COINS Seminar #47

【Date】Aug/28/2019（Wed.）15:00～16:30（Registration Open at 14：30）

【Venue】Innovation Center of NanoMedicine (iCONM) 3F 3001 Meeting room

【Registration】URL: https://www.cis-trans.jp/coins_seminar47/index.html

◆Part.1　15:00～15:45

Title：Cell Lego

Abstract：

Techniques to control the spatiotemporal organization of cells are primarily limited to homogeneous cell populations. We have previously explored synthetic single stranded DNA-PEG-lipid conjugates as a mean to introduce artificial binding capacity to cells by exploiting specific hybridization of DNA. DNA is an attractive ligand partly because of its specific binding affinity and the capacity for a practically unlimited variety of binding interaction schemes. This technology was extended to a variety of applications including the co-localization of unlike cell types and printing of cell patterns on 2D substrates. In this presentation, its potentials in regenerative medicine and biomedical devices will be discussed.

Speaker：　Hiroo Iwata, Dr. Eng.

Affiliation：　Kyoto University

Position：　Manager, Strategy Research Support Section of Center of Innovation Program, Kyoto U.

＜CV＞

1980~1982	Research associate at the Department of Material Science, University of Florida.
1983~1994	Research scientist of National Cardiovascular Center Institute, Osaka
1994~1999	Associate Professor, Research Center for Biomedical Engineering, Kyoto U.
1999~	Professor, Department of Reparative Materials, Institute for Frontier Medical Sciences, Kyoto U.
2011~2015	Director of Institute for Frontier Medical Sciences, Kyoto U.
2015~	Manager, Strategy Research Support Section of Center of Innovation Program, Kyoto U.

＜Key words＞

Biomaterials, Islet transplantation, Devices for interventional neuroradiology

◆Part.2　15:45～16:30

Title：Isolation of Rare Cells: Toward Noninvasive Diagnostic

Abstract:
In this lecture, I will discuss the recent developments in our group related to the isolation of circulating tumor cells (CTCs) and circulating fetal traophoblasts for noninvasive diagnostic tools. We have employed a novel one step electrospinning process to fabricate poly(ethylene oxide) (PEO)/ poly (3,4- ethylenedioxythiophene): polystyrenesulfonate (PEDOT:PSS) core/shell nanofiber structures with improved water resistance and good electrochemical properties. We then integrated a biocompatible polymer coating with three-dimensional (3D) PEDOT-based nanofiber devices for dynamic control over the capture/release performance of rare circulating tumor cells (CTCs), as well as the label-free detection by using organic electrochemical transistors (OECTs). We have demonstrated that these nanofiber mats deposited on the patterned indium tin oxide finger electrodes are excellent candidates for use as functional bioelectronic interfaces for the isolation, detection, sequential collection, and enrichment of rare CTCs through electrical activation of each single electrode. This combination behaved as an ideal model system displaying a high cell-capture yield for antibody-positive cells while resisting the adhesion of antibody-negative cells. Taking advantage of the electrochemical doping/dedoping characteristics of PEDOT:PSS materials, the captured rare cells could be electrically triggered release through the desorption phenomena of PLL-*g*-PEG-biotin on device surface. More than 90% of the targeted cancer cells were captured on the 3D PEDOT-based nanofiber microfluidic device; over 87% of captured cancer cells were subsequently released for collection; approximately 80% of spiked cancer cells could be collected in a 96-well plate. I will also discuss the utilization of multi-photon microscopy for monitoring CTCs in the blood stream. The number of CTCs has been used as an indication for the progress of tumor state. However, how CTCs travel in the bloodstream and how they crossed the endothelial barrier are not known. In our group, we have utilized the multi-photon microscopy to study CTCs noninvasively. Pancreatic cancer cells expressing fluorescence were subcutaneously injected to the earlobes of mice forming solid tumor. When the cancer cells break away from the tumor mass, the cancer cells in blood stream can be monitored. The number of CTCs observed in the blood vessels near the tumor mass increased to a maximum value after five week of inoculation. We also tried to identify a sub population of CTCs such as cancer stem cells (CSCs). The trajectories of CTCs and CSCs were measured and analyzed.

Speaker：Peilin Chen

Affiliation：Research Center for Applied Sciences,
Academia Sinica, Taiwan

Position：Professor/Research Fellow

URL：http://www.rcas.sinica.edu.tw/faculty/peilin.html

＜CV＞

Peilin Chen received his Bachelor degree in Chemistry from National Taiwan University in 1990 and obtained his Ph.D. degree in Chemistry from University of California, Irvine in 1998. He worked as a postdoctoral fellow in the Chemistry department of University of California, Berkeley between 1999 and 2001. Prof. Chen joined Research Center for Applied Sciences, Academia Sinica, Taiwan as an Assistant Research Fellow in 2001. He was promoted to Associate Research Fellow and Research Fellow in 2005 and 2010, respectively. He served as the deputy director of the Research Center for Applied Sciences between 2010 and 2012 and the Chief Executive Officer of the thematic center of Optoelectronic in 2012. Prof. Chen was a visiting Professor in RIKEN and Kyoto University. Prof. Chen has authored or co-authored more than 120 papers in refereed journals and conference proceedings, he has delivered more than 60 invited talks in international meetings and conferences. He organized more than 10 international symposia.

＜Award＞

Research Award for Junior Research Investigators, Academia Sinica, Taiwan (2007)
Ta-You Wu Memorial Award, National Research Council, Taiwan (2007)
Career Development Award, Academia Sinica, Taiwan (2009)

＜Key words＞

Nanofiber, Circulating tumor cell, Bioelectronic, Intravital imaging

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