

Medical Products Sector

Aiming to Be Kind to People through Mastering Our Specialty

Adhesive technology is a specialty area of the Nitto Denko Group. In recent years adhesive technology has won the admiration of the electronics industry and is receiving a lot of attention. We have been promoting this technology as being the way of the future for some time. The employees of the Nitto Denko Group are about to bear the fruits of their labor.

Adhesive Technology and Medical Products Sector

The Nitto Denko Corporation's first production aim after its inauguration was to produce domestic electrical insulation material. It was based on the technology used to make our electrical insulation tape that we have developed many adhesive tapes now being used in varied fields. Medical adhesive tape which is now a standard product in the medical sector was developed using this initial technology. Such tape can be used for a multitude of purposes such as for the protection of wounds or for attaching medical equipment to the body when necessary. It is imperative that medical tape is gentle to the skin. It is for this reason that we do not use substances that may cause irritation. Instead we have chosen to use soft base material resembling dermal tissue. Initially we were faced with using an adhesive given the use of our adhesive technology.

The surface of the skin is covered by very thin layers of stratum corneus. The layers of stratum corneus play an important role in guarding the human body from invasion of chemical material or pathogenic bacteria. In the past when adhesive tape was removed there existed a risk of this protective layer also being removed. For a long time the skin irritation caused by this protective layer of skin being removed was thought to be unavoidable. After many years of research the Nitto Denko Group succeeded in developing the world's first effective adhesive tape that could be medically applied and which when removed does not remove the outer protective layer of skin. Our product is called YUKI-BAN. It uses lipo-gel adhesive.



Whilst advances in technology are essential when considering improved medical care, we at the Nitto Denko Group prioritize the need to produce products that endeavor to minimize the patients' pain, discomfort and fear whether they are infants or elderly.

Expansion of Transdermal Drug Delivery Patch

The Nitto Denko Group's transdermal drug delivery patch has been another example of how an idea with a great deal of hard work can become a reality. We have been developing transdermal drug delivery patches since 1970 and now have four available medical products. Our patches enable medicines to be administered continuously through the skin allowing for more effective treatment.

One example of how transdermal patches can be applied is in the treatment and administering of medicines for asthma patients. Asthma episodes tend to begin at dawn with both patients and their families bearing heavy burdens in trying to manage and treat episodes when they occur. Transdermal patches containing tiotropium enable continuous and stable treatment thereby efficiently controlling episodes.

Transdermal drug delivery patches containing isosorbide dinitrate are used as prophylactics in treating angina. By incorporating our YUKI-BAN lipo-gel adhesive technology into the development of this product, it is gentle to the skin and can be applied every day.



The Nitto Denko Group is enthusiastic to expand its development of "people-friendly" transdermal drug delivery patch products. In 2006 we signed a contract with Eisai Co., Ltd. which will have Nitto Denko Corporation and Eisai Co., Ltd. working collaboratively on the development of a transdermal drug delivery patch containing *Aricept*® for the treatment of Alzheimer's disease. We hope to be able to develop a product that will assist patients at the early stages of the condition.

In 2003 Nitto Denko acquired a U.S. specialized producer of transdermal drug delivery patches. By having production sites domestically in Japan and also overseas we expect to be able to more effectively promote the use of this technology globally. Our business collaboration with Aveva Drug Delivery Systems Inc. is an example of this which will enable the development and manufacturing of drug delivery tape globally. In January, 2007 we succeeded in gaining the license to produce and distribute *Penles*® Lidocaine Tape from an associated developer. This is the first transdermal drug delivery patch that Nitto Denko Corporation is selling on a private-label basis.

The Nitto Denko Group is motivated towards progressing "people-friendly" medical care. It is for this reason that the Nitto Denko Group is actively contributing to the driving, development, manufacturing and sales of transdermal drug delivery tape products.

Biotech Sector Role in the Development and Production of Medicines

For the last several decades low molecular weight synthesized drugs have been mainly developed by the pharmaceutical sector. In recent years, advancements in biotechnology have been outstanding and it is considered that remedies for many intractable diseases such as genetic diseases or cancers will be possible as a result of the continued

advancements being made in biotechnologically based medical products. It is foreseeable that peptides and/or genes may feature in such applications.

The practical application of biotechnologically based medicine is dependent on establishing a reliable administering technique. In 2003 the Nitto Denko Group developed gene carrier, *Cytopure*™ with the aid of polymer technology, which is able to carry genes into mammalian cells. As *Cytopure*™ is broken down within a cell, the advantageous effects of the delivered gene begin to show. This product is marketed by Kinovate Life Sciences, Inc., a Nitto Denko Group company in the Americas.

The Nitto Denko Group given the future medical benefits that are envisaged to be possible through the development and advancement of biochemical medicines is directing its attention towards the biochemical-related business. It is in this area that the Nitto Denko Group believes that we will be able to make the largest contribution towards medical improvements.



Aveva Drug Delivery Systems Inc.