Seminars in Biotechnology BTEC 591 & BTEC 691

"Personalized Microfluidics : A Lab-on-chip for MRD"

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Sürekli Eğitim Merkezi (SEM), Management Conference Room

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Dr. Kutay İçöz received the B.Sc. degree in Electronics and Communication Eng. from İstanbul Technical University in 2002. He got his M.Sc. degree from Ohio State University Electrical and Electronics Engr. Department in 2004 and Ph.D. degree from Purdue University Biomedical Engr. Department in 2010. Then he joined Harvard Medical School and Massachusetts General Hospital Department of Neurosurgery as a postdoctoral research fellow. Between 2012 and 2014 he worked as a senior engineer at Intel Corporation Assembly & Test Technology Development Division. In 2014 he joined to Abdullah Gül University as a faculty of Electrical-Electronics Engineering. His research focuses on novel applications of micro/nano technology on biology and medicine, biosensors, point of care devices and biomedical instrumentation.

Abstract

In this talk a time and cost-efficient microfluidic chip for screening the leukemia cells having three specific antigens will be presented. In this method, the target blast cells are double sorted with immunomagnetic beads and captured by the 3rd antibody immobilized on the gold surface in a microfluidic chip. The captured blast cells in the chip were imaged using a bright-field optical microscope and images were analyzed to quantify the cells. First sorting was performed with nano size immunomagnetic beads and followed by 2nd sorting where micron size immunomagnetic beads were used. The low-cost microfluidic platform is made of PMMA and glass including micro size gold pads. The developed microfluidic platform was optimized with cultured B type lymphoblast cells and tested with the samples of leukemia patients. The bone marrow samples of leukemia patients receiving chemotherapy treatment were tested both with the developed microfluidic platform and the flow

cytometry. A 99% statistical agreement between the two methods shows that the microfluidic chip is able to monitor the decrease in the number of blast cells due to the chemotherapy. The experiments with the patient samples demonstrate that the developed system can perform relative measurements and have a potential to monitor the patient response to the applied therapy and to enable personalized dose adjustment.