



WAC 2014

Waikoloa Hilton Village, Kona, Big Island of Hawaii

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Congress Theme: **Emerging Technologies** for a New Paradigm in
System of Systems Engineering

Technical Sponsor: IEEE SMC Society

WAC 2014 PANEL SESSION

**TechnoBiology: Engineering Technologies
Serving Medicine and Related Concerns**

Wednesday August 6, 2014

10:20-11:50 AM

Chair: James M. Tien, Ph.D., NAE, Dean of Engineering,
University of Miami, USA

1. **John Floyd, MD, Neurosurgeon, University of Texas Health Sciences Center, San Antonio, USA.**



A Dual Phase 1/2, Investigator Initiated Study to Determine the Maximum Tolerated Dose, Safety, and Efficacy of Rhenium Nanoliposomes (^{186}RNL) in Recurrent Glioblastoma. At the University of Texas Health Science Center San Antonio (UTHCSA) and Cancer Treatment and Research Center (CTRC), The Department of Neurological Surgery, Radiology and Oncology teamed together to develop a de novo therapy for patients with malignant brain tumors utilizing engineered nanoparticles, a novel radio-nucleotide, and state of the art convection flow catheters implanted into the tumor using the latest neurosurgical techniques.

2. **Kazuo Kiguchi, Ph.D., Kyushu University, Japan.**



Developing and Applying Technology to Human Assist Systems. Human assist systems such as power-assist robots are expected to play an important role to enrich human daily life in these days. The latest technology on the human assist systems for

physically weak persons is presented. The concept of perception-assist is also introduced in the presentation.

3. Delbert Tesar, Ph.D., University of Texas, Austin, USA.



Marriage of Man and Machine The goal is to maximize human performance under a very wide range of conditions and functions in conjunction with ever-increasing intelligence in Electro-Mechanical Systems (EMS). This would be accomplished by improving the mutual awareness (performance maps/envelopes) of the man and machine to enable short-term (actions) and long-term (mission plans) functions to be carried out with minimum uncertainty relative to the available resources and the desired objective.

4. Takeshi Yamakawa, Ph.D., Kyushu Institute of Technology, Japan, and Dr. Hiroshi Nakajima, OMRON. Japan.



Important Point for Engineers in the Biomedical Engineering Research (Yamakawa)

The presenter drew up and led the national project which includes engineers and neurosurgical doctors engaging in epilepsy. Our target of research was to develop the minimally invasive surgical tools to inactivate the epileptogenic focus. It was successful for monkeys, thus successful from the viewpoint of engineering, but it was not successful from the viewpoint of medical science, because it could not be developed to human beings because

of the budget. Therefore we have to make a plan including clinical research considering research deadline and budgets.

The importance of daily measurements and personalized feedbacks (Nakajima)

It has been urgently required to prevent lifestyle related diseases such as obesity, hypertension, and diabetes in all over the world. Because of their name and causes, lifestyle modification should be the primary treatment which should be continuously supported. Daily measurements of lifestyles and vitals will provide rich and important information for taking care of them.

5. James M. Tien, Ph.D., University of Miami, USA.



On Technobiology: A New Frontier for Engineering. Engineering has and will continue to have a critical impact on healthcare; the application of technology-based techniques to biological problems can be defined as technobiology. More importantly, nearly every discipline in engineering -- from industrial engineering to solid state electronics – has potential technobiology applications, including a system-of-systems approach to healthcare, vital sign sensors, imaging, tissue printing, and DNA sequencing. In short, technobiology can be considered to be a challenging new frontier for engineering.

6. Bijan Tadayon, Ph.D., J.D., Z-Advance Computing, Potomac, MD, USA. (VIA SKYPE®)



IP/Patent Issues for Biological/Biotech Research and Products. We will present some examples. The patentability of biological products is discussed. It is an extremely difficult problem, and nobody has the complete picture and correct answer, yet. People are polarized on this issue. It is also an evolving field. For example: Who owns the IPs? Is the monopoly for critical medicine right? What is the public policy? What other countries think about these issues? The economic aspect of the field is discussed. Does the size of a company matter more in this field, for competition in the market, research funding, and IP protection?

7. Saeid Tadayon, Ph.D., J. D., Z-Advance Computing, Potomac, MD, USA. (VIA SKYPE®)



IP/Patent Issues for Medical Diagnosis, Surgical Methods, Medical Devices, and Procedures. We will present some examples. The patentability of the products is discussed. In particular, we discuss the medical treatment methods. Some of the problems with this field are discussed.