"The 82th of Stem Cell Biology and Regenerative Medicine Forum"

Date：Jun 24th (Wed) 2015
Time : 18:00 ～ 19:30
Place：Auditorium in 1st Building at Institute of Medical Science in Univ. of Tokyo

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（Internal Speaker）

18:00-18:30 Hiroshi Watarai (Division of Stem Cell Cellomics, Center for Stem Cell Biology and Regenerative Medicine, IMUST)
ImPACT of Serendipiter on Hematology and Immunology

（External Speaker）

18:30-19:30 Keisuke Goda (Professor, Department of Chemistry, Graduate School of Science, University of Tokyo, Program Manager, ImPACT Program, Cabinet Office, Government of Japan)
Serendipiter – a cell search engine that turns serendipity into planned happenstance

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Hosted by Center for Stem Cell Biology and Regenerative Medicine

---Information---

* Please register attendance at the reception desk.
* Next forum (the83rd) will be held on Jul. 31st (Fri) 18:00～ at Tommy Hall
* Please contact tatsu-m@ims.u-tokyo.ac.jp, for Forum speaker recommendations

ImPACT of Serendipiter on Hematology and Immunology

Hiroshi Watarai (Division of Stem Cell Cellomics, Center for Stem Cell Biology and Regenerative Medicine, IMUST)

Fluorescence-activated cell sorting (FACS), a specialized type of flow cytometry, provides a method for sorting a heterogeneous mixture of biological cells into two or more containers, one cell at a time, based upon the specific light scattering and fluorescent characteristics of each cell. A wide range of fluorophores can be used as labels in flow cytometry. Fluorophores, or simply "fluors", are typically attached to an antibody that recognizes a target feature on or in the cell; they may also be attached to a chemical entity with affinity for the cell membrane or another cellular structure. Each fluorophore has a characteristic peak excitation and emission wavelength, and the emission spectra often overlap. Consequently, the technology has applications in a number of fields, including molecular biology, pathology, immunology, plant biology and marine biology. It has broad application in medicine (especially in transplantation, hematology, tumor immunology and chemotherapy, prenatal diagnosis, genetics and sperm sorting for sex preselection). However, potential limitations of FACS include the need for antibodies that target specific proteins; fortunately, large-scale projects such as the Human Protein Atlas are continuously producing antibodies that will enable the isolation of ever more subtypes of cells. Another relevant limitation of FACS is the requirement of a large starting volume, which hampers the isolation of cells from extremely low volume samples such as fine-needle aspirates. Similarly, FACS is neither well suited for the isolation of extremely rare cells because of false positive signals, nor for environmental samples containing extremely heterogeneous cell sizes. Currently, FACS also fails to image the cell to be sorted, thereby preventing the combination of morphological and transcriptomic analyses. Developments in flow imaging-based cytometry may address this problem in the future. The “serendipiter”, next generation cytometry, will give disruptive innovation in hematological and immunological fields.

Serendipiter – a cell search engine that turns serendipity into planned happenstance

Keisuke Goda (Professor, Department of Chemistry, Graduate School of Science, University of Tokyo
Program Manager, ImPACT Program, Cabinet Office, Government of Japan)

Science builds on reproducibility – one of the most fundamental principles of the scientific method under which an experimental test must be reproduced or replicated in order to verify whether a proposed hypothesis is correct. This principle is based on the assumption that the tested system be sufficiently simple so that experimental results can easily be reproduced. Over the past century, physical science has evolved significantly by virtue of "easy" reproducibility. As the system becomes more and more complex (e.g., large molecules, biological cells, and microbes), it is increasingly difficult to achieve reproducibility and the chance of uncovering hidden laws of nature hence decreases, rendering the act of making discoveries more and more serendipitous or accidental.

To address this fundamental problem in science, my interdisciplinary team (through the ImPACT program funded by the Cabinet Office in the Government of Japan) currently works on the development of a cell search engine – the biological analog of a search engine like Google's. This technology known as the "serendipiter" is based on a unique integration of novel methods in photonics, microfluidics, gene engineering, and information technology and is expected to screen target single cells in a large heterogeneous population of cells with high throughput, high specificity, and high sensitivity. Therefore, this technology will turn difficult-to-reproduce biological events into easy experimental tests and hence serendipity into planned happenstance.