Discovery and Development –

Strengthening basic and pharmaceutical research

Exciting advances in biomedical science – driven by understanding of the human genome and cell biology – are leading to unprecedented changes and opportunities for life scientists from government and academic laboratories to pharmaceutical and biotechnology companies.

Translating this knowledge into future therapies, however, will be tied in large part to the availability of new analytical technologies and bioprocessing tools. BD helps improve the efficiency and quality of life science research by offering a powerful and growing portfolio of tools that focuses on cell analysis in the "age of biology."

The *BD FACSAria* II Cell Sorting System, launched in 2008, is the next-generation high-performance cell sorter with improvements that make cell sorting easier and more accessible to life science researchers working across a wide range of advanced applications.

Transforming cellular analysis

BD is a pioneer and leader in the field of flow cytometry for cellular analysis. The Company's instrument portfolio includes the *BD FACSAria* II System, the platform of choice in research labs around the world performing a broad range of cell sorting applications.

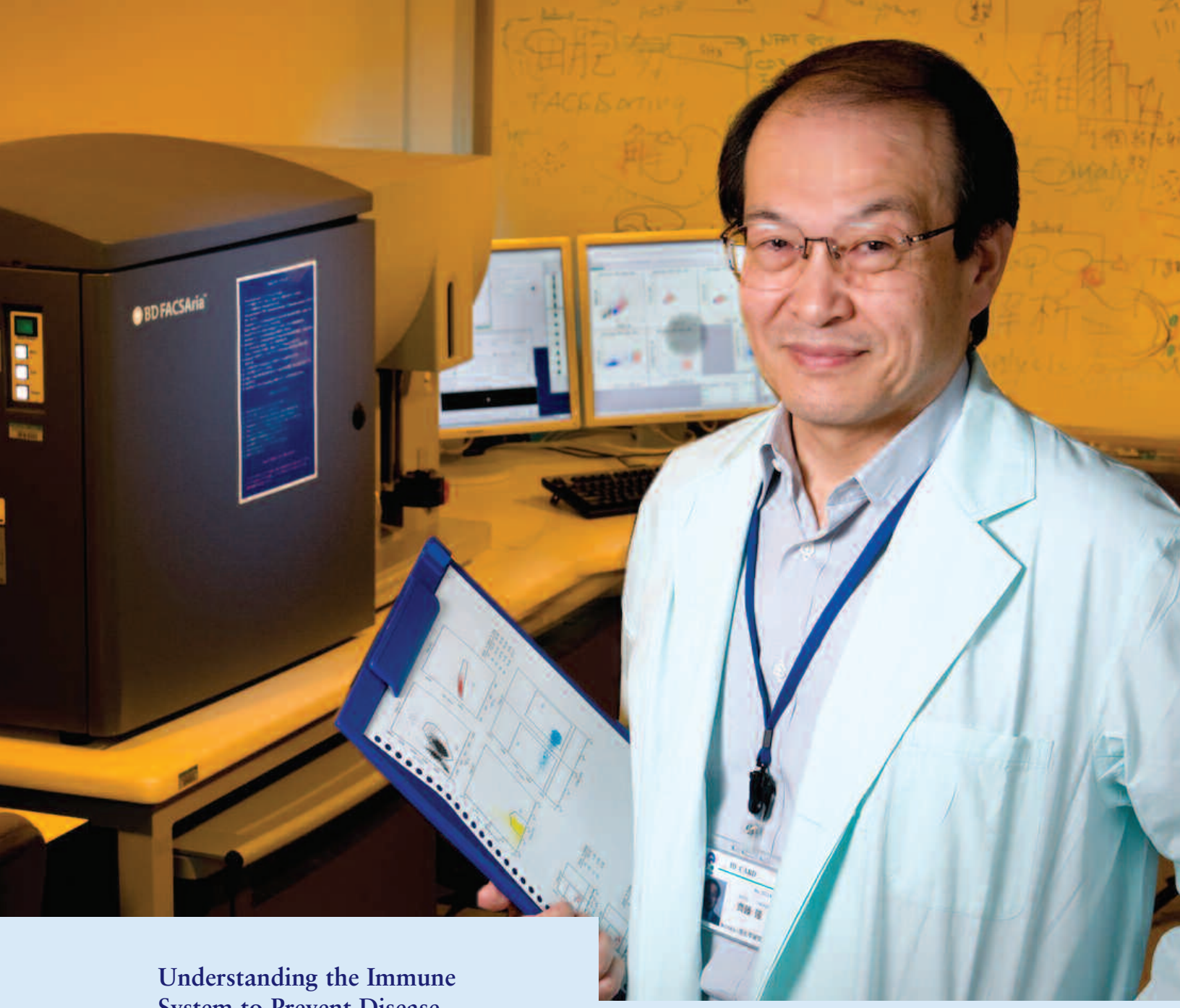
To meet the specific needs of today's life science researchers working with advanced applications, BD now offers the *BD Influx* Cell Sorter, which became part of BD's product portfolio through the 2008 acquisition of Cytopeia. An open, configurable cell-sorting platform that can be optimized for research, application and environmental requirements, the *BD Influx* System is especially suited for bioprocessing, cell therapy research, marine biology and stem cell research.

The *BD Influx* Flow Cytometry System offers leading-edge life science researchers a configurable platform that can be optimized to meet their unique application-specific requirements in such diverse areas as stem cell research, cell therapy research, drug discovery and marine biology.

Flow cytometry is a powerful platform and an important tool in stem cell research. BD's expertise in hematopoietic stem cell research is driving ongoing development of other tools that optimize workflow, standardize procedures and streamline experiments. This expanding portfolio of state-of-the-art research instruments and tools reflects BD's position as a world leader in applying innovative tools and expertise to solve complex research problems. These solutions may ultimately help life scientists discover new lifesaving and life-improving therapies.

Advancing research efficiency

The high cost of drugs – a key issue for patients and entire economies – can be attributed to a big increase in R&D and clinical trials costs.



Understanding the Immune System to Prevent Disease

Better understanding the mechanism to trigger an immune response could help scientists prevent or control many deadly or debilitating diseases – from AIDS to rheumatoid arthritis to allergy.

The RIKEN Research Center for Allergy and Immunology is the only government-supported institute for immunology and allergy in Japan and one of only a few in the world. The Center's Laboratory for Cell Signaling studies the function and formation of T cells and signal regulation, which play a central role in cell-mediated immunity.

Since the human immune system uses T cells to recognize and defend against external pathogens, the laboratory utilizes flow cytometry systems, such as the *BD FACSAria* Cell Sorter, for many applications. Monitoring various types and stages of T cells is one important application. Another is following the expression of a specific cloned gene. Insights derived from this work not only help RIKEN scientists understand the immune system, but they may also lead to new lifesaving therapies.

"In our flow cytometry laboratory, we work closely with BD engineers to make sure all cell sorters and analyzers are working optimally," says the laboratory's group director Dr. Takashi Saito. "We have also worked with BD to test and develop new technologies."

BD provides a growing portfolio of reagents for cellular characterization and sorting that, when coupled with BD's advanced flow cytometry platforms, helps improve the efficiency and productivity of drug and vaccine research and development.

A case in point is *BD Phosflow* Reagents, used by scientists to understand and analyze how a particular drug under development can lessen the effects of disease by inhibiting critical cell signaling pathways. With *BD Phosflow* Reagents, scientists can analyze the phosphorylation state of multiple proteins in a single cell to help enhance the discovery of new pharmaceutical therapies.

BD is also expanding its line of drug metabolism and toxicity assays for pharmaceutical, biotechnology and contract research organizations. The Company's high-quality tests quickly help researchers determine the risks of potential drugs long before they reach patients.

An important part of cellular research is creating a laboratory environment for cells to grow that more closely resembles the one they encounter inside the body. BD serves as a premium supplier of advanced cell surfaces and coatings. Through acquisitions and internal development, BD has expanded its portfolio and strengthened its position as a leading provider of defined surfaces used in drug discovery, academic research and cell therapy development.

Enhancing production of biological medicines

Beyond the research lab, makers of biopharmaceuticals, bioengineered vaccines and stem cell therapies struggle to produce new medicines efficiently. BD helps customers meet this challenge by increasing their production yields with safer cell culture products and services. In fact, cell culture media supplements from BD's Advanced Bioprocessing product platform are currently used in the manufacture of more than 30 marketed biological medicines.

To help further enhance the safety of biological medicines, BD plans to manufacture cell culture media supplements in a state-of-the-art, dedicated animal-free/antibiotic-free facility in Miami, Florida. This new *AF*^{2} Facility also will expand the Company's product portfolio to include chemically defined basal cell culture media. As a result, BD will offer customers a complete solution: yield-enhancing, fully supplemented, easy-to-use cell culture media that meet or exceed current regulatory requirements.

BD's Advanced Bioprocessing cell culture media products are currently used to enhance the production of biopharmaceuticals, cell therapy products and bioengineered vaccines.

BD helps improve the efficiency and quality of life science research by offering a powerful and growing portfolio of tools that focuses on cell analysis in the "age of biology."

BD produces hundreds of custom flow cytometry instruments, such as the *BD LSR* II System, which are uniquely configured to meet customer requirements via the BD Special Order Research Products program.