



## Ophthalmology

### The joy of seeing

Visual disturbances significantly reduces a person's quality of life. These conditions include cataracts that affect many as they age; glaucoma, which develops in about one in 20 Japanese aged over 40; and ametropia, including myopia which has been increasingly noticed in younger aged individuals. The evolution of medical devices has given many patients the joy of seeing again with their own eyes. Here we introduce medical devices, which continue to innovate and advance the field of Japanese ophthalmology.

### Cataracts: Evolving multifocal intraocular lenses

Cataracts are a condition in which the lens becomes turbid, largely due to aging. Even with modern medicine, cloudy lens cannot be restored to their original condition. Now the common method is to surgically remove lens and insert an intraocular lens. Cataracts, which were once the number one cause of blindness, are now more or less a disease which can be avoided through surgery owing to the emergence and subsequent improvements of intraocular lenses, and the development of lens reconstruction techniques for lens insertion.

The intraocular lens was introduced in 1949 by British ophthalmologist Harold Ridley. The idea of creating an intraocular lens with polymethyl methacrylate (PMMA) was inspired from pilots who sustained eye injuries from fighter jet PMMA windshield fragments, and did not show signs of foreign body reaction. It was 1985, some 36 years later, when Japan approved intraocular lenses.

The evolution of intraocular lenses over the past decade, especially multifocal intraocular lenses, have allowed not only lenses that offer far and near focus, but also diversified selection of lenses according to individual lifestyles. It is possible to select the lenses that best suit our needs after consultation with our optician; such as reading, crafting, using a computer, and improving astigmatism.

Cataract surgery is no longer just the replacement of a cloudy lens with a clear lens. It would be no exaggeration to say that the surgery is now an opportunity to think about how to improve one's quality of life. The multifocal intraocular lens will continue to evolve as a device with the potential to expand the joy of living and seeing.



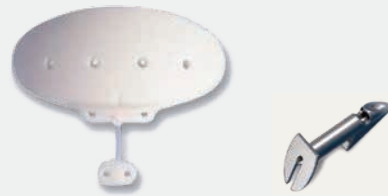
Multifocal  
intraocular lenses

### Glaucoma: Implants that expand surgical treatment options

Glaucoma may develop due to increased intraocular pressure, or in normal intraocular pressure. But in both cases, the visual field narrows due to damage to the optic disk where the optic nerve gathers. If it progresses, vision may eventually be lost. As the optic nerve is not restored to its original condition, the most important thing is to delay progression of the condition through early detection and early treatment. Recent advances in diagnosis and treatment have made it possible to reduce the

risk of blindness.

Guidelines for diagnosis and treatment have been published by the Japan Glaucoma Society. The basis of treatment is continuous pharmacotherapy with eye drops. However, should the condition continue to worsen, then various surgical operations are approved as indications. In 2011, a device called a tube shunt (implant) for draining aqueous humor from the eye and prevent an increase in intraocular pressure was introduced from overseas and approved. The tube shunt is a gift for patients with problematic conditions that cannot be treated with conventional glaucoma surgery.



Silicone plate (left) and tube (right) used for tube shunt surgery. The area of the oval plate is 350 mm<sup>2</sup>, and the tube is an extremely small device with an outer diameter of 0.38 mm and an inner diameter of 0.05 mm.

### The evolution of contact lenses

Contact lenses (CL) are designated as highly controlled medical devices. They are defined as "medical devices that require proper management as they may materially affect health and life in the event of adverse reactions or malfunction of devices."

The market for silicone hydrogel CL has been growing in recent years. Silicone is a material with a very high oxygen permeability, but essentially hydrophobic. For CL, in which high hydrophilicity is essential for comfort, developing products using silicone was deemed problematic. However, progress in surface treatment technology at CL manufacturers allowed the launch of products that combine high oxygen permeability and hydrophilicity on the lens surface, and they are now the mainstream. Over the past decade, an array of products that leverage these new materials and better manufacturing technologies have been developed in those technologically high-value-added products including CL for astigmatism and CL for presbyopia. Particularly in Japan, the world's most aged society, the importance of CL for presbyopia is expected to increase in the future.

Meanwhile, colored CL, which make the pupils look larger, are popular among women. In this field, products made of materials in the former generation using older coloring technology are still available on the market. The challenge now is to raise awareness, encourage correct usage, promote the use of highly safe products, and ensure eye safety among colored CL users.

### Reference

The Japan Glaucoma Society Guidelines for Glaucoma (3rd Edition) addendum: Guidelines for Glaucoma Tube Shunt Surgery  
[http://www.nichigan.or.jp/member/guideline/glaucoma3\\_1.pdf](http://www.nichigan.or.jp/member/guideline/glaucoma3_1.pdf)