

Principal Researcher	Atsushi Ikai		Number of Researchers	3	
Research Institution • Department • Title	Professor, Life Science, Tokyo Institute of Technology		Location of Institution	Yokohama	
Title of Project	Time lapse nano-analysis of single cell components: Development of Harvesting, Identification and Injection Methods of Functional Molecules				
Abstract of Research Project	We will develop a new method of cellular level surgery based on the nano-mechanical handling technology of single molecule proteins we have been developing using the atomic force microscope. The application of the new method will be injection of genomic DNA into a single cell, extraction of mRNA and proteins from a live cell and identification of the extracted molecules. The proposed method has advantage over the conventional methods using glass micropipettes in its ability to continuously harvest nucleic acids and proteins from a live cell without destroying it, thus enabling us to collect data concerning time dependent changes in the physiological and biochemical states of a particular live cell. By the development of the method, many of the drug tests currently done using animals may be replaced by those using human cells. The result will be more accurate assessment of toxicity and side effects of test drugs on human. In the regenerative medicine, the cell surgery method will be applied to the stem cells in early stage of culture to replace certain genetic defects with healthy genes and new organs will be created without the genetic defects of the donor of stem cells who is most likely the recipient of the organs.				
References	<ol style="list-style-type: none"> 1. Osada,T., Uehara,H., Kim,H. and Ikai, A., mRNA analysis of single living cells, Journal of Nanobiotechnology Vol. 1 pp. 1-8 (on line). 2. Atsushi Ikai "Biomolecular Devices" pp. 203-212. "Drug Delivery Systems" pp. 213-224. In The Frontline of Nanotechnology (Japanese) (2003) Tokyo Kyoiku Joho Publishing. 				
Term of Project	Fiscal years 2003-2006 . (4years)				
Budget Allocation (in thousand of yen)	FY2003 28,300	FY2004 21,600	FY2005 15,800	FY2006 15,800	FY2007 TOTAL 81,500
Homepage Address	http://www.ikai.bio.titech.ac.jp/index.html				