

From the Editor

Contact lens becomes popular in recent years. Many people give up the use of ordinary glasses and choose to wear contact lens. The technology of contact lens has advanced a lot since its introduction. A number of choices are provided to meet clients' needs. One may count on personal preference to choose the frame of ordinary glasses. However, in case of contact lens, health concern is more important in making the right choice.

In the feature article, we have invited our optometrist to write on the topic "Contact lenses-The past, present and future". If you decide to use contact lens, getting more information and knowing the benefits and risks of wearing them help you to make a correct choice.

The Student Health Service website (<http://www.studenthealth.gov.hk>) has been launched since 2007. We are proud to introduce a new service in our website: E-cards. Health messages of different themes are available, e.g. healthy diet, regular sports, eye care and relaxation. You may also make use of the E-cards to say sorry or to show your appreciation to friends. Send your warmest message to your friends here. There are more spectacular and interesting e-cards to come. Bookmark our website and visit frequently to get more.



Editorial Board Members: Dr. WAN Ka-leung, Ms. Mary THAM G.S.,
Ms. CHOI Choi-fung, Ms. FAN Sau-mun, Ms TUNG Yuet-hung
Tel: 2349 4212 / 2349 2772 Fax: 2348 3968
Website: <http://www.studenthealth.gov.hk>

Contact Lenses - The past, present and future

Mr. Roy WONG, Optometrist, Student Health Service, Department of Health

There are many types of contact lenses in the market, including soft lenses, hard lenses, daily-wear lenses, extended-wear lenses, disposable lenses, color lenses, and astigmatic lenses. These terms make choosing suitable contact lenses difficult. For those who are interested to use contact lenses, let us understand them in more detail.

In fact, contact lenses can be classified into different categories according to:

1. **Manufacturing materials:** soft lenses, rigid gas permeable lenses and hard lenses.
2. **Wearing time:** daily-wear lenses, extended-wear lenses.
3. **Wearing habit:** disposable lenses, non-disposable lenses.

Contact Lenses = Cornea Contact Lenses

No matter which kind of contact lenses you choose, it comes into direct contact with the cornea. Thus, the health of the cornea is the prime consideration when choosing a pair of contact lenses. In order to maintain the cornea healthy, the most important criterion is adequate oxygen supply. Oxygen mainly diffuses into cornea from air. Contact lens prevents the cornea from direct contact with air. It forms a barrier to oxygen and blocks the oxygen supply. In order to solve this problem, the oxygen permeability of the contact lenses should be increased.



What are Hard and Soft Lenses?

The first generation contact lens is made of Polymethyl methacrylate (PMMA) which is a kind of plastic. The advantages of PMMA are its hardness and durability. You cannot change its shape. Thus, it is called hard lens. It has a disadvantage of being oxygen impermeable. As a result, hard lens is replaced by rigid gas permeable lens in later stage.



Do you know?

The first contact lens was made by a German scientist Adolf Eugen Fick in 1887. Its low oxygen permeability cause frequent corneal inflammation. The first soft contact lens was made by a Czechoslovak chemist Otto Wichterle. Since it is more comfortable compared with hard lens, it becomes the most popular contact lens today.

Adolf Eugen Fick



Rigid gas-permeable-RGP lenses:

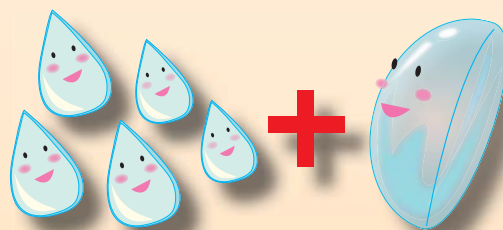
Most rigid gas permeable (RGP/ Rigid GP) lenses contain silicon which makes them softer than hard lenses. Since silicon is a gas permeable material, oxygen can pass through it freely. Moreover, a tear film is formed between contact lenses and the cornea. During blinking, the tear film exchanges with oxygen-saturated tear on the eyeball. This also enhances oxygen supply to the cornea. Since gas permeable lens does not contain water, it does not absorb water on the surface of eyeball. Moreover, its intact surface prevents accumulation of any dirt and eye secretion. Thus, the lenses can be used for a longer time.

Although rigid gas permeable contact lenses have many advantages, it is less popular than soft lenses. Why?

Since the shape of Rigid GP lens does not change according to the shape of the cornea, it is less comfortable compared with soft lens and it takes a longer time to adapt. Some users eventually give up due to the uncomfortable feeling.

Soft Contact Lenses:

Soft contact lens is made of hydrogel. This material contains water molecules making it soft and elastic. It applies on the surface of the cornea comfortably and tightly. In Hong Kong, over 90% of contact lens wearers use soft lenses since it is easier to adapt and more comfortable.



Do you know?

Oxygen permeability and water content

For a material suitable to make contact lenses, oxygen permeability is an important factor. High oxygen permeability means sufficient oxygen supply to cornea. Both silicon and water are highly oxygen permeable. Thus, water content of soft lenses can be used as an index to oxygen permeability. However, high water content also means that the lens will absorb more water from the surface of eyeball. It is not suitable for users with insufficient tear supply and makes the dry eye symptoms even worse.

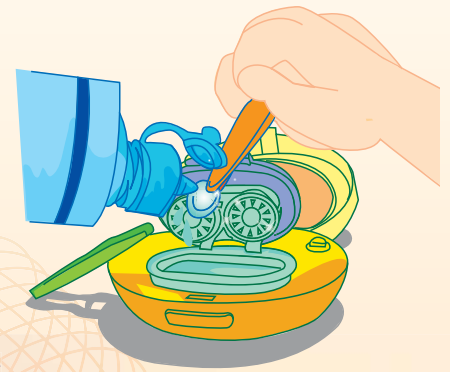


However, the oxygen permeability of water is lower than silicon. Therefore, soft lens is less oxygen permeable than rigid gas permeable lens. Its surface allows protein in tear to stick on it easily. This protein deposit cannot be completely removed by daily cleansing. As time goes by, accumulation of such deposit makes the lens less durable and causes discomfort.

In comparing soft lens and rigid GP lens, soft lens is less durable (life span about ½ to 1 year). It is difficult to clean the protein deposit on the surface and is associated with higher risk of infection. On the other hand, rigid GP lens is highly oxygen permeable and more durable (lifespan about 1 to 2 years). It can correct astigmatism and has lower risk of infection. However, rigid GP lens is less comfortable than soft lens and one take more time to adapt to wearing the rigid GP lens. Hence, both soft and rigid GP lenses have their benefits and risks, but rigid GP lens seems to be a healthier choice to your eyes.

New products: Silicon Hydrogel Lenses

Recently, there is a breakthrough in the technology of contact lens. A new product, Silicon Hydrogel lenses, combines the advantages of both soft lens and rigid GP lens. It is a kind of soft lens made of a material called Silicon Hydrogel. Its oxygen permeability is higher than soft lens. Thus, it minimizes the chance of corneal complication due to low oxygen supply. It is likely to become the main stream product in contact lenses industry in future.



Daily and Extended Wear Contact Lenses

According to the wearing time, contact lenses can be classified into the following categories:

Daily Wear:

Only suitable to be worn in daytime; sleeping without taking it off is not recommended. Its water content is about 38% with moderate oxygen permeability. The recommended wearing time is 10-12 hours daily.

Extended Wear:

Users can wear it longer than daily lenses. The water content is about 50%-70% with higher oxygen permeability. The recommended wearing time is 12-14 hours daily.

Continuous Wear:

Made of silicon hydrogel material with high oxygen permeability. Users can wear it during sleep. Wearing can be continued for several days. Its high oxygen permeability ensures cornea with sufficient oxygen supply. It allows comfortable wearing with little care. The recommended wearing time is from 7 to 30 days.

Risk of bacterial infection

Despite technological advance, the chance of bacterial infection gets higher if you wear your contact lenses during sleep, swimming, or in a dusty and smoky environment, or if you have suffered from acute conjunctivitis before. Even if manufacturers of some continuous wear lenses state that their lenses can be worn for 30 days continuously, the question is whether it suits you or not. It can only be answered by a qualified optometrist after detailed assessment. Not everybody can wear the lenses continuously; users should follow optometrists' instructions.

Traditional Lens, Frequent Replacement Lens and Disposable Lens

According to the wearing schedule, contact lenses can be classified into three categories:

Conventional:

Can be soft lens or rigid gas permeable lens. It should normally be replaced after use for 6 months to 1 year for soft lens and 1 to 2 years for rigid gas permeable lens. It needs to be cleansed and disinfected daily.

Frequency Replacement:

Mainly soft lens. Lenses should be replaced every month, every two weeks or weekly. The reason is to minimize the adverse effects caused by deposit on the surface of lenses. It needs to be cleansed and disinfected daily.

Disposable:

Mainly soft lens. Lenses should be replaced daily. It is more convenient since cleansing is not necessary.

Type	Wearing schedule
Conventional Lens	Replaced every 6 months or above
Frequent Replacement Lens	Replaced every month, every two weeks or weekly
Disposable Lens	Replaced daily

Disposable lenses: a new concept in wearing contact lenses

Disposable lens was first introduced to the market in the USA in 1987. Its main advantages are hygienic and convenient. It also avoids the chance of complications due to deposit on lenses or allergy to cleansing solutions. It is growing in popularity.

Conclusion

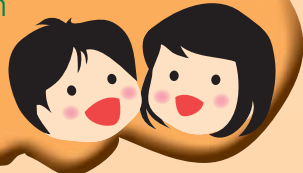
After knowing all these, you may still hesitate about how to choose contact lenses that suit you most. We must know that all types of contact lenses have benefits and risks and there is no such thing as "The Universal Best Lens". Besides the type of contact lens, your personal health, eye condition, wearing habit, daily lifestyle and environmental factors all affect the choice of contact lens. Thus, the one that can match your needs would be your best lens.

Please be reminded that contact lens fitting is a professional technique. Since contact lens applies to the cornea directly, inappropriate fitting of a contact lens can cause minor problems such as failure to adapt, or serious problems such as corneal ulcer which will damage vision permanently. Thus, contact lens can only be fitted by qualified optometrists; and regular after-care service is also essential.

Do you know?

It is reported that if you sleep with contact lens regularly, the chance of bacterial infection of your cornea is twenty times higher than someone who wear spectacle.

※Remarks



※Remarks: Lancet 1999; 354:179-183. Carmeli Y, Troillet N, Karchmer AW, et al. Health and economic outcomes of antibiotic resistance in Pseudomonas aeruginosa.

Contact lenses are light, virtually invisible and convenient to carry. However, as our optometrist has emphasized in his feature article, we have to consult a registered optometrist to find out the appropriate type of contact lens for ourselves. Besides, we have to pay attention to personal hygiene and know how to take care of the contact lenses in order to prevent eye infections.

Some students express their views on contact lens wearing as follows:

It's really inconvenient as you would drop your contact lenses easily.



I am confident when I put on my contact lenses, but I have to clean them with care.

Wearing too long would be harmful to eyes, but it is alright to wear for a while for the sake of convenience in work.



I think young children should not wear contact lenses.

Do not wear it long. Contact lenses make you feel comfortable, convenient and beautiful, but a bit dry.

It is annoying to do daily cleansing, rinsing and disinfecting of the lenses.



That's good; nobody knows that I am wearing glasses.

Make appearance attractive but bring trouble

Answer: c
Astigmatism occurs if the cornea curvature is irregular. Thus, it causes rays from a luminous point not being focused at a single point on the retina, resulting in blurred images for objects at any distance.

A letter to Health Box from our client:

Hello,

How are you! I have a problem! Please help me! I felt that my vision is deteriorating. I have 750 degree of short-sightedness on my left eye and 700 degree on the right one; in addition, there is 200 degree of astigmatism!! Can you help me? I don't want to be blind!



From
Hiu Ching



Dear Hiu Ching,

Thank you for your letter.

We understand that you are concerned with deterioration of your vision and wish to get advice on how to improve it. You are worried of becoming blind. Please be reassured that one does not get blind from severe short-sightedness unless there is other serious problem or complication, such as cataract, glaucoma or retinal detachment. Moreover, we may correct short-sightedness and astigmatism with properly prescribed visual aids such as spectacles or contact lenses.

To avoid deterioration of visual acuity, you should be aware of healthy lifestyle. Take good care of your eyes with the following measures:

- ✓ Place reading materials at least 30 cm from you eyes;
- ✓ Keep the viewing distance between eyes and the screen of a TV at least 6 times the length of its diagonal;
- ✓ Keep the viewing distance between the eyes and the computer screen not less than 40 to 60cm;
- ✓ Relax your eye muscles by looking at distant objects for 3-5 minutes after 30-40 minutes of eye-straining work, such as reading or using the computer
- ✓ Read under adequate and even illumination.

Besides, I suggest that you should check your eye sight regularly, e.g. annual visit to our centres. If you notice that your eye sight is getting worse, consult a qualified optometrist for detailed assessment. The optometrist will provide assessment, advice and treatment accordingly.

Health Box

Interesting Knowledge Q & A

Which of the following condition is caused by irregular curvature of cornea?

- a. myopia b. hyperopia
c. astigmatism d. squint

(The answer can be found in the magazine)



Health Tips

Persons who wear contact lenses during sports should choose soft contact lenses.

As the eyes are in quick motion during sport activity, rigid gas permeable lenses may easily get dislodged. In addition, if a sport injury occurs, the trauma caused by soft contact lenses to the eye is smaller.



For enquiries of student's health problem,
please write to "Health Box"



Health Box
4/F, Lam Tin Polyclinic,
99 Kai Tin Road,
Kwun Tong,
Kowloon

Please write your
name & address,
contact tel. no. in
the letter.