Stephenson School of Biomedical Engineering and
Institute for Biomedical Engineering, Science and Technology
Present

BRAIN CANCER CHIP FOR PRECISION MEDICINE

METIN AKAY, PH.D.

Founding chair, Biomedical Engineering Department
John S. Dunn professor, University of Houston

1:30 p.m.
Friday, December 6, 2019
Gallogly Hall, Room 127

BIO:

Metin Akay received his B.S. and M.S. in Electrical Engineering from the Bogazici University, Istanbul, Turkey in 1981 and 1984, respectively and a Ph.D. degree from Rutgers University in 1990. He is currently the founding chair of the new Biomedical Engineering Department and the John S. Dunn professor of biomedical engineering at the University of Houston. Akay's Neural Engineering and Informatics Lab is interested in developing an intelligent wearable system for monitoring motor functions in Post-Stroke Hemiplegic Patients and detecting coronary artery disease. In addition, his lab is currently investigating the effect of nicotine on the dynamics of ventral tegmental area dopamine neural networks.

ABSTRACT:

Glioblastoma Multiforma is the most common and malignant primary brain tumor in adults because of its highly invasive behavior. The best existing treatment for GBM involves a combination of resection, chemotherapy and radiotherapy, and has a very limited success rate with a median survival rate of less than 1 year. The aim of our project is to develop a novel 3D brain cancer chip as a tool for high-throughput drug screening in order to determine personalized treatment plans for individual brain cancer patients in a matter of weeks. The brain cancer chip we have developed is composed of photopolymerizable poly(ethylene) glycol diacrylate hydrogel, and integrates a microwell array with microfluidic channels. This chip allows for the simultaneous administration of up to three drugs while establishing a concentration gradient that supplies a unique mixture of drugs to each microwell. Therefore, our brain cancer chip provides a sustainable, high-throughput 3D tissue formation platform for multi-drug testing. Our preliminary studies strongly encourage us to utilize the brain cancer chip to determine the optimal combination of anticancer drugs, using only a tiny tissue sample collected from a patient by biopsy, to most effectively treat GBM in patients in a shorter period of time. The chip will also be useful and cost-effective for high-throughput screening of cancer drugs and assessment of treatment responses, and could pave the way for precision medicine in cancer treatment.

In collaboration with Drs. H Xia, N Avci, YM Akay.

GALLOGLY COLLEGE OF ENGINEERING
STEPHENSON SCHOOL OF BIOMEDICAL ENGINEERING
The UNIVERSITY *of* OKLAHOMA

GALLOGLY COLLEGE OF ENGINEERING
INSTITUTE FOR BIOMEDICAL ENGINEERING, SCIENCE AND TECHNOLOGY
The UNIVERSITY *of* OKLAHOMA