In This Issue of *inter*Link

Letter from the Editor

World Congress 2009

European Cell Therapy & TE Patient Survey

Annual Chapter Meetings
2008 Taipei Overview

Mark Your Calendars!
2010 Chapter Meetings
2011 Chapter Meetings
2012 World Congress-Vienna, Austria

Laboratory Feature
Byoung-Hyun Min – Ajou University

TERMIS-EU Summer School 2009

BioPix Software

Journal, *Tissue Engineering*
Parts A, B and C now ONLINE!
Librarian Recommendation Form

Meetings Endorsed by TERMIS

TERMIS Governing Board

Edited and Compiled by:

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Queensland University of Technology

Sarah Wilburn
TERMIS Administrator

Letter from the Editor

Dear Colleagues,

As 2008 draws rapidly to a close, it is a good time to look back over the year's personal highlights and achievements and I will do so for our TERMIS organization. The most notable was the conferences held by the three chapters Europe, Asia-Pacific and North America in three fantastic locations of Porto, Taipei, and San Diego. The feedback received from the delegates and speakers was hugely positive with many people enjoying the breadth and high standard of the scientific program.

For many, it was a wonderful opportunity to meet and hear both international and national researchers presenting their latest research. A highlight of the programs was the presentation of various awards to our members including "Best Oral" and "Best Poster" awards alongside "Travel Grant" awards for budding PhD students & early career researchers to attend the conference.

The Korean Organizing Committee headed by Dr. Jung-Man Kim, in close collaboration with the TERMIS Governing Board, is now very busy planning the 2nd World Congress, in conjunction with the 2009 Stem Cell Symposium, which will be held in Seoul at the Lotte Hotel World from August 31 through September 3. Please add these dates in your diary and we hope you can join us in Seoul in 2009. Further details can be viewed at www.termis.org/wc2009.

More information is available on our Society's website, so please check regularly for conference updates. We currently have dates and locations for the 2010 and 2011 Chapter Meetings, as well as, the site of the 2012 3rd World Congress.

Earlier this year, the Department of Defense in the United States announced the creation of the Armed Forces Institute of Regenerative Medicine (AFRIM), which will be comprised of two multi-institutional consortia one led by Wake Forest University, Winston-Salem, N.C., and the University of Pittsburgh; and one led by Rutgers University, New Brunswick, N.J., and the Cleveland Clinic. We would like to congratulate these institutes on their collaborations to develop regenerative medicine therapies that will ultimately benefit wounded soldiers and civilians with severe injuries. The North American programs will strengthen our global presence as several large initiatives already started in 2006 and 2007 in Europe (Germany, the Netherlands, United Kingdom, Portugal) and Asia (Japan, China, South Korea) by very active members of our society. Overall, I conclude at the end of 2008 that we are truly a global society, which has a large potential to make a major impact in the next decades to come. I would like to thank all TERMIS members for there continued active participation in 2009.

I wish you a merry Christmas and a peaceful holiday season combined with a fresh and successful start in 2009.

Yours sincerely,
Dietmar W. Hutmacher PhD (NUS), MBA (Henley)

TERMIS 2nd World Congress
August 31 - September 3, 2009
Lotte Hotel World
Seoul, South Korea

In Conjunction With: the 2009 Seoul Stem Cell Symposium

Science and Technology for Patients!

Welcome to Korea! Hankuke osimeul hwanyoung hapnida!

It is my deep pleasure to invite you to the 2nd World Congress of the Tissue Engineering and Regenerative Medicine International Society (TERMIS) in conjunction with 2009 Seoul Stem Cell Symposium in Seoul, Korea. The first TERMIS World Congress was held in Pittsburgh in 2006, and following congresses are to be held every third year. The Seoul Symposium organized by Stem Cell Research Center was started in 2002, and has been held every year. This upcoming meeting will surely fulfill its brilliant achievement by synergizing the two renowned societies' experience and potentials.

Tissue engineering and regenerative medicine is an emerging multifaceted field involving biology, medicine, engineering and many other related disciplines. It can revolutionize the ways that we improve the health and quality of life by replacement, repair, maintenance and enhancement of tissue function for either therapeutic or diagnostic applications. It is no doubt that tissue engineering and regenerative medicine, being one of the most outstanding and greatest progresses of the last decades, will be the novel innovation of the future.

The main slogan of this congress is entitled **"Science and Technology for Patients"**. The program of this meeting will be stimulating with a focus on breaking scientific developments and current issues from foremost opinion leaders. I am confident that not only outstanding scientific and educational programs, but also an opportunity to enjoy the friendship and expertise of your colleagues will make this a most valuable and memorable meeting for you and your companions. Finally, I sincerely hope that each and every one of you has a wonderful time in Korea, enjoying the harmony of traditional and modern cutting-edge Korean science and culture, as well as warmest welcome from nice Korean hospitality.

Thank you very much.

Jung-Man Kim, MD, PhD
President TERMIS 2nd World Congress 2009

TERMIS 2nd World Congress
August 31 - September 3, 2009
Lotte Hotel World
Seoul, South Korea

In Conjunction With: the 2009 Seoul Stem Cell Symposium

Call for Symposia – Deadline to Submit is December 31, 2008

We invite you to submit symposium proposals for 2nd TERMIS World Congress in conjunction with 2009 Seoul Stem Cell Symposium held in Seoul, Republic of Korea during August 31 ~ September 3, 2009. Symposia are the scientific centerpiece of this congress. Proposals on any topics relevant to tissue engineering and regenerative medicine will be welcome. This congress will have more than 30 symposia in the scientific program (running in length from 1 ½ hours to 2 hours), each organized around a specific theme or topic. Individual talks in symposium range from 15 to 30 minutes in length (30 minutes for keynote or invited speakers).

Proposal applications must be received before December 31 (Wednesday), 2008 through termis2009wc@cescon.co.kr. Proposals will be reviewed and selected by the Scientific Program Committee. If a proposal is accepted, the organizer(s) will be required to submit a final summary description of the symposium. This summary will appear in the preliminary program and should be written so as to stimulate interest and promote attendance. The symposium organizers will have authorities for arranging chairmen and speakers (including keynote or invited speakers, oral or poster speakers through the reviewing process after abstract deadline).

Application Format: See attached file

Deadline for Application Receipt: Extended to December 31, 2008
The acceptance or rejection of the proposals will be notified to symposium organizers before January 31, 2009. Each accepted proposal organizer is responsible to check for exact time and location of his/her symposium. Organizers are also responsible for notifying all participants in their symposium concerning the date, time, and place of the session.

For further information, contact to the Scientific Program Chairmen (see below).

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TERMIS 2nd World Congress
August 31 - September 3, 2009
Lotte Hotel World
Seoul, South Korea

In Conjunction With: the 2009 Seoul Stem Cell Symposium

Information on TE & RM in Korea from the Meeting President
Jung-Man Kim, MD, PhD and Jung-Keug Park

1. How would you judge the quality of TERM in Asia and specifically Korea compared to Europe and US?

1.1 Academic Aspects:

Table 1 lists the major organizations carrying out active studies on TERM largely classified to source of stem cell and types of organ. Even though we tried to divide by universities and institutions, almost all works have been done by collaboration with medical doctors, biologists and materials scientists. Over 20 universities including hospitals and four government research institutes have carried out basic studies of embryonic and adult stem cells for cell therapy, development of biodegradable scaffolds and artificial organs. Remarkable outcomes were successful in the area of cartilage, bone, skin and stem cell. Research funds in the area of TERM has been supported by several government authorities such as the Korea Ministry of Education, Science and Technology (KMEST) for basic research, the Korea Ministry of Family, Health and Welfare (KMIHW) for clinical applications, the Korea Science and Engineering Foundation (KOSEF) for academic, the Korea Research Foundation (KRF) for academic, and the Korea Ministry of Knowledge and Economy (KMIC) for commercialization from 1996.

The estimated total funding is around 50 billion won (US$ 40.0 million) in 2007. Especially, KMEST is starting a Frontier Research Program for "Development of Cell Therapy" from 2002 year with the fund of 10 billion won (US$ 120 million) per year for next 10 years. This huge program composes of embryonic stem cell and adult stem cell for cell therapy, cryopreservation of organ, tissue engineering, xenograft for artificial organ and manufacturing of all artificial organs. The representative research centers supported by government are listed in Table 2.

1.2 Commercialization Aspects:

Also, Table 3 and Figure 1 lists the selected venture companies for the commercialization of neo-organ using cell therapy and regenerative medicine. Approximately 100 startups or business units are currently active and employ ~ 1,000 scientist and staff. Ten products were already introduced. Among these products, Chondron® developed by SewonCellontech Co. Ltd. was first approved for cartilage repair of autologous chondrocyte transplantation by Food and Drug Administration at Korea (KFDA). Also, Articell developed by Duplogene was approved by KFDA. Chondron® sales (at retail) are estimated at 560 million won (70 case, 8 million won per case) in 2000 and also approved the medical insurance of 2.9 million won per case under 40 years old from 2002. Also, three artificial skin as Holoderm® and Kaloderm® manufactured by TegoScience and Keraheal® by MCTT, respectively. InnoPol® as porous PLGA scaffolds manufacture by special gas foaming methods was launched on market by Regen., Co. Ltd. This cylindrical PLGA porous scaffold for penile enlargement is selling up to 400 pieces around 400~800 US$ for retail on 2006. CreavaxRCC®, InnoLAK®, and AdipoCell®, were lunaching in market as adult stem cell therapy. Table 4 listed six of KFDA approval, over 10 of IND and over 20 of pre-IND products of tissue engineered and cell therapy products for launching in market in Korea.

Yonsei Univ., Medical College had built the 1st Institutional GMP facility in Korea from 2005. Several provincial governments are of great interest for Bio-Cluster of TERM products; Chungbuk Osong Bio-Health Science Technopolis (www.cb21.net), Jonnam Biotechnology Research Center (JBRC, www.biohub.re.kr) and GyeonGi Bio-Center (www.ggbc.or.kr).

Even though the slow start of Chondron®, another skin commercial product and biomaterial, the fact that ~700 patients have already been treated with Chondron® is encouraging. Another important fact is the emerging of the early-stage and business units for the storage of stem cell and therapeutic cloning of stem cell. Nevertheless, this business has limited only the storage of hematopoietic (umbilical cord derived) stem cell for the treatment of disease in the future. They tried to differentiate the manufacturing of the neo-organ, for instance, HistoStem Co. Ltd and MediPost Co. Ltd. were successful with the chondrogenesis from hematopoietic stem cell for the treatment of arthritis, etc. The estimated private investment for these companies exceeded to ~ 50 billion won (US$ 50.0 million) for last three years. Nine venture companies have been publicly listed on KOSDAQ and outside the exchange market.

2. What is your special interest area in TERM?

The final goal of engineering might be a commercialization via the concept of science and technology. Especially, the regulation by the government of each country must be needed. So, I would like to focus on the Regulation System and Commercialization Aspects for each country. Also, very innovative technologies in TERM fields such as induces pluripotent cell (iPS), cell imaging and bio-nano fusion technology must be needed for the future development.

3. Why did you accept to organize the TERMIS WC?

3.1. Dreams of science and technology for patients
3.2. Let participants enjoy both science and Korean culture/ sightseeing
3.3. Let stimulate laboratory to clinical-translational research

4. Conclusion

We are seeing a recent situation of research activities and commercialization in the area of the TERM in Korea concisely. Tissue engineering as well as regenerative medicine remains a dynamic and growing field within universities, institutes, private sector, and premarket enterprise like a melting furnace. It will steadily and continuously increase the engagement of scientists and staff, the supporting of research funds and the investment from private companies in Korea, eventually, to prolong and improve human lives. Even though the fundamental of research and industry field for TERM looks like a baby right now, it enters an adolescence era through the development of new technology, innovative ideas and venture company in the near future in Korea.

In respect with this point, 2009 TERMIS WC Seoul might be very important for the exchange of scientific information and mutual interests of technology in the world.

Table 1. Research Activities of TERM in Korea

Organs	Universities and Institutes
Bone	Catholic Medical Univ., Seoul National Univ., Yonsei Univ., KRICT[a], Chonbuk National Univ., Youngnam Univ., KICET[b], Sejong Univ., etc
Cartilage	Ajou Univ., Chonbuk National Univ., Inje Univ., Yonsei Univ., Catholic Medical Univ., KAIST[c], etc
Embryonic stem cell	Seoul National Univ., Pocheon Univ., Maria Hospital, Yonsei Univ., Hanyang Univ., etc
Adipose stem cell	Seoul National Univ., Inje Univ., Chonnam Univ., Pusan Nat'l Univ., etc
Hematopoietic stem cell	Samsung Hospital, Catholic Medical Univ., Chonnam Nat'l Univ., etc
Mesenchymal stem cell	Chonnam National Univ., Catholic Medical Univ., Yonsei Univ., KRICT, Sunchunhyang Medical Univ., etc
Muscle derived stem cell	Hannam Univ., Catholic Medical Univ., KRICT, etc
Neuronal stem cell	Yonsei Univ., Ajou Univ., Seoul National Univ., etc
Skin derived stem cell	Nuclear Hospital, Chonnam Univ., etc
Skin	Hanyang Univ., Nuclear Hospital, Daegu Catholic Univ., etc
Pancreas	GIST[d], Seoul National Univ., Catholic Medical Univ., etc
Peridontal regeneration	Ewha Univ., Seoul National Univ., etc
Nerve regeneration	Sungkuyngwan Univ., KRICT, KNIH[e], Chonbuk Natl Univ., etc
Liver	Seoul National Univ., Dongguk Univ., KAIST, Hanyang Univ., Kyungbook Nat'l Univ., etc
Vascular graft	Hanyang Univ., KIST, Ajou Univ., GIST, etc
Ureter, Cornea	KIST[f], Gyungsang Univ., Dongguk Univ., etc

[a]KRICT : Korea Research Institute of Chemical Technology, [b]KICET : Korea Institute of Ceramic Technology, [c]KAIST : Korea Advance Institute of Science and Technology, [d]GIST : GwangJu Institute of Science and Technology, [e]KNIH : Korea National Institute of Health, [f]KIST : Korea Institute of Science and Technology

Table 2. Typical government supported projects for TERM

Center	Director	Supported government	Period/Fund	Remark
Stem Cell Research Center	Prof. Dong-Wook Kim, PhD (Yosei Univ.)	KMEST	- 2002~2012 (10 years) - 12 MS$/year	
High Performance Stem Cell Research Center	Prof. Il-Haon Oh, MD, PhD (Catholic Medical School)	KMIHW	- 2004~2009 (6 years) - 2.0 MS$/year	
Muscloskeletal Bioorgan Center	Prof. Young Sook Son, PhD (KyungHee Univ.)	KMIHW	- 2004~2013 (9 years) - 1.5 MS$/year	
Cardiovascular/ Neuronal Bioorgan Center	Dr. Soo Hyun Kim, PhD (KIST)	KMIHW	- 2005~2011 (6 years) - 1.5 MS$/year	
Stem Cell Therapy Center	Prof. Byung Hyun Min, MD, PhD (Ajou Univ)	KMKE	- 2005~2010 (5 years) - 2.0 MS$/year	
Tissue Engineered Products Research Center	Prof. Heung-Jae Chun, PhD (Catholic Medical School)	KMKE	- 2006~2011 (7 years) - 2.0 MS$/year	

Table 3. Companies of TERM in Korea

Organs	Company	Registered name	Web adress
Bone	BiomedLab		www.bmelab.co.kr
	Oscotech	OsteoPeak®	www.oscotech.com
	Teasan Med. Eng.		www.tmed.co.kr
	Bioalpha		www.daewoog.com
Cartilage	Sewon Cellontech	Chondron®	www.rmsbio.net
	Duplogen	Articell®	www.duplogen.com
Cell therapy	HistoStem		www.gistostem.co.kr
	LifeCord Inter. Co.		www.lifecord.co.kr
	MediPost		www.medi-post.co.kr
	Innocell		www.innocell.com
	Futurecellbank		www.futurecellbank.co.kr
	Chabiotech		www.chabiotech.co.kr
	Boryungbiopharma		www.boryungbio.co.kr
	Greencross		www.greencross.com
	KT biosys		www.ktbiosys.com
	Goodgene		www.goodgene.co.kr
	Mizmedi hospital		www.bizmedi.com
	Mariabiotech		www.mariabiotech.com
	Innomedisys		www.innomedisys.com
	Anterogen		www.anterogen.com
	BHK Inc.		www.bioheartkorea.com
	Biotron Inc.		www.biotroninc.com
	Celltrion Inc.		www.celltrion.com
	FCB-Pharmicell		www.fcbpharmicell.com
	Imgen. Co.		www.imgencorp.com
	Jeonnam Biotech. Res. Center		www.biohub.re.kr
	Oscotec Inc.		www.oscotec.com
	RNL Bio Co.		www.rnl.co.kr
	Smart Bio		www.smartbio.co.kr
	Tego Science Inc.		www.tegoscience.com
	ViroMed Co.		www.viromed.co.kr
	Daewoong Pharm. Co.		www.daewoong.com
	Keygene science Co.		www.keygene.co.kr
	CG Bio Co.		www.daewoog.com
	Biostar Co.		www.stemcellbank.co.kr
	Genexel-Sein		www.genexel.com
	Kolon Co Ltd		www.kolon.co.kr
	Binex		www.bi-nex.com
	CTC Bio		www.ctcbio.com
	Goodcelllife		www.goodcellife.com
	KMH		www.kmholdings.co.kr
	ACTS		www.actsco.com
	Creagene		www.creagene.com
	Celltrion		www.celltrion.com
	Sansung P&C		www.sansung.co.kr
	Neurotech Pharm		www.neurotech-pharma.com
	Easybiosystem		www.easybio.co.kr
	Biorane		www.biorane.com

Scaffold	DENKIST Innotechmedical REGEN Biotech Greencross BD Korea Maxgen	CharmFil® InnoPol® topore® Greenplast®	www.denkist.com www.innotechmed.com www.regenbiotech.com www.greencorss.com www.bd.com www.msjsw.com
Skin	Dong A Pharm. Co. Hanall Pharm. Co. Hansbiomed MCTT TegoScience Welskin Bioland Trichogene	 SureDerm® Autocell® Holoderm® Welskin® Biograft®	www.donga.co.kr www.hanall.co.kr www.hansbiomed.com www.mctt.co.kr www.tegoscience.co.kr www.welskin.com www.biolandtd.com www.trichogene.com
Tissue bank	Korea Tissue Bank		www.ktb.or.kr
Xenograft	Cho-A Pharm. Co. MGeneBio P.W.G. genetics Korea PMG BioFarming Anigene		www.choa.co.kr www.mgenbiotech.com www.spfpig.com www.anigen.co.kr

Table 4. Lists of KFDA approval products launched in market.

	Trade Name	Cell / Tissue	Treatment
NDA (Launching in Market, 10 products)	Chondron	Chondrocyte	Chondyle defect
	Articell	Chondrocyte	Chondyle defect
	Holoderm	Keratinocyte	Burn
	Kaloderm	Keratinocyte	Ulcer, burn
	Keraheal	Allo-keratinocyte	Burn
	InnoPol	PLGA scaffold	Penile enlargement
	Crevas-RCC	Dendrocyte	Cancer
	DCVAC-EPL	MSC/chondrocyte	Bone, chondyle defect
	Adipocell	Adipocyte	Scar
	Immuncell LC	Autologous activated lymph cell	Cancer

Table 5. Lists of TERM products in Korea in IND and pre-IND meeting

Register Name	**Company**	**Cell / Tissue**	**Treatment**
BioCell	**BHK Co**	**Autologous Activated Lymph Cell**	**Cancer**
MyoCell	**BHK Co**	**Autologous Myogenic Cell**	**Heart Infarction**

DCVAC-EPL	**Binex**	**Autologous Dendrocyte**	**Breast Cancer**
DCVAC-ERL	**Binex**	**Autologous Dendrocyte**	**Colon Cancer**
InnoLC	**InnoCell Co**	**Autologous Activated Lymph Cell**	**Cancer**
CreaVaxPC	**Creagen**	**Autologous Dendrocyte**	**Prostate Cancer**
MSC-1	**FCBPharmiCell**	**Bone Marrow MSC**	**Brain Infarction**
MSC-2	**FCBPharmiCell**	**Bone Marrow MSC**	**Heart Infarction**
Cartistem	**Medipost**	**Hematopoietic Stem Cell**	**Chondyle defect**
Ostem	**SewonCellon Tech**	**Bone Marrow MSC**	**Bone defect**

European Cell Therapy & Tissue Engineering Patient Survey

Ivan Martin – TERMIS-EU Chair

One of the initial programs targeted by TERMIS, guided by the vision and support of Prof. D. Williams and Prof. J. Vacanti, has been to identify ways to map the treatment of patients using cell therapy- or tissue engineering-based approaches. Thanks to a collaborative effort with the European group for Blood and Marrow Transplantation (EBMT), TERMIS-EU will launch at the beginning of 2009 the first experimental version of a patient survey sheet.

In 1990, EBMT introduced an "activity survey" as a novel instrument to capture comprehensive information on marrow transplant numbers and to distribute this information rapidly. Using the survey sheet, all EBMT members and affiliated teams started to report annually the number of patients transplanted, sorted by indication, hematopoietic stem cell source and donor type. The activity survey has evolved into a mandatory self-reporting system and forms an integral part of the comprehensive quality assurance programme of the accreditation committee JACIE (http://www.JACIE.org), shared by EBMT and the European section of the International Society for Cellular Therapy (ISCT). Importantly, the survey only includes the number of treated patients, without any reference to their clinical outcome. In its simple configuration, it provides the basis for counselling on the individual patient level as well as for healthcare institutions and administrative agencies in the field of stem cell transplantation. The survey has been extremely successful in the past 18 years, has achieved global recognition and is now the largest of its kind. Part of its success is due to the trustworthy organization of the program, guided by Prof. A. Gratwohl (head of the bone marrow transplantation unit at the University Hospital Basel). Generated records and data are centrally managed and can be accessed by all contributing groups in the form of specific queries (e.g., "how many patients have been treated last year in the UK and France for acute myeloid leukemia using unrelated cord blood-derived cells?"). Data acquired in the past years have provided the opportunity to generate several scientific publications, which can be found in the EBMT website under http://www.ebmt.org/4Registry/registry6.html#publications .

From 2009, TERMIS-EU and EBMT will send to the society members an extended version of the survey sheet, including other cell types and indications, thus entering at large the field of cellular therapy and tissue engineering. Other societies and groups, including the EU section of ISCT and the EUropean League Against Rheumatism (EULAR), are considering becoming associated to the program. For the time being, the initiative will be coordinated under the same framework of the existing EBMT one, and thus will not incur into administrative costs for TERMIS.

The program is expected to establish a comprehensive, quantitative map of patients being treated with specific cell types, sorted by the cell processes and delivery modes used. I deem this as a great opportunity for TERMIS to have an effective impact in the scientific, clinical and regulatory aspects of tissue engineering and regenerative medicine. Obviously, success of this initiative depends on how actively members of the different societies involved in patient treatment will comply with its filling out (once per year) and will contribute to its spreading. In this regard, we do need your support! Please do not hesitate to contact me if you have any questions, criticisms or suggestions about the survey.

Very best wishes,

Ivan Martin
European Continental Chair

TERMIS-AP 2008 Taipei Meeting Overview

Ging-Ho Hsiue, PhD
Distinguished Chair Professor.
National Tsing Hua University
President 2008 TERMIS – AP

The 2008 TERMIS–AP Chapter meeting was held in Taipei, Taiwan on Nov. 6–8. This meeting was presided by Professor Ging-Ho Hsiue, Department of Chemical Engineering, National Tsing Hua University and Professor Sheng-Mou Hou, Department of Orthopedic Surgery, National Taiwan University; the program was organized by Professor Hsing-Wen Sung who is also from the Department of Chemical Engineering, National Tsing Hua University. Although there was some difficulty due to an unexpected demonstration in the neighborhood of the meeting site on Nov. 6, the entire scientific program went very smoothly on Nov. 7 and 8. There were 3 keynote lectures delivered by Professor Shu Chien of University of California San Diego, Professor Teruo Okano of Tokyo Women's Medical University and Professor David Williams, the Editor-in-Chief of Biomaterials. Additionally, there were 52 invited lectures offered by distinguished scientists from both local and foreign countries. Also, there were 34 oral presentations and 162 poster presentations in the scientific program.

In total, there were 324 participants from 16 countries. The number of participants from each country is shown in the following table. There were four scientific sessions (including a SYIS session) held in parallel on Nov. 7 and 8. Overall, it was a very successful meeting and the responses from all participants were quite positive. The organizing committee would like to express their sincere gratitude to those who attended and contributed to this meeting. Also, the organizing committee would like to thank all the TERMIS–AP council members, particularly Prof. Hai Bang Lee and Prof. Teruo Okano; without their kind support, this meeting could not be held in Taipei. Some pictures taken during the meeting are shown as follows. For those who would like to take a look at the program and the pictures taken in the meeting, the meeting website is still available at http://www.termis-ap2008.tw.

Nation	number of participants
Australia	7
Brazil	1
Canada	1
China	21
Iran	1
Japan	40
Korea	70
Malaysia	12
Netherlands	2
Portugal	3
Singapore	10
Spain	1
Taiwan	143
Turkey	1
United Kingdom	2
United States	9


Tissue Engineering and Regenerative Medicine
–Asia Pacific International Conference


Tissue Engineering and Regenerative Medicine
–Asia Pacific International Conference


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Mitsuo Umezu
Applied Chem
Kiyotaka






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 2010: Orlando, Florida
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

Hilton
Travel should take you places®

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: Location TBD

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**.

Lab Feature. Cell and tissue engineering Laboratory, Ajou University

Byoung-Hyun Min (MD, PhD), Professor
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Director, Biomedical Engineering Research Center, Ajou University
Director, Cartilage Regeneration Center, Ajou Medical Center
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http://www.cellntissue.com

Outline of laboratory

Since it supported the autologous chondrocyte transplantation for the first time in Korea in 1996, Ajou University Cell Therapy Center (AUCTC) has been at the forefront of higher learning and research. The AUCTC aims to identify potential therapeutic avenues arising from the characterization of models of human diseases, especially cartilage regeneration. The translation of basic research into therapy requires the investigation of pathogenesis of disease at multiple levels, ranging from the molecular to the clinical approach. Investigators at our center therefore adopt a multidisciplinary approach to the human disease study and employ a wide range of laboratory techniques in this process. Owing to our original work, the focus of our work is on cartilage regeneration, extending to management of osteoarthritis. Novel biomaterial, mechanical stimulation (Low intensity ultrasound: LIUS) and cell transplantation methods illuminate the possibility of overcome to such an inveterate disease. Cell therapy center is a "translational" research facility, which can bring discoveries from the laboratory bench directly to the clinical setting.

Figure 1. We are permitted to produce various types of biomaterials in GMP certificated manufacturing facility.

Research group

1) University, Institute

* Ajou University Medical Center
* Department of Molecular science and Technology, Ajou University
* Insitute of Cell Therapy Research Center, Inha University
* Brain Korea 21, Korea Research Foundation

2) Collaborated Biocompanies, Research Institutes & Universities

* RegenPrime
* Biocore, Bioland, Biosupport, Biotron
* Green Cross Corp.

* KAIST, Yonsei Univ., HanYang Univ., Seoul National Univ.

Research activities

The research in our center focuses on regenerative medicine by cell transplantation and tissue engineering technology. We are attempting to regenerate various tissues, including bone, cartilage, cornea, intervertebral disc and nervous tissue. We have successfully translated basic research into clinical applications and as a result we do clinical trial under permission of kFDA. The main applications of our cell therapy and tissue engineering technology are:

1. Cell

Part I) A variety of surgical techniques have been proposed to repair cartilage defects, including curettage, spongialization, autologous osteochondral transplantation, and drilling through the subchondral bone. However, numerous limitations still exist and should be overcome for the effective clinical application of this method. Problems in ACI are frequently experienced in old age and are thought to be due to the degenerative changes in the cartilage such as the decrease in the number and the proliferation capacity of chondrocytes. Therefore, studies on the molecular events underlying the age-related degenerative changes of chondrocytes are in demand and, once elucidated, could provide an insight into the identification of definite barometers to practically evaluate clinical applicability of the cultured chondrocytes. The purpose of this study was to investigate age-related changes in the proliferative ability of human articular chondrocytes in culture. In addition, the possible markers for the proliferative capacity of chondrocytes were examined. PCNA and p21 could be molecular markers that represent the status of these age-related properties of human articular chondrocytes *in vitro.* We are also trying to elucidate the molecular processes regulating aging and dedifferenation of articular chondrocytes (Kim HJ, Park SR, Park HJ, Choi BH, Min B-H, Potential predictive markers for proliferative capacity of cultured human articular chondrocytes: PCNA and p21, *Artificial Organs,* 29(5):393-398, 2005).

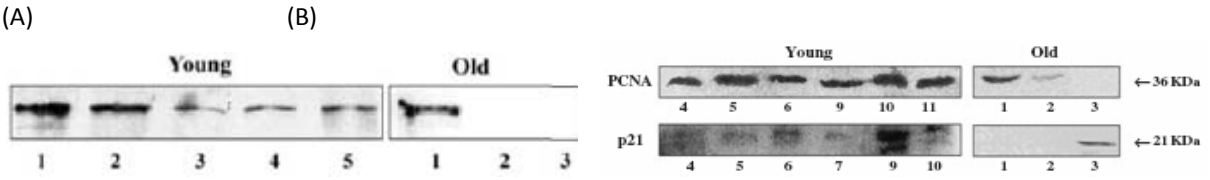

Figure 2. (A) The phenotypic difference between young and old chondrocytes in culture. The expression of type II collagen during passages (passages 1-5 in young cells and passages 1-3 in old cells) (B) The expression of PCNA and p21 was examined in the young (the passages 4-11) and the old (the passages 1-3) chondrocytes. These results were examined by Western blot analysis.

Part II) Most of the studies until now have focused on finding efficient chondrogenic conditions such as three-dimensional (3-D) environment, growth factors and/or mechanical stimulations. Evaluation of chondrogenic differentiation of MSCs has mainly depended on the expression of chondrocyte phenotypes such as Sox-9, collagen type II and proteoglycans. Only a little is known, however, about molecular mechanisms or specific changes in gene expression patterns during the process, and limited information only for CD90 and CD105 is available on the surface marker changes during the differentiation of MSCs. Therefore, we were investigated changes in the surface antigens expression on hMSCs during the chondrogenic differentiation and dedifferentiation processes, thereby understanding phenotypic changes during the process and identifying specific markers for differentiated chondrocytes. It is going to be an interesting project to examine stemness of once differentiated hMSCs using TGF-β after dedifferentiation.

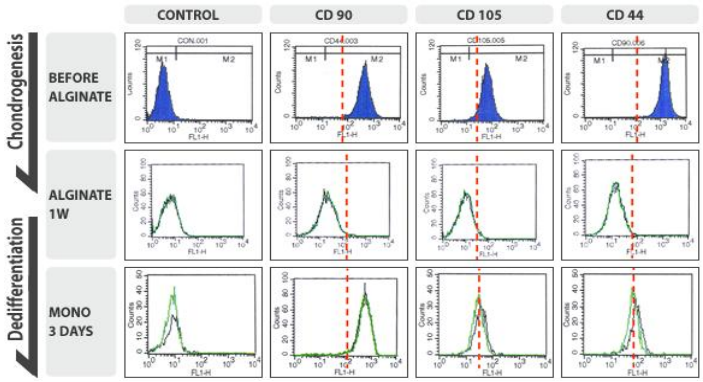

Figure 3. Markers gene expression of hMSCs during chondrogenic differentiation MSCs.

Part III) MSCs are attractive as a potential source of cells for cell-basal therapeutic strategies, because MSCs differentiate into functional cell types that constitute the tissues (osteoblasts, chondrocytes, adipocytes, tenocytes, muscle cells etc). But, MSCs in bone marrow (BM) are heterogeous and exist at low-end ratio, and moreover, the ratio is reduced following age increases. At these reasons, it is limited to obtain pure and larger number of MSCs for clinical application. Our aim is that many MSCs are obtained during early cultivation period thought microenvironment change by mechanical stimulation (such as low intensity ultrasound). Cell adhesion related actin-cytoskeleton and focal adhesion proteins are increased by ultrasound, these results can explain effects of ultrasound on MSCs adhesion and mechanotransduction. Our further work is that identify signaling pathway for understanding mechanotransduction of MSCs.

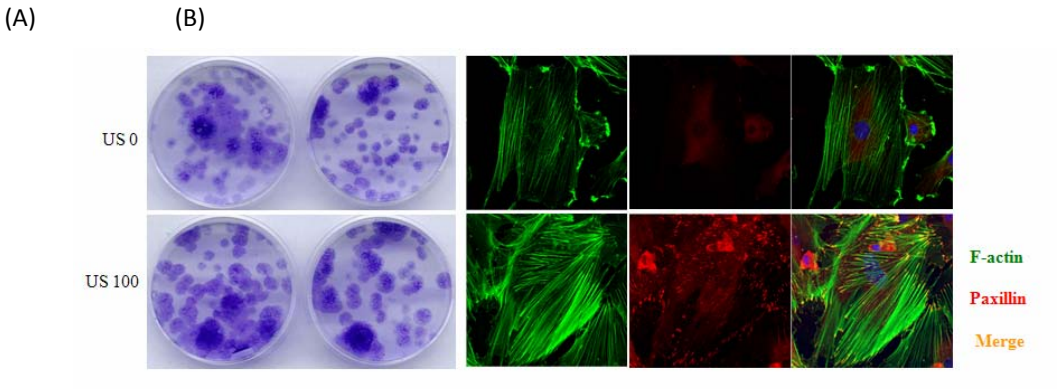

Figure 4. (A) CFU-Fs analysis by crystal violet staining (12days), (B) Cytoskeleton and focal adhesion changes by immunofluorescence (12days, confocal image, X400).

2. Biomaterial: <u>Extracellular Matrix (ECM) scaffold</u>

Bone marrow stromal cells or MSCs exists as a population of cells having the capacity to differentiate into osteogenic, chondrogenic or adipogenic lineages in vitro and in vivo. To utilize the enormous MSCs potential for cartilage injury repair, numerous attempts have been made, including MSC-seeded scaffold and cultured MSCs

implantation in vivo. Formation of biological substitute using the concept of tissue engineering generally requires an artificial scaffold. The three dimensional environment plays an important role in promoting cell-matrix interactions during chondrogenesis and the phenotypic stability of chondrocytes are closely related to their surrounding 3D matrix.

The extracellular matrix (ECM) has received significant attention as a functional scaffold in the tissue engineering field, because it can serve not only a physical support but also provide favorable environments for cells. However, the ECM scaffold still requires many technical improvements to construct artificial tissue suitable for clinical use. So, we developed a novel ECM scaffold fabricated by our proprietary procedure using cultured chondrocytes and focus on ECM application to clinical use, such as cartilage defect. And, we have demonstrated that ECM would provide a good environment for differentiation of the MSCs and regeneration of cartilage tissue.

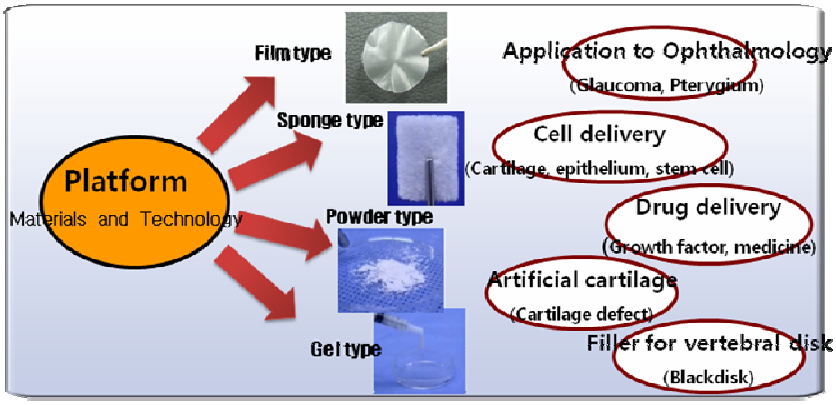

Figure 5. We invented ECM derived biomaterial in various form and applied them in regenerating various tissue

We speculate that the chondrocyte-derived ECM scaffolds are biocompatible, versatile in shape and mechanical property, and flexible in application, thereby providing an ideal platform not only for cartilage tissue engineering but also for diverse other clinical purposes.

3. LIUS (Low-Intensity Ultrasound)

Ultrasound (US) is being used widely in clinic for diagnostic and therapeutic purposes, but clinical utilization of low intensity ultrasound (LIUS) has been very limited. However, therapeutic potential of LIUS has been reported in animal models of musculoskeletal system disorders, and its application is being expanded in various fields. We have already reported our results and current status on the application of LIUS in cartilage tissue engineering. LIUS has positive effects on the i) viability of chondrocytes and MSCs in 3-D culture, ii) chondrocyte proliferation in monolayer culture, iii) matrix protein synthesis at the transcriptional level, iv) matrix integrity by regulating the levels of TIMPs and MMPs, v) chondrogenic differentiation of MSCs *in vitro* and *in vivo* and vi) repair of cartilage damages *in vivo*. (Min B-H, Choi BH, Park SR, Low intensity ultrasound as a supporter of cartilage regeneration and its engineering, *Biotechnology and Bioprocess Engineering*, 12:22-31, 2007).

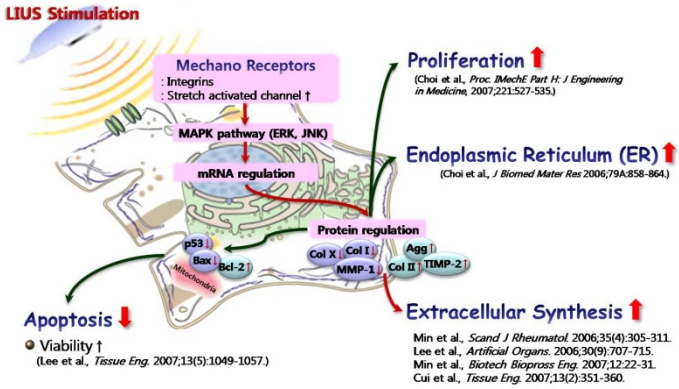

Figure 6. Summary of the cellular events involved in the LIUS function. The LIUS signals in chondrocytes or MSCs may be mediated by integrins and SACs on the cell surface, which induce subsequently intracellular calcium signals and MAP kinase pathways such as ERK and JNK, eventually leading to the induction of matrix proteins synthesis (Choi BH, Choi MH, Kwak MG, Min B-H, Woo ZH, Park SR, Mechanotransduction pathways of low-intensity ultrasound in C-28/I2 human chondrocyte cell line, *Proc Inst Mech Eng [H]*, 221(5):527-35, 2007).

Workshop-INSERM Summer School 2009

« Tissue engineering: study of the interfaces materials/cells/tissues »

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Phase I - Update on…

May 27-29, 2009 • Saint-Raphael (France).

Objectives
Regenerative medicine aims to restore the functional activities of tissues and organs by using the concept of cellular and tissue engineering. This concept includes all the technologies that use living cells and / or materials (synthetic or natural) in order to improve, regenerate or replace the impaired function of tissues or organs. This concept largely exceeds the traditional concepts of biocompatibility and requires a strong interdisciplinary work between physic, chemistry, cell biology, material science, and clinic. The objective of this workshop is to provide a broad public basis of cell and tissue engineering reporting on the latest scientific and technological advances in the fields of materials and their interfaces with the cells and tissues. The audience consists of basic researchers, clinicians and engineers that will exchange their views on the advanced techniques of molecular and physicochemical characterization of the interfaces cells / tissues / materials in an attempt to identify the advantages and the limits of the current therapeutic solutions based on tissue engineering concepts.

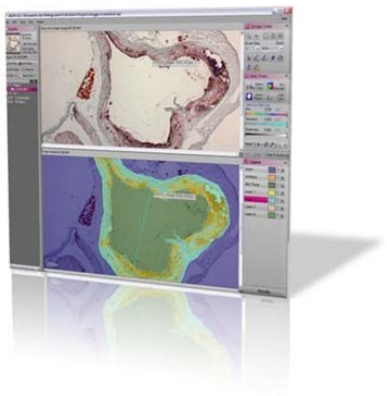
Audience
Academic and industrial researchers, clinicians, engineers and technicians, doctoral and post-doctoral students, working in laboratories, hospitals or center of investigations and regulation agency. The lectures will be given in English.

Maximum number of participants: 60

Program
Recent progress in the field of materials and cells for tissue engineering will be presented. In particular, biodegradability, nanostructuration and biofonctionalization of materials will be discussed. The methods of physicochemical and molecular characterization of materials and their interfaces with cells and tissues will be investigated in detail. Methods of cell cultures in static and dynamic conditions and relevant methods for cell imaging will be also widely discussed. Finally, examples of applications in the field of skin, bone, cartilage and vessels engineering will be presented and analyzed through a round table dedicated to the transfer of technology from the bench to the bedside.
With the participation of: Mario Barbosa (Porto, Portugal), Ivan Martin (Basel, Switzerland), Nicolas L'Heureux (Novato, USA), Clemens Van Blitterswijk (Enschede, The Netherlands), Josep A. Planell (Barcelona, Spain), Pierre Weiss (Nantes, France), Didier Mainard (Nancy, France), Odile Damour (Lyon, France), Patrice Laquerrière (Reims, France), Philippe Lavalle (Strasbourg, France), Karine Anselme (Mulhouse, France), Michel Vert (Montpellier, France), Luc Sensebe (Tours, France), Laurent Laganier (Lyon, France).

BIOPIX
software

Use your images as evidence!



Microscope images can, if objectively quantified or measured, often be used as scientific evidence. BioPix iQ is an image analysis program, used for quantifying histological images of cells and tissues. BioPix iQ is so **easy to use and learn**, that anybody in a lab can use it. Let BioPix empower you with image analysis that is both **easy yet powerful**.

The program has been developed together with scientists at Gothenburg University, in order to guarantee the usefulness and ease of use. The interface and workflow is adapted for fast and easy quantification of hundreds of images and produces reliable data in no time. The applications of the program have been published in several journals (e.g. Boström et. al. Nature Cell Biology 2007).
BioPix is now happy to give you as a TERMIS member, a special sponsorship offer. We will rebate the standard price (4200 USD) to **3500** USD, and donate **15%** of all sales from its members to TERMIS.

A free trial of the program can be downloaded from our webpage www.biopix.se. Look for the TERMIS logo!
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Meetings Endorsed by TERMIS

January 2009

- Expertissues Wintershool on "Preclinical Models and Imaging in Musculoskeletal TE"
  Winterschool Dates: January 25-28, 2009
  Winterschool Location: Radstadt, Salzburg, Austria
  (Adress: Hotel Zum Jungen Römer; Römerstr. 18; A-5550 Radstadt)
  Invitation | Program

February 2009

- 1st Alexandria International Congress on Tissue Engineering
  Conference Dates: 14-16 February 2009
  Conference Location: Alexandria University, Egypt
  Congress Moderator: Mona K. Marei
  View Congress Flyer

March 2009

- Hilton Head Workshop
  Conference Dates: March 5-8, 2009
  Conference Location: Hilton Head Island, SC
- One-day Short Course on March 4, 2009 entitled, "Directing and Assaying Stem Cell Differentiation."

April 2009

- 35th Annual Northeast Bioengineering Conference
  Conference Dates: April 3-5, 2009
  Hosted by: Harvard-MIT Division of Health Science and Technology

May 2009

- ICRS 2009
  Conference Dates: May 23-26, 2009
  Conference Location: Hotel Intercontinental, Biscayne Bay Miami, FL

June 2009

- ICMAT 2009 - Symposium A: Advanced Biomaterials and Regenerative Medicine
  In conjunction with the 2nd Asian Biomaterials Congress
  Conference Dates: 26 June - 3 July 2009 in Singapore

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

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

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