PHARMACEUTICAL INDUSTRIES IN TOYAMA

Profile (outline of Toyama Prefecture)
Toyama prefecture is located near the center of Japan and is approximately the same distance from the three largest cities in Japan—Tokyo, Nagoya, and Osaka. Excellent highways and easy access to and from the airport allow you to easily take a one-day business trip to any of these three cities and insures that you never miss out on important business opportunities.

Toyama prefecture has been an industrial area full of variety along the Japan Sea coast for a long time because of its high-quality work force and abundant supply of electricity and water. In recent years, we have been program emphasizes advanced technology such as mechatronics, new materials, and biotechnology. New information and design industries as part of our Brain Location Program are also under development.

PHARMACEUTICAL INDUSTRIES

1 Highly esteemed production base of medical products
Toyama’s pharmaceuticals has a more than 300 years long history and tradition. The pharmaceutical companies in Toyama prefecture have updated
equipment, and manufacture quality secured pharmaceuticals, strictly based on Good Manufacturing Practice (GMP).

There are approximately 100 manufactures and over 100 factories in Toyama in terms of pharmaceutical products. These companies include manufactures of specialized agents, generic drugs, self-medication products and drug-on-deposit products, as well as manufactures that focus on new drug development. Especially, special preparations such as poultices, ointments or eye drops are produced by highly-developed pharmaceutical technology. Furthermore, industries relating to pharmaceutical industry, such as container, packaging and printing are also developed well. Therefore, Toyama prefecture acquires a steady reputation as medicine manufacturing base in Japan.

Due to the revision of the Pharmaceutical Law in April 2005, complete outsourcing of the manufacturing of pharmaceutical products has become possible. Production plants in Toyama prefecture are actively investing their equipment, aiming to expand contracted manufacturing, and pharmaceutical industry in Toyama is expected to make great progress.

Trends in production values for pharmaceuticals made in Toyama Prefecture

($ bil)

Source: Ministry of Health, Labour and Welfare

【Other statistical materials】
○ Value of pharmaceutical production (per resident): 240,000yen
2 Variety of experimental and research institutes and organizations

In Toyama prefecture, public institutions are making efforts to improve their research and development system. Industry, academia and government are cooperating to promote research on the discovery and development of new drugs.

Toyama prefecture has the only prefectural pharmaceutical research institute and prefectural medicinal plants research center in Japan. They work on pharmaceutical research for traditional medicines, technical instructions to pharmaceutical companies, cultivation and research of medicinal plants.

Director General of the Toyama Prefectual Institute for Pharmaceutical Research is Doctor Kiyoshi Takatu, who is very famous for the discovery of Interleukin-5 (IL5). He is also professor of ‘Department of Immunobiology and Pharmacological Genetics’ in Graduate School of Medicine and Pharmaceutical Science for Research in University of Toyama.

【Toyama Prefectual Institute for Pharmaceutical Research】
- Drug development through natural medicine, biotechnology and natural research
- Quality evaluation of pharmaceutical product
- Drug formation and pharmaceutical research
[Medicinal Plants Research Center]
- Establishment of cultivation technologies of medicinal plants
- Research into process control methods and quality testing of crude medicine

Toyama Prefectual Institute for Pharmaceutical Research

Research Division of Pharmacy and Pharmacology
- Development and research of pharmaceutical resources and new medicines
- Testing and research of efficacy and safety of medicines
- Pharmaceutical research of medicines

Research Division of Biotechnology and Traditional Drugs
- Development and research of new traditional medicines
- Development and research of applied biotechnological products
- Research on physiological activities of biotechnological traditional medicines

Testing Division of Pharmacy
- Development and research of pharmaceutical testing and testing methods
- Drug manufacturing approval reviews
- Open laboratory

Medicinal Plants Research Center
- Testing on cultivation methods and preparation and processing methods for medicinal plants, as well as quality testing
- Dissemination of cultivating medicinal plants, and supplying seeds and seedling of medicinal plants
- Dissemination of information about medicinal plants, and managing the Garden of Medicinal Plants Specimen
The University of Toyama was reorganized October 2005 and has recently started the reorganization of education and research by integrating three universities as one. The new university contains eight faculties, an institute and a hospital: Humanities, Human Development, Economics, Science, Medicine, Pharmacy and Pharmaceutical Science, Engineering, Art and Design, the Institute of Natural Medicine, and the University Hospital.

The Philosophy and Goal of the new university are as follow: University of Toyama will uphold a global standard of education and research integration with life sciences, natural sciences, arts, and social sciences as a university open to the regional community and to the world. The University will nurture our students with a strong sense of mission and creativity. We will make significant contributions to the local, regional and international community, and will promote the harmonious development of science, art, and culture, and human society.

● **Endowed chair [Department of Immunobiology and Pharmacological Genetics]**

In April 2007, “Department of Immunobiology and Pharmacological Genetics” has established in “Graduate School of Medicine and Pharmaceutical Science for Research”, promoting the researches to find natural products regulating the immune system, by using biotechnology.

The professor of the “Department of Immunobiology and Pharmacological Genetics” is Doctor Kiyoshi Takatu, who is very famous for the discovery of Interleukin-5 (IL5), substance related to strengthens and weakens the function of the immunity. In this department, they carry out research about clarification of the transmission system which is important for immune response related to pathogen and allergen in human body, and search for natural products control the transmission system.

● **Institute of Natural Medicine**

Institute of Natural Medicine aims to contribute the evaluation of traditional medicines scientifically using high technology that have been developed remarkably in late years, for constructing a new medical and pharmaceutical system with harmonization between the Eastern and Western medical systems, and to establishing holistic medical cares including the maintenance of natural
Institute of Natural Medicine promotes the following principal subjects such as 1) the ensuring and preserving of natural medicinal resources, 2) the fundamental researches of medical and pharmaceutical sciences, and harmonization of the Eastern and Western medical systems, 3) the establishment of scientific diagnosis and medical treatment in the system of Kampo medicine, and the nurturing of people who will be engaged in Kampo medicine, 4) the foundation of a central base dispatching the information of traditional medicine researches, building up a closer connection with researchers in the Institute, and performing co-operative works with domestic and international scientists.

Based on the national government’s intellectual cluster formation project, 18 regions, including Toyama, in Japan have been designated by the Ministry of Education, Culture, Sport, Science and Technology to conduct special project. Toyama Medical-Bio Cluster integrated medical-bio technology and electronic and micro fabrication technologies in collaboration with University of Toyama, Toyama Prefectual University, Toyama Industrial Technology Center, Toyama Prefectual Institute for Pharmaceutical Research, and some companies from inside and outside Toyama Prefecture. It works on the development of diagnostic devices and the creation of new type of industry through the development of Toyama’s original drugs.

Medical-pharmaceutical projects and engineering projects have been
performed with mutual good collaboration of the researchers. There has already been great success in the development of the technology by which antibodies against specific antigens can be exhaustively yielded, and this is the first and only technology of its kind in the world. Through the exploitation of these technologies, some bio-venture companies have been able to be established.

<<The summary of major projects>>

● Application of immune function to diagnosis and clinical treatment.

They have developed microwell chip consisting of about 230,000 microwells, in which single lymphocytes can be captured, stimulated, and the cellular responses can be analysed at single cell levels. They developed ‘Lymphocyte array system’ that could analyze cellular responses of lymphocytes at single cell levels in a high-throughput manner and developed the protocol to produce antigen-specific recombinant human antibody using ‘Lymphocyte Microarray System’. Using this system, they successfully produced monoclonal human antibodies against type B hepatitis virus. Accumulating many patents, they promoted a bio-company, called ‘SCWorld’ which meant Single Cell World.

● Development of a micro-arrayed immunochip system.

They are trying to develop novel micro-well array systems incorporating antigens, antibodies, or lymphocytes, applying to the parallel monitoring of immunoreactions and immune responses. They developed basic methodologies for seeding lymphocytes into micro-well array and picking up a single lymphocyte from the chip. Based on these results, the automatic screening system for antigen-specific B lymphocytes has been now being developed. They have also investigated monitoring methods for viable activity and antibody production of a lymphocyte in a micro-well using pH and oxygen.

● Development of Kampo Medicine-based tailor-maid treatment-Proteomic pattern analysis.

The analysis of blood samples from the rheumatoid arthritis (RA) patients using SELD-TOF-MS system demonstrated algorithm for approximate 80% positive prediction was established to assess the efficacy of ‘Keishibukuryougan’ in the RA patients.
Educational organizations for future leaders of “Pharmaceutical industry in Toyama”

Toyama has long been making strong efforts in education to develop human resources for the pharmaceutical industry.

About 300 years ago, small private schools (Terakoya) for prospective itinerant merchants became widespread, and about 100 years ago, a pharmaceutical school (present-day Faculty of Pharmaceutical Sciences, University of Toyama) was established. Today, pharmaceutical courses are available in some prefectoral high schools to develop the next-generation human resources to lead the pharmaceutical industry in Toyama Prefecture.

- University of Toyama: Faculty of medicine
  - Faculty of Pharmacy and Pharmaceutical Sciences
  - Institute of Natural Medicine
  - University Hospital
- Toyama Prefectural University:
  - Graduate school of bioengineering
  - Department of Bioengineering, Faculty of Engineering
- Toyama Hokubu High School: Pharmaceutical and Biotechnology Course
- Namerikawa High School: Pharmaceutical Course
- Prefectural Pharmaceutical Business Education Center