xenografts for Bone Substitutes

We were the first in Korea to develop xenografts as bone substitutes and get Korea Food Drug Administration (KFDA) approval for utilizing porcine trabecular bone (patent pending). The product is characterized by closer mechanical stiffness and Ca/P ratio to human bone than bovine-based xenografts. Above all, the manufacturing process is so simple and reproducible that the cost was greatly reduced.

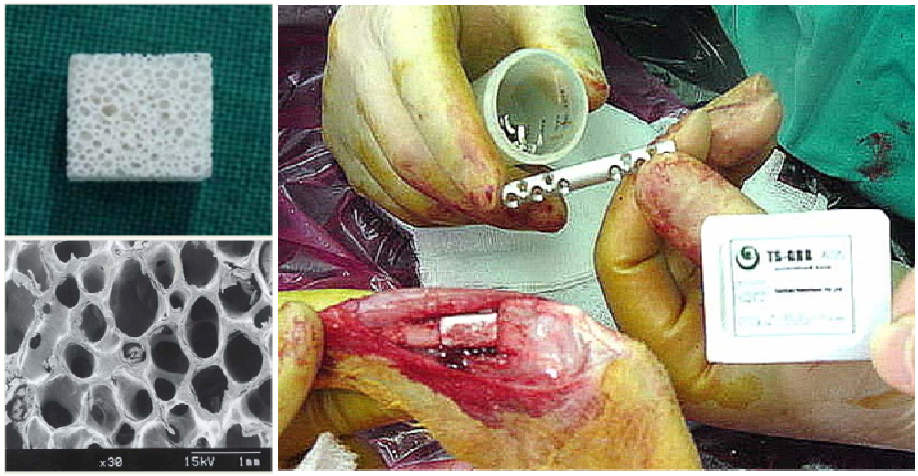


Fig. 3. The xenograft bone substitute marketed in Korea.

Computer-Aided Scaffolds

The scaffolds commonly fabricated using salt-leaching or gas-forming methods have limitations in that cells cannot penetrate their entire thickness. The cells can spread and expand remarkably only on the surface due to the low interconnectivity between pores. To solve this critical issue, we used the rapid prototype (RP) technique to improve the interconnectivity. As the fabrication process is totally controlled by a computer, the pore size, interconnectivity, and overall shape of the scaffold are managed precisely as desired. An animal study also gave positive results.

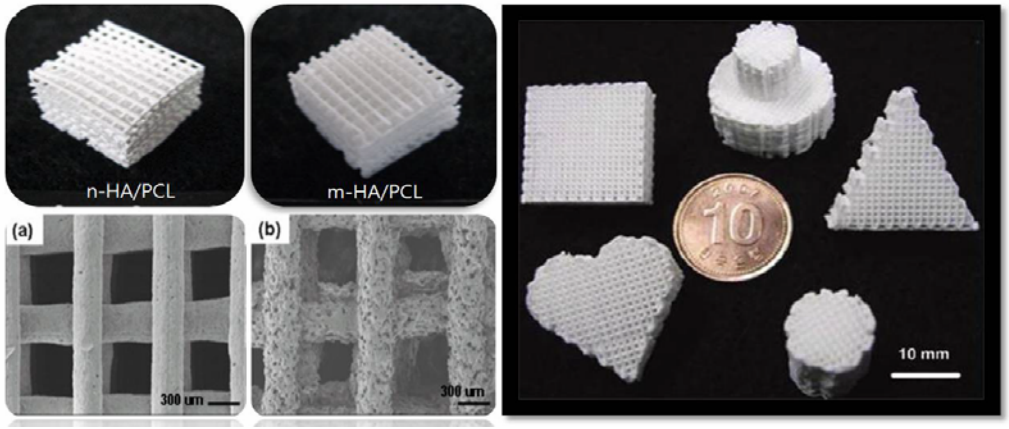


Fig. 4. Various scaffolds manufactured using the layer manufacturing process (LMP) with (a) nano- and (b) micro-sized hydroxyapatite (HA) particles.

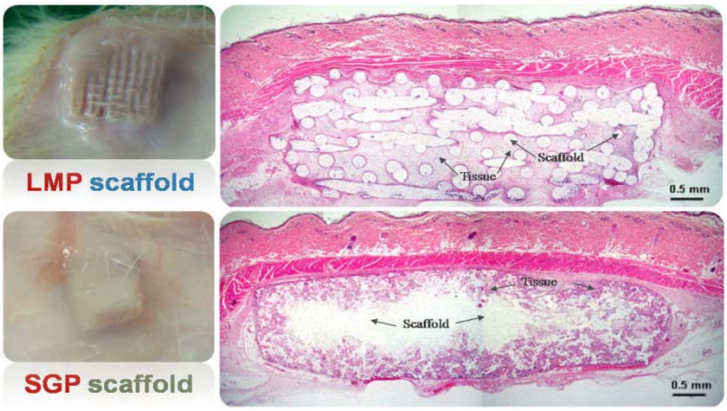


Fig. 5. Histological observations of scaffolds made using the layer manufacturing process (LMP) and salt leaching & gas forming process (SGP) methods.

Bioreactors

Bioreactors were developed to provide cells/tissues with physical stimuli similar to those found in the human body. The physical stimuli can be classified into three types: tensile, shear, and compressive forces. All of these can be controlled in an incubator by computer.

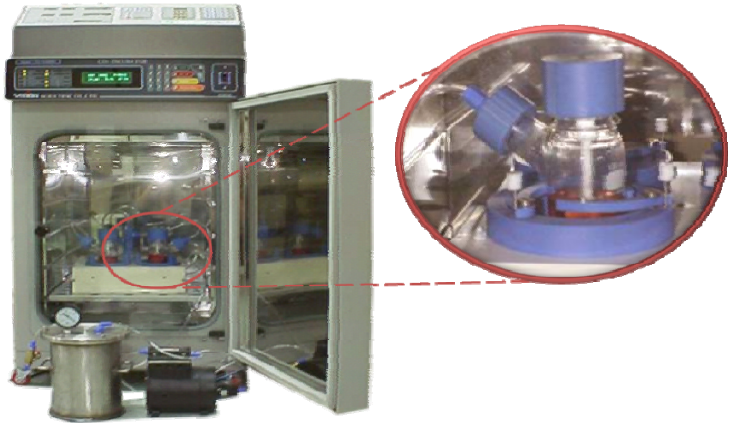


Fig. 6 : A bioreactor to establish hydrostatic pressure on cells and/or tissues. The controller enables us to impose pressure and shear stress due to the rotation of the stirring bar inside the pressure chamber.

Staffs

Acknowledgments

We thank the Korean Science & Engineering Foundation (KOSEF) for the establishment of the laboratory as a National Research Laboratory and the Korean Ministry of Health, Welfare, and Family Affairs for research funds.

END.

2. Laboratory Feature

Network of Excellence for Functional Biomaterials, National University of Ireland Galway

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TERMIS 2010 - 'At the Crossroads: Development and Translation'
Network of Excellence for Functional Biomaterials – Galway, Ireland

termis
GALWAY, IRELAND, 13TH -17TH JUNE 2010

On behalf of the Local Organising Committee of the Tissue Engineering and Regenerative Medicine International Society-EU Chapter Meeting, I would like to invite you to join us and colleagues from around the world in Galway, Ireland in June 2010 for what promises to be an exciting and informative conference. As hosts of this conference we take this opportunity to familiarise the membership of our history and the future that holds.

The National University of Ireland, Galway (NUI, Galway) was established in 1845 and is now one of Ireland's foremost centres of academic excellence with a long history and association with biomedical research. The National Centre for Biomedical Engineering Science (NCBES), incorporating the Regenerative Medicine Institute (REMEDI), were established in 1999 as an

umbrella organisation with the vision to bring together engineers, scientists and clinicians to establish a cutting-edge research facility to support interdisciplinary research activity in Tissue Engineering and Regenerative Medicine. Under this umbrella, the Network of Excellence for Functional Biomaterials (NFB) was established originally as a Biomaterials Research Cluster in 2003 aiming to develop the next generation of biomaterials with clinical relevance. In 2007, NFB became a Strategic Research Cluster (SRC) funded by Science Foundation Ireland (SFI) in order to establish a critical mass of biomaterials activity in Ireland. Since 2007, NFB has established partnerships with leading academic institutions, research laboratories, hospitals and companies both in Ireland and around the world aiming to support the translation of biomaterials from the laboratory bench to the patient's bedside. While the core service of NFB centres on academic-based research and development, we are engaged with collaborators in the biomedical device industry both in Ireland and abroad. Based in Galway, NFB is located in perhaps the most dynamic biomedical R&D centre in Ireland, where numerous multi-national companies, small and medium enterprises and start-up companies are based.

NFB is a dynamic, multidisciplinary and diverse group of researchers with more than 30 engineers, biologists, chemists and clinicians working together to develop biomimetic materials and platforms which are focused on clinical targets in the areas of musculoskeletal and cardiovascular reconstruction, neural regeneration, soft tissue repair and ophthalmic applications. NFB is continuously developing new technologies to deliver therapeutic biomolecules such as drugs, genes, cells, growth factors and hormones to specific target sites,

Figure 1. The NFB group based at NUI, Galway

Naturally occurring polymers (e.g. collagen, elastin, hyaluronic acid and chitosan) and synthetic materials with clinical relevance (e.g. PEG, PVA, PLGA, PDO, PCL and titanium) constitute NFB's inventory. NFB researchers employs a range of nano- and micro-fabrication technologies to

create complex structures with topographical cues to be used as scaffolds for tissue engineering applications. Moreover, state-of-art facilities are available to evaluate the bulk, surface and biological properties of the produced biomaterials.

Biomaterials design has evolved from basic, passive constructs that imitate the structural characteristics and closely match the mechanical properties of native tissues to bioactive constructs that aim to incorporate instructive signals to the scaffold and offer control over cellular functions. To this end, researchers at NFB are working on chemistries using PEG-based cross linkers that enable functionalisation of the produced scaffolds and subsequently facilitate antibody or peptide immobilisation for targeting and tracking the next generation of delivery systems

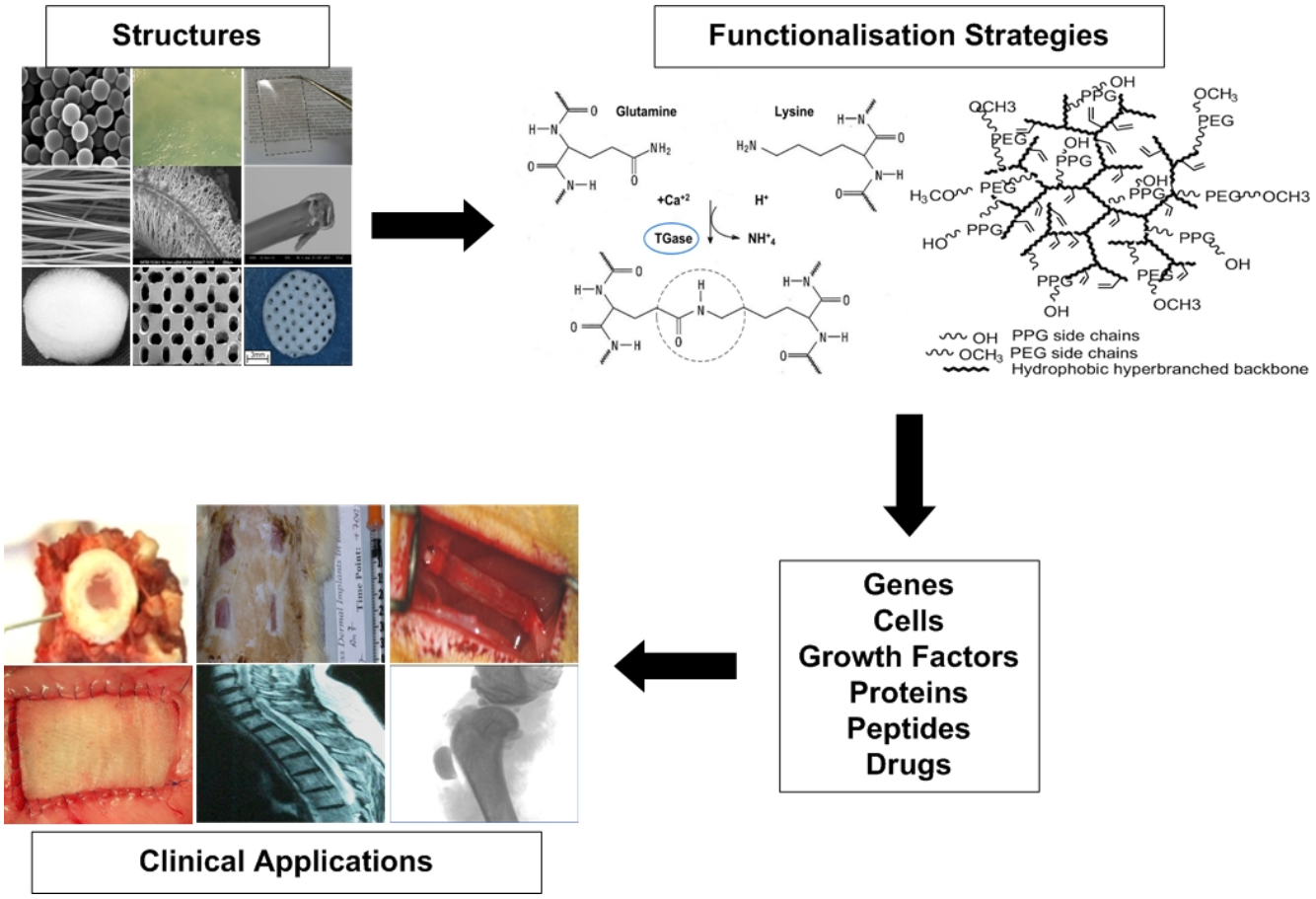


Figure 2. Three-dimensional constructs functionalisation strategies and clinical targets currently in place at NFB

NFB's Clinical Targets: Several natural and synthetic biomaterials that provide topographical cues and closely imitate structural features and mechanical properties of native extracellular matrix assemblies constitute NFB's inventory. Moreover, NFB has developed novel functionalisation strategies that aim to incorporate instructive signals onto and/or into the scaffold in order to modulate cellular functions and facilitate functional neotissue formation. Monofunctional (transglutaminase) and multifunctional polymeric systems (polyethylene glycol-

and polyamidoamine-based) have been designed and developed as means of anchoring therapeutic molecules onto scaffolds. Moreover, hollow nano- and microspheres are being employed as vehicles for encapsulation and subsequent localised and sustained release of bioactive molecules at the side of the injury. Some of the clinical targets are discussed in subsequent sections.

Intervertebral Disc Regeneration: One of the current research endeavours is the restoration of degenerated intervertebral discs (IVD). Degeneration of IVD is the main cause of neck and low back pains. The IVD is composed of two distinct but interdependent tissues: a gelatinous centre, known as the nucleus pulposus (NP), and several surrounding coaxial lamellae that form the inner and outer annulus fibrosus. This unique structural feature allows IVD to constrain motion at high loads and provide flexibility at low loads. Factors such as abnormal mechanical stresses, biochemical imbalances and nutritional and genetic deficiencies are all reported to play a role in disc degeneration disease (DDD). As the natural aging process continues, the gelatinous nucleus pulposus region of the disc is replaced by a more solid, less-flexible cartilaginous disc. The current treatments for neck and back pains include short-term relief treatments (massage, heat and cold therapy or medications), conservative treatments (exercise, acupuncture or manipulation) and surgery in worst cases. However, surgery involves the use of invasive techniques which increases risk to the patient. Our strategy is to develop an injectable, functionalised hydrogel loaded with hollow extracellular matrix-based spheres that not only will structurally restore the intervertebral disc properties but will also provide a gene-therapy approach to upregulate extracellular matrix components such as aggrecan that have been shown to be limited in the diseased state. The nano-spheres will be delivered by injection directly into the intervertebral column as can be visualised in Figure 3. The spheres will be functionalised using in-house designed and developed hyperbranched polymeric systems that will enable delivery of specific bioactive molecules. The findings from these studies will be used to gain a better understanding of disc degeneration and to develop a new therapeutic approach to relieve symptoms of intervertebral disc degeneration.

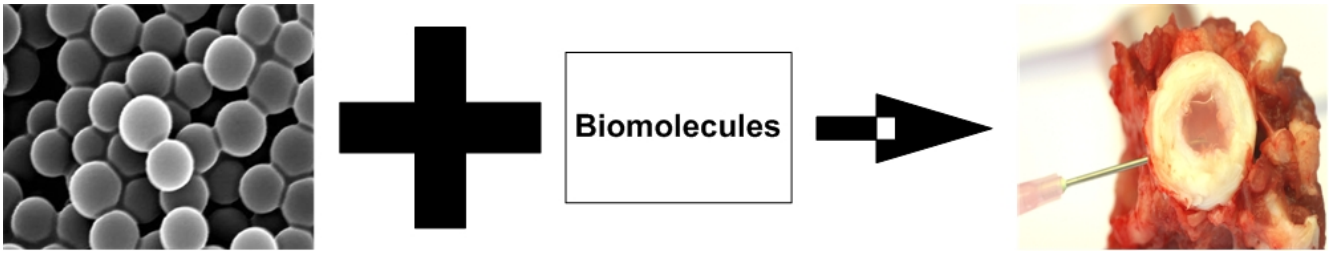
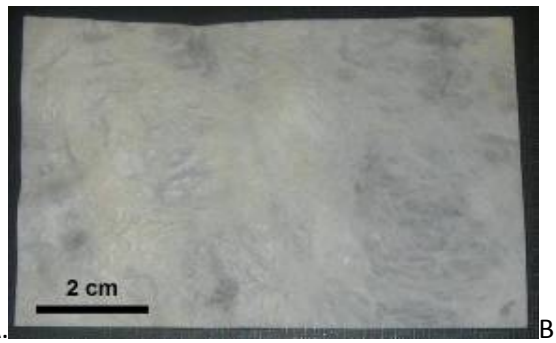


Figure 3. Schematic of the functionalised nanosphere approach for the treatment of IVD

Soft Tissue Repair: Wound repair results from a complex and highly orchestrated cellular and biochemical response to tissue injury. Cells migrate to the wound site, deposit a large amount of extra cellular matrix and form a scar. Although scarring recreates the cohesion of tissue, it often does not restore its function. Scarring also takes place around biomedical implants, resulting in the formation of a fibrotic capsule that effectively isolates the implant from the surrounding tissue and impairs its proper function. Given that scarring constitutes a major impediment in

clinical practice with enormous healthcare costs, NFB is developing several scaffold-based platforms to induce acceptable wound healing and to restore function. For example, in cases of chronic healing (e.g. diabetic patients), a fibrin-based scaffold has been used to target a vector encoding eNOS to the wound site, thereby enhancing transfection efficiency of the vector resulting in greater eNOS expression, greater production of NO and better healing in an impaired wound model. Epidermolysis bullosa (EB) is a particularly severe genetic condition which leads to extensive blistering, repeated wounding and poor healing ability. EB is caused by mutations in the COL7A1 gene, which results in the reduction or loss of type VII collagen in the skin. One of our projects aims to deliver the COL7A1 gene to EB cells through a non-viral gene-delivery system.

NFB is also using natural and synthetic hollow microspheres to encapsulate anti-fibrotic drugs and incorporate them into implantable devices in order to inhibit fibrotic capsule formation. Another strategy developed by NFB in the area of wound healing is the cholecyst-derived extracellular matrix (CEM). We have shown it to be very effective in the augmentation of body wall defects primarily due to its strength and inherent biological properties. Optimal stabilisation and functionalisation offers control over degradation that can match the rate of the healing process.

A. 

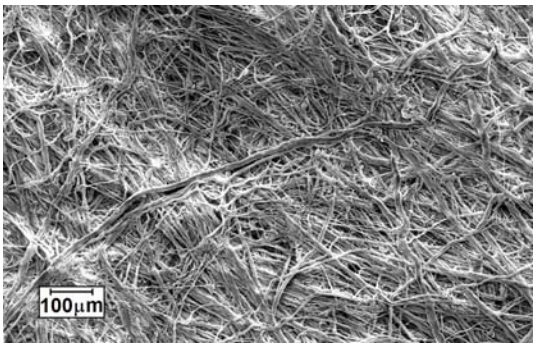
B. 

Figure 4. Cholecyst derived extracellular matrix developed in the NFB laboratory that shows a mesh like structure under a scanning electron microscope (B).

Regenerative Functional Neural Constructs: Another important clinical target for NFB is the regeneration of functional neural constructs for the treatment of both spinal cord and peripheral nerve injury. Structural constructs have been shown to aid and direct neurite growth. Transplantation of a variety of cell types has resulted in axon regeneration with limited functional improvement after spinal cord injury in animal models. Molecular therapies that work to promote regeneration, such as administration of neurotrophin, and those that target deleterious inhibition of regeneration, such as chondroitinase ABC, have also yielded favourable results. Despite recent advances in this area, limited demonstration of functional improvement in *in vivo* models has prevented advancement of any regenerative therapy for clinical use. This may be due in large part to the multifaceted nature of spinal cord injuries, which presents a major challenge to therapeutic development. Primary mechanical trauma to the cord induces secondary injury consisting of a complex cascade of molecular events that lead to the loss of myelin and the formation of a glial scar. Therefore, to realise viable treatment for clinical applications, we are working to combine the positive aspects of current therapeutic approaches.

NFB is developing novel, functionalised scaffolds that target injury mechanisms at the molecular, cellular and tissue levels. Innovative design concepts allow biodegradable polymers to simultaneously provide structural guidance and act as a reservoir for sustained drug, gene and cell delivery. We have also developed gradients of concentration and compartmental functionalisation of bioactive molecules that facilitate guided neurite growth. Functionalisation approaches using hyperbranched polymers have the capability to complex genes vectors that express neurotrophin and ultimately help us to realise our target, namely restoration of function.

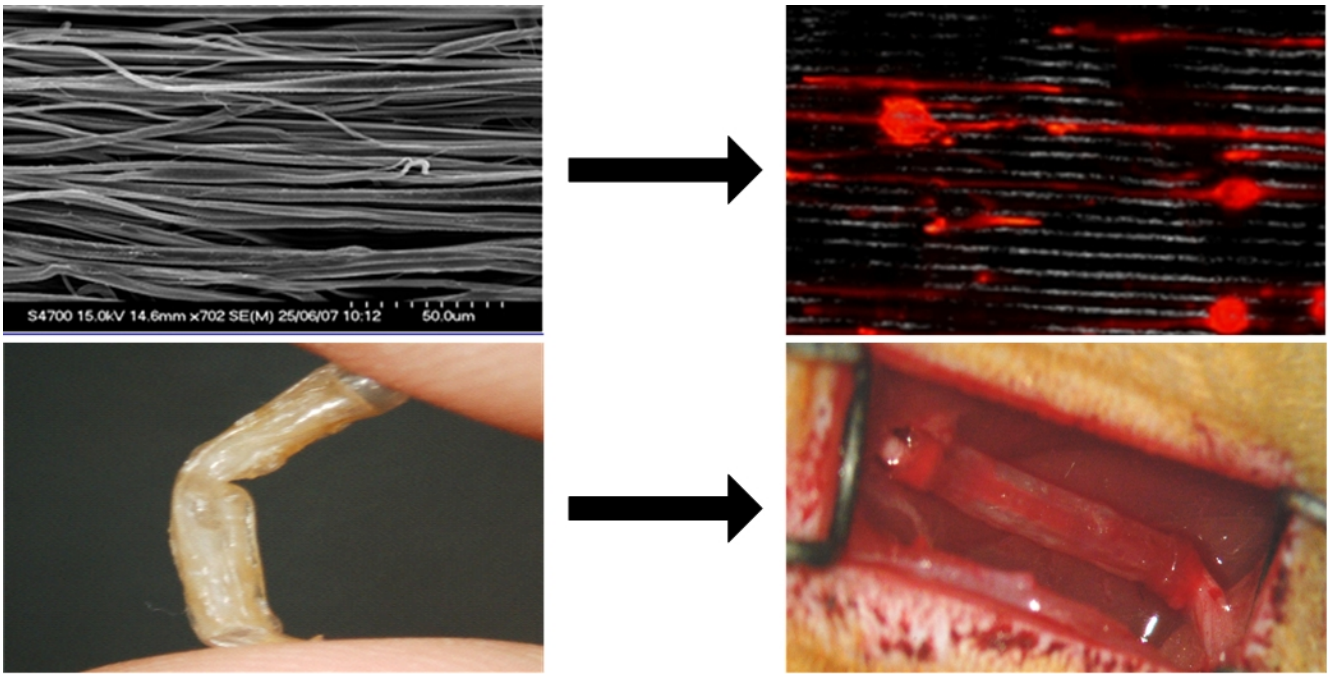


Figure 5. Peripheral neural conduits that have been developed in the NFB laboratory

Funding of NFB: In 2007 NFB became a Strategic Research Cluster funded by Science Foundation Ireland (SFI). The SFI funding allowed NFB to focus on the development of specific nano-based platforms and to develop specific targeting and delivery mechanisms for various clinical applications. NFB has also been awarded significant funding from the EU through the FP6 and FP7 programmes. These awards allowed NFB to direct SFI-developed platforms for specific clinical applications. NFB has also been successful in securing funding from complimentary projects through the Health Research In addition NFB has benefited from funding from the charity Dystrophic Epidermolysis Bullosa Research Association (DEBRA). DEBRA is keen to develop clinical solution for debilitating wound healing conditions in epidermolysis bullosa patients. In the past few years, there is a growing emphasis on the commercialisation potential of applied research. Through Enterprise Ireland, NFB has raised significant funding to develop platforms that have a commercial potential to a commercial translation stage.

NFB supports the medical device industry, pharmaceutical and diagnostics industries both in Ireland and abroad by providing a resource for up skilled workforce geared for research in the industry.. Indeed, Galway hosts one of the highest concentrations of medical device companies in Europe with at least 50% of the top 25 biomedical companies in the world operating here.

The future for NFB looks bright as funding has been secured for the next five years. In addition four new academic staff members (Dr. Dimitrios Zeugolis, Dr. Wenxin Wang, Dr. Yolanda Garcia and Dr. Yury Rochev) have been recruited in the last year to develop sustainable critical mass of Biomaterials activity in Ireland. Hosting the TERMIS-EU meeting in Galway 2010 will give an opportunity for the TERMIS members to visit us. We would like to extend a warm welcome to all the TERMIS community who are passing by through Ireland to drop by NFB- we will buy a pint for you!

END.

TERMIS-EU Membership Business Meeting

Held during the World Congress in Seoul

Tuesday, September 1, 2009
4:00 – 5:00 PM Korean Standard Time
Lotte Hotel World – Room 3F, Emerald Room

All EU Members attending the World Congress are invited!

TERMIS-EU Directory

We encourage those members within the European Chapter to please register to the TERMIS-EU Directory. The Directory was created to link the EU members at one location and enables EU members to search for members within your own area of research. To register today, please visit https://www.termis.org/directory.php.

TERMIS Chapter Meetings

2010 Chapter Meetings

TERMIS-EU: Galway, Ireland
Conference Dates: 13-17 June, 2010
Meeting Chair: Prof. Abhay Pandit
Conference Venue: Galway Radisson SAS Hotel

TERMIS-AP: Sydney, Australia
Conference Dates: September 2010
Meeting Chair: A/Prof. Geoffrey McKellar

TERMIS-NA Orlando 2010
Conference Dates: December 5-8, 2010
Conference Location: the Hilton located at the Downtown Disney Resort
Conference Chair: Anthony Atala, MD
Scientific Chair: James Yoo, MD, PhD
Hosted by: Wake Forest Institute for Regenerative Medicine

2011 Chapter Meetings

TERMIS-EU 2011: Granada, Spain
Conference Dates: 7-10 June 2011
Conference Location: Granada Exhibition and Conference Centre
Conference Chair: Antonio Campos Muñoz, MD, PhD
To request further information, please send an email to acampos@ugr.es.

TERMIS-NA 2011: Houston, Texas
Conference Dates: Fall 2011
Conference Chairs: Antonios Mikos, PhD and Jennifer West, PhD
Hosted by: Rice University

TERMIS-AP 2011: Singapore
More Information Coming Soon

EuroSTEC

EuroSTEC is an Integrated Project (IP) on 'Soft tissue engineering for congenital birth defects in children: from 'biomatrix - cell interaction - model system' to clinical trials', funded by the European Commission under the Sixth Framework Programme (FP6). The project brings together 15 partner organisations (10 research institutes and 5 companies) from 9 European countries.
Modern tissue engineering approaches will be used to treat children with structural disorders present at birth, such as spina bifida, urogenital defects, gastroschisis, diaphragmatic hernia and esophageal atresia. A translational route through in vitro and animal experiments should finally lead to early clinical trials. Of course ethical and regulatory issues will be fully addressed before final clinical application. A dialogue with society, including patient's associations, will be sought.
The EuroSTEC project officially started on January 1, 2007. Through the website www.eurostec.eu we present the progress of our research.

Objectives
The aim of the EuroSTEC project is to use modern tissue engineering approaches to treat children with structural disorders present at birth, such as spina bifida, urogenital defects, gastroschisis, diaphragmatic hernia and esophageal atresia. The project strives to take a translational route through in vitro and animal experiments to early clinical trials.
Tailor-made "smart" biomatrices (scaffolds) are prepared using natural scaffold molecules (collagen, elastin) and/or manmade polymers (poly lactic/glycolic acid), and are substituted with regulatory molecules such as growth factors and glycosaminoglycans.
A variety of cells, including stem cells, fibroblasts, muscle cells and urothelial/epithelial cells are cultured in vitro and seeded into biomatrices. Biomatrices prepared with and without cells, will be implanted using novel animal models for major congenital birth defects, and evaluated for their capacity to regenerate the correct tissues. Biomatrices will degrade in time and be replaced by the body's own tissues thus assuring compliance with growth which is especially important in young children. Prenatal and postnatal reconstructive procedures will improve the final outcome of reconstructive surgery. Clinical trials for diaphragmatic hernias form the start of the patient registry and protocol development for future clinical studies. The pre- and postnatal patient registry system is evaluated in a pilot phase.
Ethical and regulatory issues are fully addressed before final clinical application, and parents and children will have to be able to understand these new treatment options. A dialogue with society, including patient's associations, will be sought. Demonstration activities will be undertaken to increase the awareness of new treatment modalities based on tissue-engineering. Finally, surgeons will be trained to use the new operation techniques.
The project combines European leaders in the field of biomatrices, cell culture, animal models, surgery, and ethical and regulatory issues.

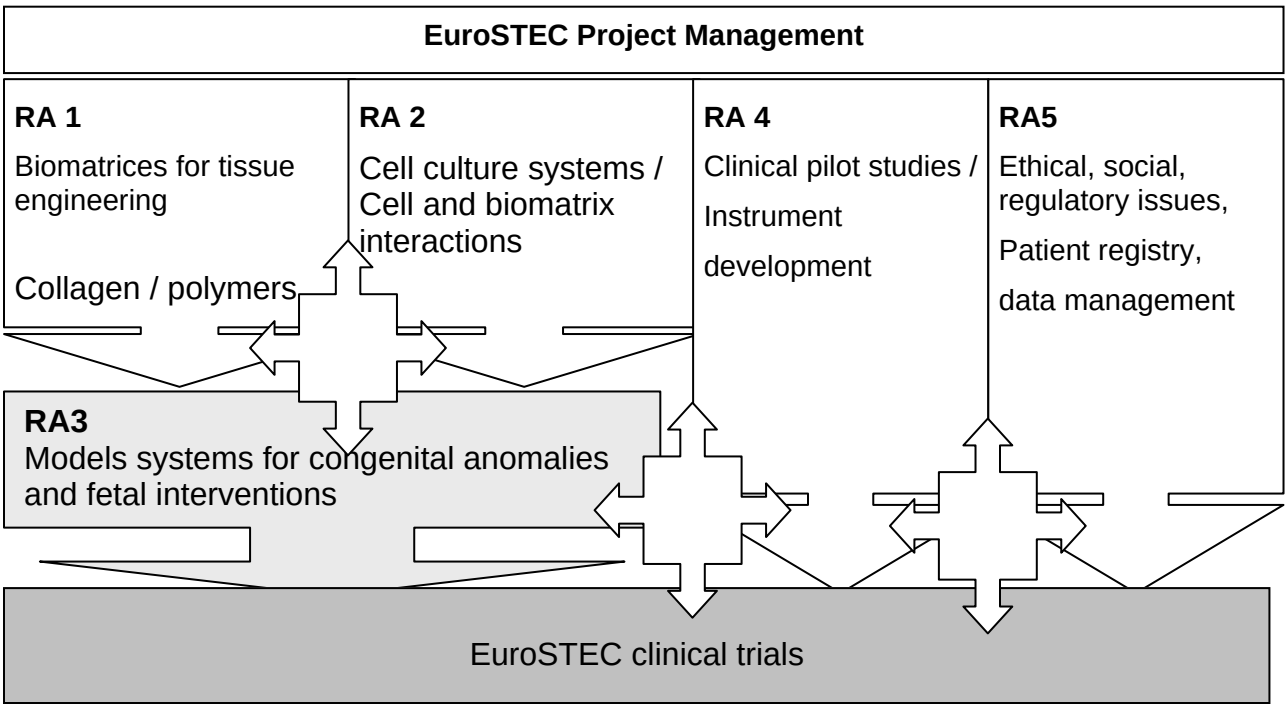


Figure 1 : Interactions of the different research area's (RA) and management overview of the EuroSTEC project.

TERMIS

A special EuroSTEC symposium will take place at the TERMIS World Meeting 2009 in Seoul, Korea. This symposium involves presentations on the recent results from the EuroSTEC program.

Information

The Publishable Executive Summary of the second year of the EuroSTEC-project is now accessible at www.eurostec.eu/publications. For more information about the EuroSTEC-project, please contact the coordinator:

Prof.dr. W.F.J. Feitz
Radboud University Nijmegen Medical Centre
Department of Urology 659
P.O. Box 9101
6500 HB Nijmegen
The Netherlands
Email: **eurostec@umcn.nl**
Or visit the website: **www.eurostec.eu**

MARK YOUR CALENDARS!

2012 3rd TERMIS World Congress
In
Vienna, Austria

September 5-8, 2012

Hofburg Congress Center

"Tissue Engineering and Regenerative Medicine"
Conference Chair: Heinz Redl, PhD
Program Chair: Martijn van Griensven

Ludwig Boltzmann Institute for Trauma Care in the AUVA Research Center and
the Austrian Cluster for Tissue Regeneration
Expertissues – NoE
TERMIS

To request further information, please send an email to **Office@lbitrauma.org**.

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Members of TERMIS may purchase a subscription to the journal, *Tissue Engineering* at a discounted membership rate. The journal, *Tissue Engineering*, published by Mary Ann Liebert Publications, Inc., is the official journal of TERMIS. For further information on the journal, *Tissue Engineering*, and to view information on other journals published by Mary Ann Liebert, please visit the Tissue Engineering website.

***Tissue Engineering*, 2009 Subscription Rates**
Tissue Engineering, Official Journal of the Tissue Engineering and Regenerative Medicine International Society, has been receiving increasing numbers of excellent reviews and methods papers. Tissue Engineering (Part A) has traditionally focused on hypothesis-driven scientific reports. The Reviews and Methods journals will enable the flagship *Tissue Engineering* to bring these valuable papers to the readership on a much larger scale.

New for 2009, Mary Ann Liebert, Inc., publishers of the journal, *Tissue Engineering*, are offering a combined subscription for *Tissue Engineering*, Parts A, B and C.

Combined Subscription to ***Tissue Engineering*, Parts A, B, & C**
Print: $199.00 US & Canada; $249.00 outside US **Online**: FREE to members
***Tissue Engineering*, Part A**
Co-editors: Antonios G. Mikos, and Peter C. Johnson

The flagship journal provides a fundamental understanding of structure-function relationships in normal and pathologic tissues with the ultimate goal of developing biological substitutes. The Journal brings together scientific and medical experts in the fields of biomedical engineering, biomaterials science, molecular and cell biology, genetic engineering, and surgery to present and discuss advances in this emerging field.

***Tissue Engineering*, Part B, Reviews**
Co-editors: John P. Fisher, Antonios G. Mikos, and Peter C. Johnson

This new journal meets the urgent need for high-quality review papers due to the rapid expansion of the field. The Journal presents critical discussions, analyses, and concise summaries of research in different aspects of the field to assess where we are now and future directions.

***Tissue Engineering*, Part C, Methods**
Co-editors: John A. Jansen, Antonios G. Mikos, and Peter C. Johnson

This new journal presents procedures and protocols that will be adopted by the tissue engineering community as the research is translated into clinical applications. Authoritative papers will bring consistency to the research methods employed and help the field grow and mature.

Regenerative Medicine Online Package
The publisher also offers a special package that includes *Tissue Engineering*, Parts A, B, C, as well as *Cloning and Stem Cells*, *Stem Cells and Development* and *Rejuvenation Research Online* only for $350.00. If you are interested, please check the corresponding box that is included within the TERMIS online membership form.

Free Online Access to the Journal, Tissue Engineering - For Members Only!
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If your institution does not currently subscribe to the journal, *Tissue Engineering*, we ask that you please complete the library recommendation form and fax to your institution's librarian encouraging them to subscribe to the journal today.
Library Recommendation Form

13 PhD positions (Early Stage Researchers)
in the field of Tissue Engineering

In the framework of the Marie Curie Initial Training Network (ITN) on

Training Multidisciplinary scientists for Tissue Engineering and Regenerative Medicine

(MultiTERM)

the MultiTERM partners offer **13 PhD positions for a period of three years**
(fellowships for Early Stage Researchers / ESR), starting from September 2009.

The major objective of the MultiTERM project is to train the next generation of multi-disciplinary researchers in key elements of TERM: biomaterials, cell biology, bioreactors, animal modelling, clinical and industrial translation. During their training, the early stage scientists will develop new materials and implants for tissue engineering as well as state-of-the-art novel visualization procedures to monitor the behaviour of the implanted tissues.

Positions are offered at:

- Radboud University Nijmegen Medical Centre, The Netherlands
- Uppsala University, Sweden
- University Hospital Basel, Switzerland
- University of Zürich, Switzerland
- Aap Implantate AG, Germany (Aap BioImplants Netherlands BV, The Netherlands)

Detailed information on these positions and the MultiTERM training programme is available at www.multitermproject.eu.

Eligibility criteria

Applicants should be in the first 4 years (full-time equivalent) of their research careers, including the period of research training, starting at the date of obtaining the degree which would formally entitle them to embark on a doctorate. They should not be a national of the country of the host institution, and should not have resided or performed their main activity in the country of the host institution for more than 12 months in the 3 year period immediately prior to the start date.

More information

More information about the MultiTERM program can be found at www.multitermproject.eu. Specific enquiries can be addressed to the program coordinator, dr. Egbert Oosterwijk or the project manager, dr. Nicoline Geverink via multiterm@umcn.nl.

Meetings Endorsed by TERMIS

July 2009

- International Conference on Bioprinting and Biofabrication in Bordeaux (3B'09)
  Conference Dates: July 6-8, 2009
  Conference Location: Bordeaux (France)

- 2nd Annual Business Education Course, The Business of Regenerative Medicine: From Stem Cells to the Market Place
  Course Dates: July 13-16, 2009
  Course Location: Cleveland, Ohio

August 2009

- Rice University's Annual Short Course Advances in Tissue Engineering
  Short Course Director: Dr. Antonios G. Mikos, Professor of Bioengineering and Chemical & Biomolecular Engineering at Rice University
  Short Course Dates: August 12-15, 2009
  Short Course Location: Rice University Campus

- ISS Piran 2009 - Stem Cells & Regenerative Medicine
  International Summer School 2009
  Summer School Dates: August 21-29
  Summer School Location: Piran, Slovenia

September 2009

- ESB2009
  Conference Dates: September 7-11, 2009
  Conference Location: Lausanne, Switzerland
  Conference Venue: Beaulieu Convention Centre, Lausanne

- Biomaterials-Africa 2009
  Conference Dates: 20-22 September 2009
  Conference Location: CSIR International Convention Centre in Pretoria, South Africa
  Conference Scientific Chair: Prof. Ugo Ripamonti, MD, PhD

- 2009 World Stem Cell Summit
  Conference Dates: September 21-23, 2009

Conference Location: Baltimore Convention Center, Baltimore, MD

- Symposium: Patching Holes in Human Tissue - Current applications of textiles in medicine
  Symposium:The IFAI Expo 2009 has organized an educational program that will be held on September 23, 2009 from 9:30 AM - 12:00

October 2009

- bone-tec 2009 – International Bone-Tissue-Engineering Congress
  Congress Dates: 8 – 11 October, 2009
  Congress Location: Hannover, Germany
  Deadline for symposia proposal: 31 March, 2009
  Deadline for abstract submission: 31 May, 2009

November 2009

- Stem Cells USA & Regenerative Medicine Congress
  Conference Dates: 17-19 November 2009
  Conference Location: Washington D.C.

- Combined Meeting of the ESGCT, GSZ, DG-GT and ISCT
  Conference Dates: 20 - 25 November 2009
  Conference Location: Hannover, Germany
  Conference Venue: Convention Center at Hannover Fairground
  Abstract Submission Deadline: August 15, 2009
  Early Registration Deadline: September 15, 2009

February 2010

- Meniscus 2010
  The Meniscus: From Cradle to Rocker
  Conference Dates: February 4-6, 2010
  Conference Location: Ghent, Belgium
  Conference Chairs: R. Verdonk and P. Beaufils

2009 World Stem Cell Summit
September 21-23, 2009
Baltimore Convention Center
Baltimore, Maryland
www.worldstemcellsummit.com

As a proud supporter of the 2009 World Stem Cell Summit, TERMIS is delighted to offer discount registration passes to all TERMIS members that wish to attend this flagship stem cell event. The Summit will take place in Baltimore Maryland on September 21-23, 2009 at the Baltimore Convention Center and will bring together international ReGEN leaders from science, business, and policy. The conference includes a focused science track that showcases 28 scientific presentations from stem cell biologists, bio/tissue engineers, and nanotechnologists investigating the fields of neurology, cardiology, hepatology, oncology, hematology, etymology, and orthopedics as well as those making tools and drug discovery products for the field of stem cells and regenerative medicine. The conference will also provide a three-day business track as well as an advanced policy/societal track allowing attendees to gain a complete understanding of the field.

Tissue Engineers are a core component of the success, delivery and advancement of stem cells and regenerative medicine. With this in mind, we encourage all members of TERMIS to attend the 2009 World Stem Cell Summit to gain knowledge of the international stem cell landscape as well as the latest scientific discoveries, policy advancements, funding opportunities and commercialization timeline for your research and technologies. Through strategic networking, sharing of ideas and information, and forging new partnerships we hope that TERMIS members will assist in accelerating this exciting field of research-helping to find cures and contribute to the needed care of patients.

TERMIS members are encouraged to participate in the 2009 World Stem Cell Summit - STEM CELL AND REGNERATIVE MEDICINE WORLD IMPACT POSTER FORUM. Please visit http://www.worldstemcellsummit.com/2009_special_poster.html to learn more. The poster submission deadline is July 28, 2009. Contact the organizers for any questions.

Register to attend the 2009 World Stem Cell Summit at www.worldstemcellsummit.com. Academic registrants may use code GHW (case sensitive) to register for US$595. Corporate registrants may use code WML (case sensitive) to register for $1095.

If you have any questions about the 2009 World Stem Cell Summit, please contact Alan Fernandez or Robert Margolin at the Genetics Policy Institute.

Alan Fernandez 1-650-368-9300 alan@genpol.org
Robert Margolin 1-908-294-1537 rob@genpol.org

If you are interested in submitting content for consideration of inclusion in the TERMIS newsletter, please contact Sarah Wilburn, swiblurn@termis.org.

THANK YOU!

We would like to thank the TERMIS Governing Board Members and the TERMIS Chapter Council Members for their continued support!