



Many people suffer from intractable diseases.
Many other people lack even the means to undergo examinations.
For Ushio, the question is, how can light help to relieve these situations?

Healing with Light

Medicine

Optical technology in support of advanced medicine

With its long wavelength, infrared radiation provides deep-penetration heating, providing both relief of symptoms and therapeutic effects during skin regenerative therapy. Conversely, the short wavelength of ultraviolet radiation delivers high energy levels that are effective in inducing chemical reactions that are useful for sterilization and in treating skin diseases. Advances are also being made in photodynamic therapy (PDT), as in the process of killing cancer cells without surgery through the application of light, and in photodynamic diagnosis (PDD), the application of light to lesions to find and diagnose cancer cells through reactions with drugs.

While ultraviolet can have negative effects on the human body, it can also provide benefits, such as stimulating the production of melatonin (a substance that is essential for maintaining mental stability) and vitamin D (which is important for improving absorption of calcium). The development of light-based treatments and examinations

that are free of side effects is possible only using optical technology that is capable of producing light that is effective for treatment.

The keyword is Quality of Life

The discomfort and side effects of light therapy are much reduced compared to conventional treatments using surgery or drugs, and damage to the body is reduced correspondingly. With its low impact on the lives of patients, light therapy is attracting great attention for its great potential contributions to quality of life. It is also a topic of study for use in preventing diseases and in health management.

Says a development manager, "Ushio made its first major foray into the field of medicine in about the year 2000. Before then, we had some connection to medicine through our involvement with endoscope and microscope lamps, but now we are making a much greater contribution in development of new medical and examination equipment that uses leading edge optical technology."

Using light for highly effective treatments with reduced side effects

Research into the use of light in medicine dates from the 19th century. This was triggered by observation of natural healing of rickets amongst homeless people who lived under street lights in the sunshine-deprived environment of northern Europe. Subsequently, the Danish physician and scientist Niels Finsen used light from carbon arc lamps to treat tuberculosis of the skin, and made phototherapy known

around the world by winning the Nobel Prize in Physiology.

"However, even though the beneficial effects of ultraviolet were generally known, concerns in the medical field about its harmful effects caused it to be shunned. So we had the idea of cutting out the harmful wavelengths and exposing patients to just the wavelengths that are beneficial."

Ushio began developing "light with high therapeutic effects and reduced side effects" for use in treatment of atopic dermatitis, psoriasis, and dermatological autoimmune diseases such as vitiligo.

"Phototherapy utilizes the immunosuppressive effect of ultraviolet radiation to damp the symptoms of skin that is experiencing excessive reactions. Since discovery of the efficacy of ultraviolet in treatment of psoriasis at Harvard University in the 1970s, the main wavelengths used are in the vicinity of 311 nm. However, the degree to which various wavelengths of light are effective is still not precisely known, and although there are indications of more effective wavelengths, the question is still pending clarification."



Excimer light phototherapy device
TheraBeam® UV308
Developed through extensive cell experiments and clinical evaluation, a newly developed "Excimer filter" maximizes effectiveness and safety.

The world's first "excimer filter," born of the enthusiasm of researchers and engineers

With the collaboration of a university, Ushio conducted a detailed analysis of wavelengths and found that the greatest therapeutic effect is obtained at a wavelength of 308 nm, and that the best results are obtained by cutting out wavelengths shorter than 297 nm, which cause skin reddening as a side effect. From this study, it is expected that greater therapeutic effect can be obtained by shortening the wavelength by just 3 nm from the conventional 311 nm.

"Ushio was already the first company in the world to introduce a commercial excimer lamp. Based on that lamp, we succeeded in development an excimer lamp with a peak at the 308-nm wavelength, an emission peak that could not be obtained with the technology of the 1970s. We were also successful in developing an excimer filter to remove wavelengths shorter than 297 nm, blazing a trail for new applications."

Then in 2008, we developed a phototherapy unit for practical applications that uses this Ushio excimer lamp to provide therapy that is both safe and highly effective. Thus was born the TheraBeam® UV308, the world's first phototherapy device using 308-nm excimer light and an excimer filter.

"The name 'TheraBeam®,' a device for therapy with a beam of light, is a reflection of Ushio's determination to contribute professionally in the field of medicine. And of course patients who can benefit from this device are found everywhere in the world, not just in Japan. Our hope is to return the smiles to the faces of suffering people wherever they may live. I believe that there are still many other contributions that we can make with Ushio light."

Enabling quantitative blood analysis with original technology

Ushio has also produced new products in the field of examinations. These are the Point Reader® blood analyzer and its special Point Strip® reagent. The development manager of these products describes the background of development.

"Around the world, more and more people are keeping pets, such as cats and dogs. Such pets are increasingly regarded as members of the family, and like people, they age

and are treated at veterinary facilities. However, unlike people, pets cannot talk to doctors to tell how they feel or explain their symptoms. This makes clinical procedures such as blood analysis of even greater importance for deciding on treatment regimes. Hearing the demand from veterinarians for "a device that can provide faster and easier blood analysis," Ushio responded by turning to its technology of light.

To fulfill this need, Ushio undertook the development of a device that makes use of immunochromatography*, a trusted method of testing that enables quick and simple evaluation in a small package. Ordinarily, immunochromatography gives only a "yes/no" finding for test results, rather than a quantitative determination. However, Ushio developed an algorithm that allows quantitative measurements utilizing technology that employs its own LEDs to analyze color density. This makes it possible to obtain clinical on-site quantitative analyses, which of course reduces the veterinarian's workload. Ushio will continue expanding the variety of special-purpose Point Strip® reagents that it provides in order to make this method useful for an increasingly wide variety of examinations.

Light's role in preventive medicine

Says the development manager, "We made this unit as simple as possible in terms of construction and operation so it could be used in countries with less developed medical institutions, such as in Southeast Asia and Africa. Actually, advanced medical care is only available in a minority of the world's countries. There are many people who cannot receive satisfactory examinations or treatments. In countries lacking adequate sanitation and medical standards, a need exists for a simple and inexpensive specialized tests that can detect diseases such as hepatitis C, as well as endemic diseases such as thalassemia. The proliferation of Point Readers®,



Blood analyzer Point Reader®
Point Reader® is a blood analyzer that makes use of immunochromatography for quantitative analysis. By using Point Strips® containing different reagents, this one unit can be used for a variety of different tests.

which are inexpensive, easily used by anyone, and provide stable results, can not only help with early detection, treatment and prevention, but can also contribute to improving medical conditions and reducing the cost of medical care."

Health and happiness through light

Both TheraBeam® UV308 and Point Reader® were born of Ushio's new endeavors in the field of medicine. One might ask, why is Ushio undertaking such endeavors? We found a partial answer to that question in a story related by one of the TheraBeam® UV308's sales people.

"A doctor once told me, 'The smile on that child's face when her illness was cured made me so glad to be a doctor. And that cure was possible thanks to Ushio's equipment. Thank you.' It made me feel warm all over. Although medicine is a completely new field for Ushio, it is one that is truly rewarding."

Light is filled with endless possibilities, and there are people waiting for those possibilities to be fulfilled. And Ushio is just beginning to challenge the possibilities of the medical field.

* Immunochromatography: An analysis method that makes use of antibody-antigen reactions. Antigens contained in the specimen react with antibodies in a reagent, resulting in color development. The method is used in influenza and pregnancy tests.



Ultraviolet irradiation device for dental implants TheraBeam® Super Osseo
TheraBeam® Super Osseo is the world's first ultraviolet irradiation device for augmenting the bonding of implants and shortening treatment times. (Sold only in Europe.)

Vascular imaging system, VeinViewer®

Using near-infrared and together with image processing technology, this system provides a means of projecting the structure of subcutaneous veins and the flow pattern of blood onto the surface of the skin as a digital image.



Lamps for endoscopes and microscopes
Compact-type with integrated reflector. Xenon lamps provide excellent color rendering for reading subtle changes in the color of lesions.