WACBE Newsletter

世界華人生物醫學工程協會
World Association for Chinese Biomedical Engineers

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MESSAGE FROM THE PRESIDENT

Savio L-Y. Woo, Ph.D., Sc.D.

Dear Fellow Members:

Thanks to the leadership of your Board, our Secretary General, Dr. Zong-Ming Li, and our Newsletter editor, Dr. Bingmei Fu, we can present to you the Inaugural Issue of the WACBE Newsletter. As your President, I'm very proud and honored to provide this important service to our membership. I invite you to read from cover to cover that includes a little history about our organization. We trust that you will share the pride of the progress we have made.

For years, I have gone to bioengineering/biomedical engineering conferences and have always found a very long list of authors with Chinese surnames at the end of the proceedings. I smile as I become very proud of the numerous accomplishments that have been made by the bioengineers of Chinese origin and/or descent. So, the dream of getting all these talents together to communicate and to collaborate has always persisted. Seven years ago, approximately ten of the more senior Chinese bioengineers (finally) got together to discuss the need of a central organization, and we formed a steering committee to explore the possibilities. It was our good fortune that Dr. Ned Hwang was willing to spearhead our first scientific meeting in Taipei, Taiwan, between December 11 - 15, 2002. It was his tremendous efforts to invite thirty-four (34) speakers to give overview lectures on their respective fields of bioengineering. In tutorial fashion, the Congress took place in one room with over 400 participants and, indeed, we have learned from each other. Ned also invited me to co-edit the book entitled Frontiers in Biomedical Engineering (Kluwer Academic Plenum Publishers, 2003), in which all the lectures of the meeting could be found. Dr. Y. C. Fung was kind enough to provide us with a very nice forward for this text.

During that meeting, we discussed the formation of the society of Chinese biomedical engineers and the name World Association for Chinese Biomedical Engineers (WACBE) was adopted. The overall goals of WACBE are:

- To network world-wide Chinese professionals and students in the field of biomedical engineering
- To promote basic and translational research in biomedical engineering
- To encourage qualified students to become biomedical engineers
- To facilitate the professional career development of its members
- To promote cooperation among and between industrialists and academics
- To establish a spirit of international cooperation in biomedical engineering

(Continued on page 6)

WACBE Steering Committee Meeting Held in Hong Kong:
Left to right: Dr. James Goh, Dr. Yimin Hu, Dr. Baoshu Xi, Dr. Francis Chan, Dr. Savio Woo, Dr. Zong-Ming Li, Dr. Ned Hwang, Dr. Ming Zhang, Dr. Arthur Mak

3rd WACBE World Congress on Bioengineering

9th – 11th July 2007

Twin Towers Hotel, Bangkok, Thailand

With Her Royal Highness Princess Maha Chakri Sirindhorn

At the WACBE Congress in Bangkok

The 3rd WACBE World Congress on Bioengineering was indeed a global event. We had close to 300 participants from 30 countries around the world gathering in exotic Bangkok for 3 wonderful days of scientific exchanges. We are grateful to the Prof Dr Yongyuth Yuthavong, Minister of Science and Technology of Thailand, who graciously gave the Opening Address, followed by Prof Savio Woo (Pittsburgh) who gave an inspiring Congress Lecture. Prof Abraham Lee (UC Irvine) and Masahiro Sokabe (Nagoya) in their Plenary Lectures presented exciting possibilities in bioengineering at both the micro and nano levels. In addition, we had 20 Keynote presentations from very prominent bioengineers and scientists. There were 40 oral paper sessions organized into 4 parallel tracks and 94 poster papers. Apart from the scientific presentations, the congress was treated to Traditional Thai Dances by the students of Mahidol University at the Gala Banquet. It was a highly successful congress thanks to the hard working organizing committee members from Singapore and Thailand, as well as guidance from the WACBE Council. We are also thankful to the sponsors and exhibitors, their contribution allowed us to provide extremely low registration fees for bona fide students to attend the congress. We also had a rare opportunity, thanks to Prof Dr Pairash Thajchayapong (NSTDA's Specialist and Senior Advisor) who specially arranged for some of the WACBE Council members to have an audience with Her Royal Highness Princess Maha Chakri Sirindhorn at the Sra Pathum Palace. Her Royal Highness has a special interest in bioengineering, in particular its application in improving healthcare. I believe the 3rd WACBE World Congress on Bioengineering was a memorable event for many where old ties were renewed and new friendships were established.

James C. H. Goh, Congress Chair
Division of Bioengineering
National University of Singapore

EXPERTS TALK ABOUT BIOMEDICAL ENGINEERING

Functional Tissue Engineering and Biomechanics of Ligaments and Tendons: Opportunities and Challenges

Savio L-Y. Woo
Musculoskeletal Research Center, Department of Bioengineering
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Ligaments connect bone to bone in order to help guide synovial joints to move easily and smoothly. Their nonlinear biomechanical properties can also limit excessive joint displacement when the externally applied loads are high, hence, protecting other soft tissues in and around the joints from injuries. Tendons, on the other hand, connect muscles to bone, transferring the force generated by muscles to bones in order to move the joints. As such, ligaments and tendons experience large, repetitive forces during sports- and work-related activities and are injured frequently. These are especially true for the ligament and tendons of the knee and shoulder joints. Once injured, the healing potential of ligaments and tendons varies from little or no healing to robust healing. Even for those that can heal spontaneously, their post-healing biomechanical properties are far from normal. Thus, how to improve their healing process and restore their functions remains a challenge in orthopaedics.

Functional tissue engineering (FTE) is an emerging field that has been shown promise in enhancing the quality of healing ligaments and tendons, as there are supporting literature on the use of growth factors, gene and cell therapy, and biological scaffolds for this purpose. In this review, we will focus on the FTE of ligaments and tendons of the knee, specifically that of the medial collateral ligament (MCL) and the patella tendon (PT), and the potential of applying the successful technology to the anterior cruciate ligament (ACL), and the posterior cruciate ligament (PCL) and perhaps other ligaments and tendons that have less healing capability. A series of recent studies in our research center has showed improvement of the healing of the MCL and the PT by using an extracellular matrix scaffold derived from the porcine small intestinal submucosa (SIS). SIS is a membrane consisting of relatively aligned collagen. When a layer of SIS was applied to a gap injury of the rabbit MCL, the healing ligament had doubled its tangent modulus, improved collagen fiber alignment, and decreased level of collagen type V at both short and long terms as compared to the untreated controls. Such encouraging findings prompted us to look into the advantage of using SIS to enhance healing of the PT. The central-third of the PT has been a favorite autograft for ACL reconstruction. However, the detrimental clinical problems of arthrofibrosis and adhesion in the anterior interval of the knee occur following the graft harvest. In a rabbit model, it was observed that SIS could significantly reduce the adhesion formation while concomitantly improve the properties of the healing PT. At 12 weeks postoperatively, both the stiffness and ultimate load of the SIS-treated healing PT were nearly doubled while compared to those for the untreated ones.

In these studies, we have also gained a better understanding of the mechanism of how SIS can enhance the healing of ligament and tendons. Currently, we want to extend its use, in combination with a newly developed collagen-platelet rich plasma hydrogel, to study the synergistic effects on ACL healing following a midsubstance tear. In addition to examine the biomechanical properties of the neo-ACL, we will evaluate the patellofemoral and tibiofemoral joint kinematics as well as the in situ forces in the neo-ACL at different stages of healing by the means of robotics technology.

As the reparative and regenerative processes of ligaments and tendons are extremely complex, it will be necessary to have molecular biologists, morphologists, biochemists, biomechanists,

physical therapists, radiologists, clinicians, and others to collaborate seamlessly to move forward. We believe biomechanics will especially play a major role in the area of in vivo studies where various treatments, postoperative rehabilitation and other clinical regimens are evaluated based on the recovery as well as the maintenance of the function of our synovial joints.

Medicine on a Chip – Opportunities for BME Research and Education

Abraham Lee
Biomedical Engineering, University of California, Irvine, USA

Microfluidics provides a platform to develop medicine-on-a-chip by custom-designing particles for controlled drug release and targeted therapeutics (gene, protein, and cell), diagnostics, and imaging. Besides synthesis of the particles, it also can serve as the platform for testing the effect of the particles on biological samples (tissue or cell) and can also be developed for biosensor applications. Due to its versatility in function and application, it provides a unique and beneficial platform for healthcare research. However, it is a technology that requires truly skilled and multidisciplinary trained workers. This forms unique challenges and opportunities for biomedical engineering education that require students to learn the tools, study the science, and be able to collaborate and communicate with a wide range of disciplines.

Tribology and Clinical Significance of Soft Tissue Gliding

Kai-Nan An
Biomechanics Laboratory
Mayo Clinic College of Medicine, U.S.A.

A tendon sliding through the pulley is analogous to a belt wrapped around a fixed mechanical pulley. Based on this theoretical consideration, an experimental system was developed that allows direct measurement of the gliding resistance or friction at the soft tissue interface. The importance of hyaluronate or proteoglycan, lubricin and phospholipids as lubricants on the gliding resistance were investigated using systematic digestion. The effects of tendon lubrication on tendon repair techniques, tendon types, postoperative therapy, and the effect of exogenous lubricating substances on the tendon grafts had been examined both in vitro and in vivo. In addition, we have also investigated the potential etiology on the development of repetitive trauma disorder of soft tissue based on the gliding at the tissue interfaces.

Potential Mechanisms Linking Inflammation and Cancer Metastasis

Cheng Dong
Department of Bioengineering
The Pennsylvania State University, U.S.A.

Attachment of tumor cells to the endothelium (EC) under flow conditions is critical for the migration of tumor cells out of the vascular system to establish metastases. The interactions between cancer cells and the host immune system are of particular interest to our group. Innate immune system processes can potentially promote tumor progression through inflammation dependant mechanisms. Human neutrophils (PMNs), which comprise 50-70% of circulating leukocytes, are being studied to better understand how the host immune system affects cancer cell adhesion and subsequent migration and metastasis. Melanoma cell interaction with the EC is distinct from PMN-EC adhesion in the initial PMN tethering on the EC and subsequent PMN capture of melanoma cells and their delivery to close proximity to the EC. LFA-1 (CD11a/CD18 integrin) influenced the capture phase of PMN binding to both melanoma cells and the endothelium, while Mac-1 (CD11b/CD18 integrin) affected prolonged PMN-melanoma aggregation. Blocking E-selectin or ICAM-1 (intercellular adhesion molecule) on the endothelium or ICAM-1 on the melanoma surface reduced PMN-facilitated melanoma extravasation. Results indicate a novel finding that melanoma-induced inflammatory cytokine IL-8 contributes to PMN tethering and subsequent melanoma arrest on the EC via the PMN-melanoma cell binding. Functional blocking of the IL-8 receptors CXCR1 and CXCR2 on PMNs, or neutralizing soluble IL-8 in cell suspensions, significantly decreased the level of Mac-1 up-regulation on PMNs while in communicating with melanoma cells and reduced melanoma extravasation. We also found that activation of nuclear factor of kB ($NF\text{-}_kB$) in PMNs is responsible for endogenous IL-8 production in response to melanoma microenvironment. These results provide new evidence for the complex role of hemodynamic forces, secreted chemokines, and PMN-melanoma adhesion in the recruitment of metastatic cancer cells to the endothelium in the microcirculation, which are significant in fostering new approaches to cancer treatment through anti-inflammatory therapeutics.

Wavelet Analysis of Hyperemic Response in Anesthetized Rats with Spinal Cord Injury

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The objective of this study is to assess the effect of spinal cord injury (SCI) on the skin blood flowmotion in rats using spectral analysis based on wavelets transform of the periodic oscillations of the cutaneous laser Doppler flowmetry (LDF) signal. A total of fourteen Sprague-Dawley rats were used in this study, of which 7 were normal rats and the other 7 were spinal cord injured rats with transection of the T1 spinal nerves. External pressure of 13.3kPa (100 mmHg) was applied to the trochanter area of rats via a secifically designed indentors. The loading duration was 6 hours for one day. LDF measurement was monitored for 20 mins prior to and after the prescribed compression period. Five frequency intervals were identified (0.01–0.05 Hz, 0.05–0.15 Hz, 0.15–0.4 Hz, 0.4–2 Hz and 2–5 Hz) corresponding to endothelial related metabolic, neurogenic, myogenic, respiratory and cardiac origins. The absolute amplitude of oscillations of each particular frequency interval and the normalized amplitude were calculated for quantitative assessments. Comparison of hyperemic response were performed between rats with SCI and normal ones. The results showed that the normalized amplitude in the frequency interval II (0.05-0.15 Hz) and interval III (0.15-0.4 Hz) was significantly lower in rats with SCI than that in normal ones ($p<0.01$). The reuslts suggested that spinal cord injury might contribute to impaired hyperemic response in SCI rats.

Introduction: Biomechanics from Molecules, Cells Tissues to Organs and Tissue Regeneration

X. Edward Guo
Department of Biomedical Engineering
Columbia University,USA

This Special Session "Biomechanics from Molecules, Cells, Tissues to Organs and Tissue Regeneration" has organized by a diverse group of biomechanics researchers in the United States of America. Most people in this group have heritages rooted in mainland of China and are performing the state of art biomechanics research and education in the United States of America. They have been actively involved in the scientific and educational exchanges in biomechanics research and education between Mainland China and the United States of America. Since 2001, they have been organizing and participating in China Overseas Workshop on Biomechanics (2001 in Beijing, 2004 in Beijing and Shanghai, and 2007 planned in Guangzhou). The third China Overseas Workshop on Biomechanics will be held in Guangzhou, Guangdong Province, China (July 4-7th, 2007). This international Workshop has been listed as one of the satellite conference of ISB 2007. The organizers and delegates of the Workshop treasure these unique opportunities brought by the ISB 2007 organizing committee and are privileged to organize the special session of "Biomechanics from Molecules, Cells, Tissues to Organs and Tissue Regeneration".

Molecular Biomechanics of Receptor-Ligand Bindings and Cellular Biomechanics in Microgravity

Mian Long
National Microgravity Laboratory and Center for Biomechanics and Bioengineering, Institute of Mechanics, Chinese Academy of Sciences, PRC.

Cell adhesion mediated by receptor-ligand bindings is crucial to such biological processes as platelet thrombosis, inflammatory reaction, and tumor metastasis. How structural variations and surface presentations of interacting molecules affect their kinetics, and how external forces regulate their dissociation have not been known well. A dual approach that coordinates biological experiments, mechanical measurements, and numerical simulations of cell adhesions and molecule bindings is used to elucidate the underlying mechanism in receptor-ligand interactions under applied forces.

Cell culture and growth in space is pre-requisite to understand cellular responses under microgravity. How a driven flow of culture medium affects biological responses of mammalian cells in microgravity, however, has been poorly understood. To elucidate the microgravity-induced cellular responses, both differentially-rotating and sheet-flow-driven cell bioreactors are proposed upon biomechanical principles, and numerical calculations of flow dynamics analyses are conducted to predict mass transport and nutrient supply inside the bioreactor.

Biomechanics Approaches in Studying Human Diseases

C.T. Lim
Division of Bioengineering & Department of Mechanical Engineering,
National University of Singapore

It has been known that any deviation in the structural and mechanical properties of a living cell not only results in the breakdown of its physiological functions, but may also lead to human diseases. For example, red blood cells (RBC) transport oxygen to the various parts of the human body by squeezing their way through narrow capillaries. However, these cells are also highly coveted by the *Plasmodium falciparum*, single-cell parasites that cause malaria. The parasite invades the RBC and releases proteins

that interact with and induced changes in the membrane. These changes cause the RBC to be both stiff and sticky. This causes clogging of blood vessels and capillaries and can lead to coma and even death. Recently, we have employed several bioengineering approaches to probe the stiffening of the infected RBCs at the cell level, as well as the stickiness of the malaria infected red cells at the molecular level. These include using the laser traps or optical tweezers, micropipette aspiration and microfluidics to study the stiffening of the infected red cells at the cell level and the single molecule force spectroscopy technique to probe the stickiness of the malaria infected cell at the molecular level. This presentation illustrates how mechanics can be important and relevant in studying human diseases.

Engineering DNA into a Material: Cell-free Protein-Producing Gels and Large-scale DNA-Gold Nanoparticle Super-lattices

Dan Luo
Department of Biological and Environmental Engineering
Cornell University, USA

Treating DNA as a true polymer, our research focuses on molecular engineering of DNA for the purpose of creating novel materials. We have synthesized branched, networked, and dendritic DNA as additional material building blocks. These DNA materials are water soluble, biocompatible, biodegradable and most importantly monodisperse and anisotropic. In addition, DNA manipulating enzymes have provided us with an enlarged tool box for creating DNA-based complex nano-architectures as well as novel functionalities. A few examples of DNA materials will be discussed in this talk; they include an addressable DNA molecule (DNA with zip-codes), a DNA hydrogel that can produce proteins without any living organisms, and DNA-regulated, large scale nanoparticle superlattices and supracrystals. These examples not only illustrate the concept that DNA can be utilized as a generic, designer material but also demonstrate the power of nucleic acid engineered materials as a link between biology and polymer chemistry, as well as between DNA and materials sciences and engineering. New properties are expected from nucleic acid engineered materials, and their applications are envisioned in biotech, pharmaceutics, and optoelectronic fields.

Mechanics of Robust and Reversible Adhesion in Biology - What can We Learn From Nature About Hierarchical Materials?

Huajian Gao
Division of Engineering, Brown University, U.S.A.

Gecko and many insects have evolved specialized adhesive tissues with multi-level structural hierarchy that allows them to maneuver on vertical walls and ceilings. The biological adhesion mechanisms must be robust enough to function on rough surfaces and also easily releasable upon animal movement. How does nature construct such macrosized robust and releasable adhesion devices? How can an adhesion system designed for robust attachment simultaneously allow easy detachment? These questions have motivated the present investigation on mechanics of robust and releasable adhesion. On the question of robust adhesion, we introduce a multiscale hair model, which assumes self-similar fibrillar structures at multiple hierarchical levels mimicking gecko's spatula/seta structure, to show that structural hierarchy plays a key role in robust adhesion: it allows the work of adhesion to be exponentially enhanced with each added level of hierarchy. We demonstrate that, barring fiber fracture, the hierarchical hairs can be designed from nanoscale and up to achieve flaw tolerant adhesion at any length scales. However, consideration of crack-like flaws in the hairs themselves results in an upper size limit for the flaw tolerant design. On the question of releasable adhesion, we show that the strongly anisotropic biological tissue results in adhesion strength strongly varying with the direction of pulling. We perform finite element calculations to show that the adhesion strength of a strongly anisotropic attachment pad exhibits essentially two levels of adhesion strength depending on the direction of pulling, resulting in an orientation-controlled switch between attachment and detachment. These findings not only provide a theoretical foundation to understand adhesion mechanisms in biology but also suggest possible strategies to develop novel adhesive materials for engineering applications.

Clinical Implication of ReadMyHeart Handheld ECG Recorder on Cardiovascular Health Management

Kang-Ping Lin
Department of Electrical Engineering,
Chung-Yuan Christian University, Taiwan

The purpose of the study is to evaluate the accuracy and feasibility of using internet/modem transmission of new generation cardiac event recorder, ReadMyHeart Handheld ECG (RMH), to monitor cardiovascular health. Subjects from three different groups are selected and provided with RMH to record their ECG data on a regular basis or whenever necessary. Data collected are transmitted back to the center by internet and/or modem and categorized by the technicians into three types: Normal, Abnormal and Noise (Signal not interpretable). It is followed by further interpretation cardiologists. A total of 112 subjects were involved in the study transmitting 1780 ECG data with 100% transmission success rate. The ratio for Normal, Abnormal and Noise are 72.37%, 12.86% and 12.88% respectively. The majoring finding of abnormal data was arrhythmia without significant ST-T change. There are a total number was 265 abnormal cases including atrial premature contraction, ventricular premature contraction, sinus arrhythmia, atrial fibrillation, complete right bundle branch block, complete right bundle branch block with ventricular premature contraction and sinus tachycardia. The study showed good results in using RMH to collect, send and monitor ECG data. This method not only bridges the gap between the patient and the doctor but also improves the timing and quality of care. Further indication of use could be extended into monitoring and evaluation of drug therapy.

The Study of Magnetic Biodegradable Bioglass as Thermoseed for Cancer Hyperthermia

Feng-Huei Lin
Institute of Biomedical Engineering, National Taiwan University, Taiwan

The malignant tumor (cancer) is a common disease, because there are many carcinogens existing in the surrounding environment. Many therapeutic methods have been developed for cancer treatment which included surgery, radiotherapy, and chemical medicine. But none among those was matched to clinical satisfaction. In recent years, due to well-developed medical instruments and biotechnologies, some new methods have been developed for cancer treatment. For example, immunotherapy, hyperthermia, etc. All turned out to be the most popular research topics for cancer therapy.This research is aimed to develop a biodegradable bioglass on cancer hyperthermia. We choose bioglass as the basic material and in cooperate the magnetic powder into the bioglass by sol-gel method. The hysteresis loop will be used to analyze the magnetic and thermal-induced property. After exposure to an alternating magnetic field, we can find out that the temperature of the material increased due to hysteresis loss. The results of cytotoxicity tests showed no harmful to the cell adhesion, proliferation and differentiation. If the bioglass with surface modification injected into human body in the future, it can be a new choice for hyperthermia to kill tumor cell more efficiently and without doing harm to the human body.

Strategies for Designing Delivery Systems for Macromolecular Drugs

Victor C. Yang
College of Pharmacy, University of Michigan, Ann Arbor,USA

All anticancer drug therapies are beset by two bottleneck limitations. The first is the absence of a preferential action of the drug on tumor cells as opposed to normal tissues. While interaction with desirable tumor target would result in therapeutic functions of the drug, exposure to inadvertent normal cells would lead to toxic side effects. The second limitation arises from the lack of ability of most drugs to cross the cell membrane, especially for large and hydrophilic drugs like proteins and DNAs. Currently, effective delivery of therapeutic compounds can only be achieved when the molecules are small (typically less than 1,000 Daltons) and hydrophobic. Yet, large drugs like proteins and genes are considered to be far more desirable anti-tumor agents, due to their unmatched reaction specificity and efficiency. At present, no existing drug by itself could overcome these two limitations, and hence a variety of delivery systems were designed to accommodate such needs; all with the same milestone goal of achieving maximum drug efficacy and minimum drug-induced toxicity.

Computational Haemodynamics and Its Clinical Applications

Xiao Yun Xu
Department of Chemical Engineering, Imperial College London, UK

Local haemodynamics are an important factor in cardiovascular diseases, such as atherosclerosis, aneurysm and valvular stenosis. Recent advances in medical imaging, computerised image processing, and computational mechanics now make it possible to simulate pulsatile blood flow in anatomically faithful arterial models derived from non- invasively acquired angiographic images. Over the last decade, there has been a rapid surge of interest in combining computational fluid and solid mechanics with in vivo imaging techniques for more detailed investigation of haemodynamics in specific arteries of individual subjects or patients. This presentation will address a number of issues that are associated with subject- specific modelling of blood flow in the cardiovascular system. Examples of clinical applications of the modelling tool will be shown.

A Remote Control System for Rat Navigation in Complicated Environment

Xiao-xiang Zheng
Zhejiang University, P.R.China

A remote control system has been developed to deliver stimuli into the rat brain through a wireless micro-stimulator for animal navigation in complicated environment. The system consists of the following main components: an integrated PC control program, a transmitter and a receiver based on Bluetooth (BT) modules, a stimulator controlled by C8051 microprocessor, as well as an operant chamber and an eight-arm radial maze. The micro-stimulator is featured with its changeable amplitude of pulse output for both constant-voltage and constant-current mode, which provides an easy way to set the proper suitable stimulation intensity for different training. The system has been used in behavior experiments for monitoring and recording bar-pressing in the operant chamber, controlling rat roaming in the eight-arm maze, as well as navigating rats through a 3D complicated environment. The results indicated that the system worked stably and that the stimulation was effective for different types of rat behavior controls. In addition, the results showed that stimulation in the whisker barrel region of rat primary somatosensory cortex (SI) acted like a cue. The animals can be trained to take different desired turns upon the association between the SI cue stimulation and the reward stimulation in the medial forebrain bundle (MFB). The system has shown great potential in useful real-world applications, such as search and rescue in areas of urban destruction and landmine detection.

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REPORTS FROM THE SECRETARY

I would like to thank my predecessor, Dr. Arthur Mak, from whom I inherited many assets accumulated during his term as the Secretary for the WACBE Steering Committee. It has been a great honor for me to continue this work in service of our WACBE members.

I am proud to report to you on the successful growth of WACBE since its formation. As of December 3, 2007, we have one hundred eighty two (182) paid members. Our fellow members include 25 Life Members, 107 Regular Members and 50 Student Members. We are distributed geographically all over the world: Mainland China (68), USA (43), Taiwan (35), Hong Kong (21), Singapore (6), UK (5), Australia (2), Japan (1), and Canada (1). We are working to expand our membership so please introduce WACBE to your colleagues and encourage them to join us as members. A Membership Application Form is enclosed in this packet. Please feel free to make copies and distribute them to potential members. The form can also be downloaded at the WACBE website www.wacbe.org (click on "membership"). You should also find your membership certificate in the packet. If you have not received your membership certificate please let us know. We hope you will display your membership certificate and share this Newsletter with your colleagues.

This year marks our first attempt to collect annual membership dues. WACBE only started to collect membership dues in 2007 even though some members joined WACBE in earlier years. So it is time to pay your annual dues for Year 2008 for all members (except for the Life Members). The deadline for renewal is January 31, 2008**.** The Membership Renewal Form is enclosed; please fill in the form and send it back to me. The renewal form can be also downloaded at www.wacbe.org (click on "membership"). We are working on an online database system for membership management. We want to completely solve all technical pitfalls before announcing this function. Hopefully, we will be able to use the online system for membership renewal by the time you receive the newsletter in the mail. Please pay attention to the announcements on our website (www.wacbe.org). The WACBE Bylaws need approval from our members. The draft Bylaws are available online at www.wacbe.org (click on "Bylaws"). Please read the document and send your comments to info@wacbe.org by February 15, 2008. If no objections are received the Draft Bylaws will be adopted into the Bylaws on March 1, 2008.

WACBE would like to issue the Call for Nominations for the 2009 election of Council Members. Five (5) positions will be filled. They are: President-Elect (2009-2011), Treasurer-Elect (2009-2011), and three (3) Councilors (2009-2013). Please submit your nominations by May 1, 2008 to Savio L-Y. Woo, PhD, DSc, WACBE President, 405 Center for Bioengineering, 300 Technology Drive, Pittsburgh, PA 15219, ddecenzo@pitt.edu (email).

Best wishes to you and WACBE for a wonderful 2008!

Zong-Ming Li, Ph.D.
WACBE Secretary

4th WACBE World Congress on Bioengineering

26 - 29 July 2009, Hong Kong

The World Association for Chinese Biomedical Engineers (WACBE) will hold its 4th WACBE World Congress on Bioengineering 2009 in Hong Kong, China, from 26 to 29 July 2009, hosted by The Hong Kong Polytechnic University with supports from many other institutions and professional societies**.**

The Association organizes biannual World Congresses. The first congress was held at Taipei in December 2002; the second was held at Beijing in September 2004; and the third was held at Bangkok in July 2007. All the three congresses brought together many biomedical engineers from all over the world to share their experiences and to exchange views on the future development of biomedical engineering. The 4th WACBE World Congress in Hong Kong will continue to offer such a networking forum.

Topics to be presented in the Congress will cover all related areas in bioengineering. Special symposia will be arranged in the following tracks:

- Biomedical Imaging and Health Informatics
- Biomaterials, Tissues Engineering and Regenerative Medicine
- Biosensors, Bionanotechnology and Medical Devices
- Cellular, Genomics and Biomolecular Engineering
- Clinical Engineering in Human Performance, Sports Medicine and Sciences, and Rehabilitation
- Pharmaceutical Science & Biotechnology

Apart from the scientific programs including invited plenary and keynote speeches, special symposia, free paper presentations, and product exhibition, student activities and social programs are also available for attendees and their guests. Awards for the best papers for innovation will be set up to young investigators.

Participants at the congress will include young and experienced biomedical engineers, physicians and scientists working in research institutions, universities and hospitals, medical device manufacturers, as well as students in this field. The WACBE World Congress 2009 will be a memorable event for colleagues and friends from all over the world to establish friendship, to promote academic exchanges at an international level and to promote the interests of biomedical engineers.

On behalf of the Organizing Committee of WACBE World Congress 2009, we warmly invite you and your colleagues to attend this World Congress. We look forward to seeing you in Hong Kong in 2009.

Important Dates

Deadline for paper/abstract submission: 31 Jan. 2009
Date for notification of paper/abstract acceptance: 15 March 2009
Date for Early Bird Registration: 30 April 2009
Date of Congress: 26-29 July 2009

Congress Secretariat

WACBE2009 Secretariat
Department of Health Technology and Informatics
The Hong Kong Polytechnic University
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(President's Message, continued from page 1)

Subsequently we formed a steering committee to work on the formation of the Association as well as planning for a second world congress. Also, the Association's operational guidelines were written through several meetings. Our second World Congress took place in Beijing, China, September, 26 - 29, 2004, with Dr. Depei Liu, and Dr. Y. C. Fung as Honorary Presidents. Over 600 delegates attended the meeting. During the General Assembly, the Association was officially formed and the guidelines of WACBE were adopted. Later on, elections were held and now we are formalized.

The Association also held our Third World congress in Bangkok, Thailand, between July 9 -11, 2007. The details of the important Congress are described in this newsletter. Our meeting also caught the attention of Her Royal Highness Princess Maha Chakri Sirindhorn, as she hosted a dinner in her palace for some of our delegates.

All three World Congresses were extremely successful and gave us numerous opportunities to make personal connections, to share the newest research findings as well as to encourage newcomers in our field and to embark on their careers. It is a pleasure to report that our next (4th) World Congress will be held in Hong Kong, China, between July 26 -29, 2009, with our President - elect, Dr. Arthur Mak, as our host.

It is guaranteed to be another exciting gathering. I hope to see all of you there.

Although WACBE is in its infancy, it has great potential to become one of the largest, most influential organizations in our field of bioengineering/biomedical engineering. But, for us to get there will require all members to participate fully and enthusiastically as well as to encourage students and young professionals to join us so that our goals may be accomplished. I look forward to having all of us working together!

Dr. Savio L-Y. Woo, Ph. D., Sc. D.
Founding President