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**Fondazione
Umberto Veronesi**
– per il progresso
delle scienze

Eye health

for the
wellbeing
of people

INDEX

<u>Freedom of speech</u>	<u>6</u>	<u>When shall we go the eye doctor?</u>	<u>23</u>
<u>Our most precious sense</u>	<u>8</u>	<u>Can we do preventive eye care?</u>	
		<u>Yes, we can</u>	<u>26</u>
<u>Eye in the new millennium, increasingly stressed</u>	<u>10</u>	<u>Few simple moves to protect the eyes</u>	<u>31</u>
<u>Eye disorders in the world</u>	<u>14</u>	<u>For more information</u>	<u>36</u>
<u>Refractive defects</u>	<u>17</u>	<u>Fondazione Umberto Veronesi</u>	<u>37</u>
<u>When the eye gets sick</u>	<u>18</u>		
<u>Also eyes can get cancer</u>	<u>21</u>		

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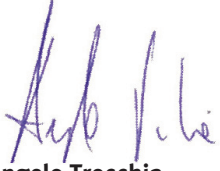
At Safilo, we are proud to announce our collaboration with Fondazione Umberto Veronesi in the production and amplification of this important scientific brochure on eye health, our most precious sense that gives us the opportunity to better experience the world around us.

Safilo has always believed in prevention as an essential tool for healthy vision and supports numerous activities in this regard in many countries around the world through its portfolio of Brands.

Polaroid Eyewear, an iconic Brand founded in 1937 by Edwin Land starting from the invention of polarised lens, represents the ultimate expression of Safilo's purpose: allow anyone to see the world at its the best. Through the years Polaroid Eyewear has continued to innovate its product offer, firmly convinced that the only true innovation is the one that allows millions of people to see and therefore to live a better life.

For this reason, Fondazione Umberto Veronesi, which has always been recognised a leader in scientific research, represents for us the ideal partner to build the ambition to make sure that everyone, especially children, can benefit from the correct tools for visual protection and correction throughout their lives.

This is because seeing well means living better.



Angelo Trocchia
Safilo Group CEO

Our senses allow us to connect and relate to the world around us. Among them, sight is certainly one of the most developed and differentiated senses through which we can acquire knowledge and information.

For millions of years, we have used the eyes especially for "distant vision". A vision capable of saving and defending us. Today it happens the exact opposite. Our eyes are strongly engaged in "near vision" always using artificial light. All of this, leads to an eye overload that with time damages this precious sense of ours. In the world, there are a few billion of people with visual defects. According to the World Health Organization, 85% of blindness could be avoided. Therefore, prevention is crucial. With this notebook, by using a simple language within everyone's reach, we want to explain how to take care of our eyes.

What tests should we take?

At what age should we do the first check-ups?

Can diet affect eye health?

These are just some of the questions that this notebook answers by providing valuable tips to preserve eye health as long as possible.

Enjoy the reading!



Paolo Veronesi
President of the Fondazione Umberto Veronesi

Freedom of speech

Today's world is extremely visual and exposes us to many pleasant stimuli. For these reasons, taking care of our eyes from the very first years of our life is becoming more and more important. Sure enough, we will pay for not protecting our eyes, finding ourselves deprived of the health of this precious sense that allows us to observe the world around us and learn from it.

Prevention plays a key role in eye health and we can all play our part in it. First of all, we should do regular check-ups to identify potential diseases that could compromise the development of visual function. Furthermore, we should not forget that "we are what we eat". A good food education, from an early age, is very important.

Just like we brush our teeth every day, almost automatically, in the same way we must have clear the advantage of eating certain foods in the right proportion to help us preserve our body's health. For eye health, specifically, first of all we need to protect us against oxidation. To do so we have to limit the consumption of sugars, and eat instead plenty of fruits, vegetables, fish and nuts, which are important sources of flavonoids and carotenoids, like zeaxanthin and lutein, and omega-3.

The go-to-choice would be to introduce these substances, which are essential for the eye health, with the diet. But if we don't manage, they must be supplemented in other ways, taking into account the different needs in different stages of life. Flavonoids, for example, are useful at any age, even in children, while omega-3 fatty acids are more useful in adults. The elderly instead, due to nutrients absorption difficulties and the poor variety of their diet, may need more supplements.

Nowadays, in addition to the commitment that each of us can put to preserve our sight's health, luckily, we have a new ophthalmology in our hands. Thanks to scientific research, that we must never forget to support, this valuable discipline can take advantage of many different exams, tools and techniques: artificial intelligence, imaging techniques or new drugs, for example, allow us to have much more precise and earlier diagnoses, and much more effective therapies than in the past. Therefore, it would be a shame to be unprepared for this precious news, that can be managed not only by doctors and ophthalmologist. It is important, in fact, to learn to rely also on other specific and competent specialists, as the orthoptists who, if present through-

out the territory, can take care of eye prevention in a broad and effective way. The eyes, which weigh only 7 grams, enclose an infinite world that we have the duty to protect as best we can.

Paolo Nucci

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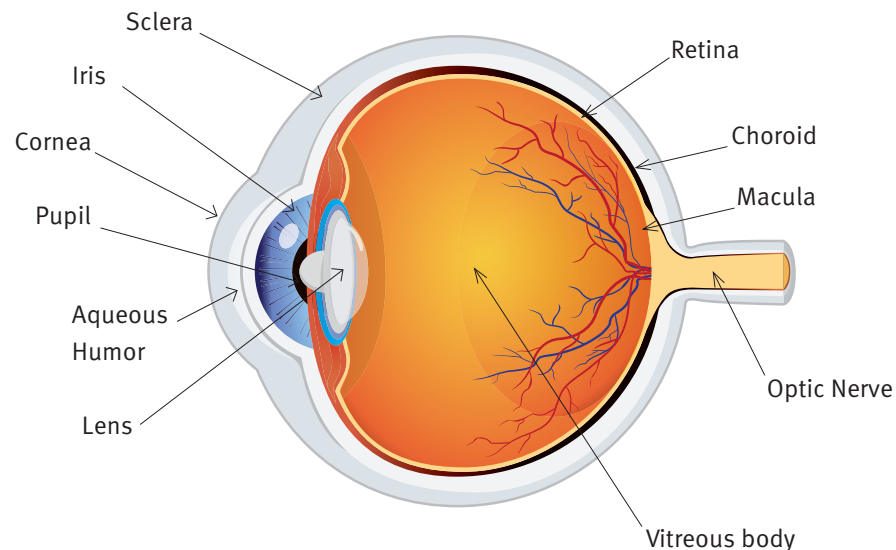
Our most precious sense

There are millions, or rather billions, of images that we collect over the course of our lives.

With every blink of an eye, we see something new, different and unique, and too often we take it for granted. Thanks to sight, our most developed and differentiated sense, humans have built their knowledge and understanding of the world. And it's thanks to our vision that, even today, we can keep learning and getting excited. To not deprive us of this precious possibility, it is important to preserve the health of our eyes, that work tirelessly to allow us to observe the world. How shall we do it?

How the eye is made and how it works

The mechanism that allows us to observe reality, regardless of the external appearance of the eyes, it is always the same, refined and precise. The light waves reach the eye, and are conveyed to the retina: from here, the optic nerve transmits them to the brain which, by decoding them, interprets the light waves as three-dimensional images.



Structure of the eye

The eyeball consists of an outer membrane called the **sclera**; it's anterior part, named **cornea**, is completely transparent and it's in direct contact with the external environment. The cornea, together with the **lens** and the **vitreous body**, constitutes the **ocular dioptric** medium, that is that system of natural lenses that allows vision: to ensure optimal vision, they must be as transparent and as regular as possible. The cornea is wet, lubricated and nourished by **tears**.

The front portion of the eye is called the iris, and it is the part responsible for the eyes color.

It has a central hole, the **pupil**, which regulates the entry of light waves: depending on the amount of external light, the pupil narrows or widens to let in more or less light. To ensure a clearly focused image, the eye uses a **biconvex lens** placed behind the pupil: the **crystalline lens**, which works by changing its curvature, somewhat like an automatic camera lens.

The entire central part of the eye is occupied by the **vitreous body**, a transparent gel-like substance. The inner surface of the eye is surrounded by the **retina**, and the part of the retina with the higher number of visual cells is the **macula**. In order for the visual function to be perfectly normal, all eye structures must be intact and fully functional; any alteration in terms of structure or functionality can cause problems for the vision. Above all, it is necessary that the cornea and the lens are transparent, and that the retina and the optic nerve have no alterations.

Eye in the new millennium, increasingly stressed

For millions of years our ancestors have used their eyes to see far and wide, towards boundless spaces in which they had to defend themselves from the wild beasts that were used to hunt, to feed themselves and to survive. Over time, the human eye has undergone a very slow evolution, until the light bulb was invented in 1879.

After this first revolution, our eyes and our way of observing the world were further affected by the other great and constant changes: in 1939 it was invented the first electronic computer, and in 1973 the mobile phone. Today, there are three billion of PCs in the world, seven billion mobile phones and, over one quarter of the planet's inhabitants are connected to the Internet on a daily basis.

For 40 million years the eye has been used to see from afar and only with natural light, although today it is heavily engaged in **near vision, with artificial light and with an incredible overload of stimulation.**

In developed countries, all children around 3-4 years of age begin to use near vision, and this activity gradually increases during elementary school, and it reaches its peak in high school and university.



Furthermore, the visual activity recently switched from texts printed on paper to bright instruments: monitors with their **"lighted screen" that emits blue light**. The distance for reading a written text also changed and dropped from 35-40 cm, to **20-25 cm** with tablets and mobile phones. This global digitalization is showing its side effects for our health, especially for our eyes.

Today, **more than 20 percent of boys between 18 and 25 are short-sighted**, and the percentage is expected to increase up to 40 percent over the next ten years.

Today, the human eye has a workload five times higher than the one it had in the immediate post-war period, and the average life span of the population has lengthened up to 75-85 years. The eye is, and will be more and more, a source of brain stimulus for the improvement of cognitive and intellectual functions, but at the same time it is exposed to more risks than in the past.

The blue light that tests our eyesight

Blue light is diffused by artificial light, but also by LEDs, or from the screens of smartphones and similar devices. It has a short wave length and therefore a higher frequency, which causes blurring and a reduction of contrast on the retina. Prolonged exposure to blue light causes eye redness, irritation, dryness, blurred vision and headache. However, long term data about the damage caused by blue light are often conflicting and they still miss further validations: the studies carried out so far, in fact, are almost all *in vitro* and recent scientific literature does not seem to confirm these damages. Thus, further research is needed.

“Dry eye”: the pathology of the new millennium

Several factors such as persistence in closed spaces, air conditioning, artificial lights, but also the increase of average environmental temperatures, stress and incorrect nutrition can cause the most common eye disease, the so-called “dry eye”. This is how we define the reduction of the **tear film**, that is the layer of tears that it’s always present on the surface of the cornea. This reduction could be due to a decreased tears production or to an increased tears evaporation.

In addition to environmental causes, this pathology often occurs in older adults: after the age of 60, or in the female population during menopause, it is common to find a deficiency of the aqueous tear film.

But they may also be other causes:

- **taking certain medications**, such as beta blockers, diuretics, muscle relaxants and anxiolytics;
- **blepharitis**, i.e. eyelid inflammation;
- **using contact lenses**, of any kind, **incorrectly**. Wearing them for too many hours during the day can be detrimental for the tear film. No matter how safe they are, contact lenses are still a foreign object and their use must be subordinated to an excellent state of the tear film.

Eye dehydration leads to a continuous ocular discomfort: the feeling of having a foreign body inside the eye, eye itching, burning, difficulty to open the eyes. Or again the urge to wash or rub your eyes, sensitivity to light, eyestrain throughout the day. Red and dull eyes are almost always a sign of poor hydration of the ocular surface, and they should not be underestimated.

How can we fix it?

In addition to the use of topical tear substitutes (artificial tears and drops), through which it is possible to restore the correct tear film, with dosages that vary according to the doctor's instructions, it may be useful to:

- avoid direct exposure to air conditioning systems or to windy places
- avoid dry environments
- not smoking
- if possible, stop using contact lenses



- clean frequently the eyelid edges
- use sunglasses
- follow a diet rich in vitamins B3, B6 and B12, as well as omega-3 and omega-6
- drink at least 1 and a half liters of water between meals

Eye disorders in the world

Eyesight is truly a precious asset; however, unfortunately, there are many countries in the world where eye health cannot be preserved as it should. According to the 2019 World Health Organization (WHO) estimates on the demographic trends in terms of sight defects, there are several billion people worldwide with at least one vision defect.

Myopia (i.e. nearsightedness or shortsightedness) → 2.6 billion, of which 312 million under 19

Presbyopia → 1,8 billion

Age-related macular degeneration → 196 million

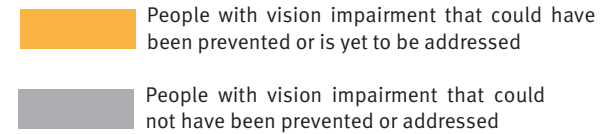
Diabetic retinopathy → 146 million

Glaucoma → 76 million

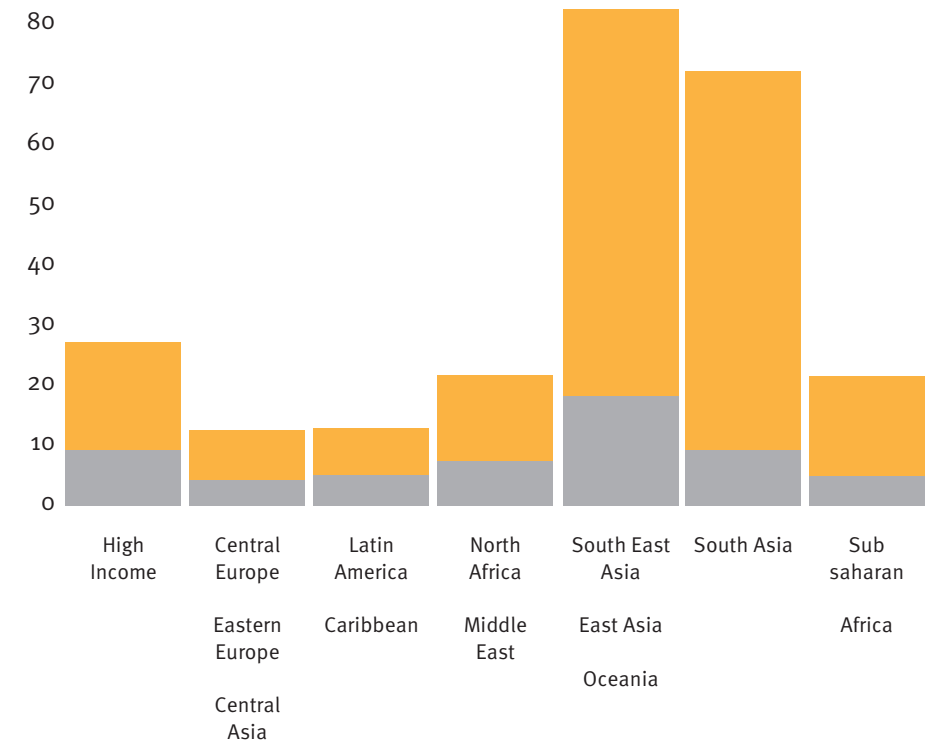
Trachoma, bacterial infection of conjunctiva and cornea → 2,5 million

As for our country, instead, in addition to the more common eye diseases, there are about 2 million Italians, mostly over 65 years old, who suffer from age-related macular degeneration. Patients with glaucoma are instead over 500.000 and there would be at least another 250.000 Italians who do not know they have this disease. Every year, 500.000 Italians undergo cataract surgery, an eye condition that affects 1 Italian out of 3 in old age.

According to WHO data, about **85% of blindness in the world could be prevented** and it is mainly women who suffer from severe visual problems.



Millions



Refractive defects

An eye able to focus correctly images on the retina is called **emmetrope**. Unfortunately, not all of the eyes have this ability and refractive errors, that affect image sharpness, are among the most common and widespread eye disorders.

Myopia

The light rays focus **in front of the retina**. The patient sees well at close distance, but has difficulties in seeing from afar. Nearsightedness can be a congenital or familial defect or it can be caused by excessive use of vision. It is a progressive condition and tends to increase during development. It therefore requires repeated fine-tuning of glasses or contact lenses.

Hyperopia

The image is formed **behind the retina**, forming diffusion circles on it and, thus, generating a confused image. The hyperopic eye is "shorter" than normal eyes and this causes the images to focus behind the retina. The patient sees better from afar, but has difficulty to see at close range.

Astigmatism

Corneal curvature defect. This is a condition of refractive asymmetry which produces a broken-down refraction of the light rays. The patient has difficulty to see up close and from afar and the images are a bit elongated.

Presbyopia

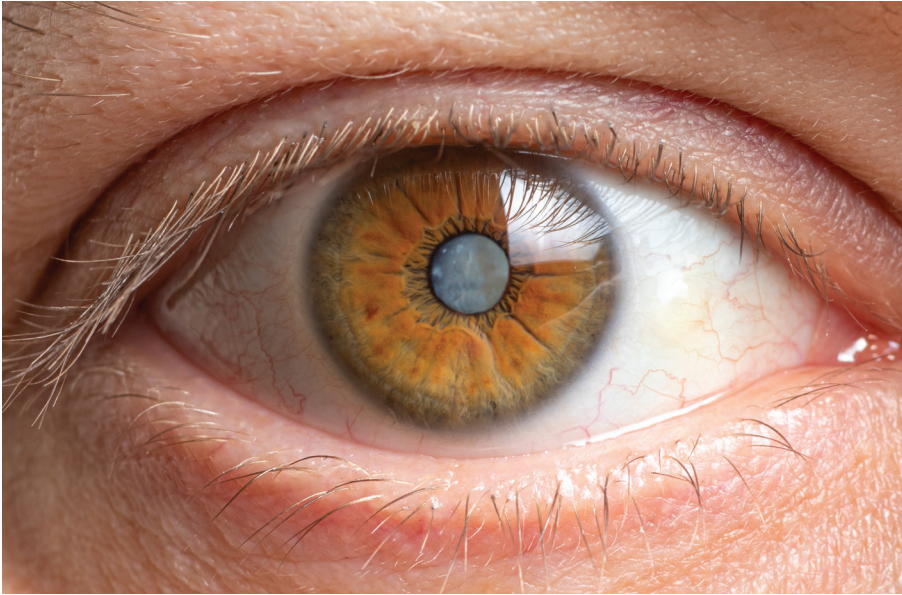
This is not a real refractive error, but represents the **natural loss of ability** of the eye **to accommodate and change the shape of the lens** to see closely. This phenomenon typically appears after the age of 40. Unlike the rest of the body, which stops growing around the age of 20, the crystalline lens continues to grow throughout life; as it ages and becomes stiffer, it gets more resistant to changes in shape. The result is a gradual reduction in eye accommodation, that implicates a more frequent use of glasses for reading and doing activities at close range

What is Golden Rice that helps prevent blindness?

Golden Rice is a variety of rice produced thanks to a genetic modification that induces the accumulation of beta-carotene, a precursor of provitamin A, in the edible parts of rice, such as the grain.

Pro-vitamin A, which is transformed into vitamin A by the human metabolism, is naturally present in many types of food such as carrots, liver, eggs and butter, which however, are not accessible to the many millions of people who eat almost exclusively rice, especially in the developing countries of Southeast Asia. According to the WHO, over 100 million of poor children in the world have a diet that lacks vitamin A and, for this reason, thousands of children become blind every year. In order to introduce vitamin A into the diet of these populations, it was created a rice plant rich in beta-carotene.

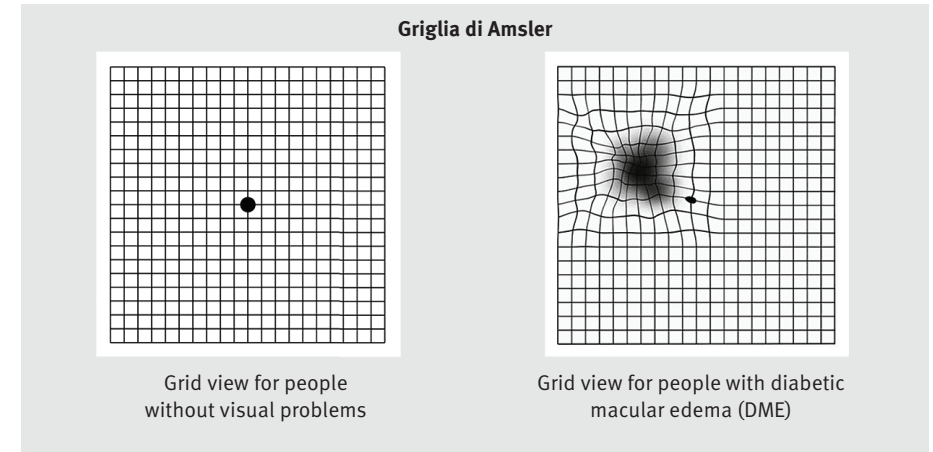
When the eye gets sick



There are many pathologies that threaten the health of our more valuable sensory organ. Here are some of the most common.

Age-related macular degeneration (AMD)

This disease **affects the macula** and represents the main **cause of blindness after 55 years old**. This pathology is linked to aging, and it's a consequence of progressive changes occurring in the structures within the eye. The disease begins with the formation of deposits and can evolve into two forms: geographic atrophy (or "dry"), with a slower progression, or neovascular AMD (or "wet"), that leads to a faster vision impairment. It is not easy to notice the onset of the disease: if it affects only one eye, a self-examination with the "**Amsler grid**" is required. The exam consists in looking at a squared paper with a central point; by covering one eye at the time, we may notice if there is a distortion of the straight lines in the central visual area. If so, an ophthalmologist must be consulted urgently. Other signs are seeing **blurred words** while reading and a **dark or empty area in the center of the field of view**.



A **balanced diet**, rich in fruits and vegetables and low in animal fat, **no smoking**, **self-check ups and periodic exams with your eye doctor** are the most effective tools to reduce the risk, or to catch the early signs of the disease and, therefore, to better control the evolution.

Cataract

To allow light to pass through, the lens must be transparent. Cataract is a **progressive and constant clouding of the lens**, usually caused by aging, but not only. The causes may be multiple: congenital ones already **present at birth**, diseases such as **diabetes**, the use of some **drugs** such as cortisone or chemotherapy, otherwise the nature can be unknown. Usually, vision loss occurs slowly; other cataract symptoms **are easy glare and double vision**. Currently, surgical removal is the only therapy, but scientists have shown that also for cataracts we can talk about prevention. According to a recent scientific study, taking antioxidants, such as vitamins, should reduce the risk of cataracts. Therefore, the advice of the experts is to **eat vitamins present in fruits and vegetables following a healthy diet**, but also to **not smoke**, because it has now been found a close connection between smoking and early development of cataracts.

Glaucoma

Glaucoma is caused by **increased pressure inside the eye**; it damages the optic nerve and induces the progressive reduction of vision and field of view. It is one of the most frequent causes of blindness in the world, although this serious outcome can be prevented thanks to timely diagnosis and care. The increase in internal eye pressure occurs when the **aqueous humor**, which is continually produced, fails to be reabsorbed/eliminated. In the early stages the patient can generally still see the object in the center of his/her field of view and he/she might not notice that the visual field is shrinking. Specialists recommend a **check-up every 2 years** to measure aqueous humor pressure to **middle-aged adults** and to younger subjects belonging to families at risk: glaucoma is not strictly considered hereditary, but there is still a greater predisposition if family members have been affected by this pathology.

Diabetic retinopathy

Diabetic retinopathy, the most frequent complication among people with Type 1 diabetes, is the consequence of **damage to the capillaries that supply the retina**.

Today unfortunately, retinopathy is one of the major causes of blindness in developed countries; the chances of blindness are related to the duration and compensation status of diabetic disease. There are two forms of retinopathy: **non-proliferative and proliferative**.

In the non-proliferating form, a macular edema is formed, which could lead to a decrease in vision. In the proliferating form, on the other hand, new blood vessels start to form on the retina, on the optic nerve head, in the vitreous body and, in more serious cases, on the iris. These vessels have a tendency to bleed into the vitreous body, which loses its transparency and no longer allows light rays to reach the retina, causing severe and sudden loss of vision. Over the years these new vessels tend to retract causing retinal detachment. To prevent the onset of diabetic retinopathy and slowing its progression, is fundamental to **control blood sugar, blood pressure and fats**. So far, **photocoagulation** of the retina by laser is the only treatment for diabetic retinopathy effective in reducing the risk of blindness and severe vision decline. If laser treatment is adequate and timely, it is possible to avoid a progression of retinal damage.

Also eyes can get cancer

Ocular cancers are quite rare, but they are responsible for the **0.1% of deaths** caused by oncological pathologies.

In childhood, the most frequent cancers are **retinoblastoma and rhabdomyosarcoma**, in adulthood, about **90%** of tumors is represented by **melanoma of the uvea** (a tissue located between the sclera and the retina), but there are also tumors affecting other parts of the eye. The great variety of neoplastic forms of the eye and ocular adnexa requires in-depth and specific knowledge: this is why ocular oncology is now considered a distinct discipline, requiring ophthalmologists with high level training and dedicated to the diagnosis and treatment of such pathologies within Ocular Oncology Centers, present on the national territory.

Watch out for symptoms

Most **retinoblastomas** manifest as a white reflection in the pupil (**leukocoria**), but it is not uncommon, as the first sign of the disease, the appearance of a **squint** that can be associated or not with leukocoria. When there is a family history of retinoblastoma, babies should be observed from the first months of life, before leukocoria arises.

Uveal melanoma, on the other hand, begins with **blurred vision, bright flashes and reduction of the visual field**. In addition to pain and the presence of a visible mass, the patient has the feeling of seeing "moving bodies" or "**flying flies**" inside the field of view.

Iris melanoma occurs in a circumscribed or diffuse form; hence any variation of iris color should alert the patient.

Ciliary melanoma can cause visual disturbances or cataracts only in advanced stages, when it has reached a size that makes it visible.

Choroidal melanoma generally develops asymptotically however, if it is located in the posterior pole, it can lead to a reduction in visual acuity. Other symptoms reported by patients are **bright flashes**, called phosphenes, or **visual field deficits**, which can be attributed to the presence of a retinal detachment associated with the neoformation.

Basal cell carcinoma is usually localized in the lower eyelid and in the inner corner, then in the upper eyelid and in the outer corner. It usually appears as a painless,

hard, adherent lump, sometimes with a central ulceration. Any lump that does not regress or an ulceration of the eyelid that does not heal should be evaluated by a specialist. The appearance of a pigmented spot or a pink lump on the surface of the eye may represent a nevus or a neoplasm.

The importance of research

As never before, in these years there has been a wide and extremely rapid evolution of therapies to treat diseases such as glaucoma, maculopathies, cataracts or refractive defects that, twenty years ago, would have been an absolute mirage. Furthermore, we are entering an extraordinary era where genetics begins to be part of advanced therapies for eye diseases. Finally, although they are not common as other types, eye cancers have a strong impact on quality and life expectancy of patients, and additional tools are needed for early diagnosis and therapy. In the last two years, Fondazione Umberto Veronesi supported the work of three researchers working on uveal melanomas and retinoblastoma.

Supporting scientific research is essential.

When shall we go to the eye doctor?



To prevent any eye disease and make early diagnosis, in order to be able to anticipate treatments as much as possible, it is important to start monitoring sight and any eye defects **from a very young age**. A very first check, that is part of the LEA (Essential Levels of Assistance), it is the red reflex, performed in all Italian neonatology. This test allows for early detection of pathologies or visual deficits such as cataracts, retinal detachment, glaucoma and retinoblastoma.

This test is then repeated by the family pediatrician the first time he/she checks the child within a couple of months after birth.



Furthermore, from birth, or in any case at a very young age, it is possible to find defects such as **strabismus**, i.e. the incorrect alignment of the eyes, which can be cured if we take action early.

Both strabismus and some refractive defects - in particular **anisometropia**, the presence of an astigmatic eye and a myopic eye -, can be the cause of low visual acuity in one eye. In this case we speak of **amblyopia**, or **lazy eye**, a condition that can also contribute to the alteration of binocular vision and can compromise the proper development of the ability to perceive images depth. To allow children to develop proper binocular vision it is necessary to correct early the refractive defects with glasses, to rehabilitate amblyopia and to perform surgery on the squint. It is in fact known that the ability to perceive the depth of the visual field requires excellent visual acuity in both eyes and correct visual alignment.

It is therefore important to have **regular eye check-ups**, even in the absence of symptoms or disorders, at different stages of life.

- Around 3 years old → to detect vision problems
- Around 6 years old → to detect refractive defects (myopia, astigmatism, hypermetropia)
- Around 12-14 years old → to detect myopia or other diseases
- Around 18 years old → to prepare for driving, work, or any military service
- Around 40 years old → to correct presbyopia
- From 50 to 65 years old (every 5/7 years) → to prevent diseases such as glaucoma, cataracts and others
- After 65 years old (every 2/3 years) → to detect the first signs of age-related macular degeneration

Can we do preventive eye care?

Yes, we can

To prevent eye problems and protect their health, lifestyle, as always, can give us a big hand. Let's see how.

Nutrition

A healthy diet is fundamental to preserve eye health. The retina, in fact, is one of the body tissues with **higher metabolism**, and therefore, is very vulnerable. To ensure its perfect function, the retina requires a constant supply of protective nutrients. Other parts of the eye, such as the cornea and the lens, are naturally affected by oxidation processes caused, first of all, by free radicals. And the eyeballs suffer a lot from zinc and vitamin C deficiency. **Fruits and vegetables** are essential to eye health, and they should never be missing on our table.

It has been shown that **vegetables with green leaves** (spinach, kale, broccoli and turnip greens), corn and eggs are particularly beneficial for the eyes, due to their high content of **lutein and zeaxanthin**, two antioxidant substances that can considerably reduce the risk of cataract. The "diet for healthy eyes" must also include vitamin E (abundantly present in **sunflower oil, almonds, wheat germ**) and vitamin C, that is capable of preventing damage caused by exposure to sunlight, and can come from eating regularly **citrus fruits, kiwis, strawberries, raspberries, peppers and broccoli**. Omega-3 fatty acids (found in some types of fish, such as salmon and sardines), known above all for their cardioprotective action, are able to play a protective role also on the eyes, by preventing the formation of plaques in the retinal vessels and thereby reducing the risk of retinal degeneration, a leading cause of blindness.

On the other hand, **excessive consumption of red meat should be avoided**, because it increases the risk of age-related macular degeneration. Also weight gain in middle-aged men can lead to the development of macular degeneration, so it is important to **keep the body weight in check**. Proper diet is therefore the **best prevention** to keep your eyes healthy for as long as possible.

Foods to eat regularly

All types of fruits and veggies
Fish
White meat
Extra virgin olive oil
Whole grain bread
Dark chocolate
Almonds, walnuts, hazelnuts
Green tea
Legumes

Foods to limit as much as possible

Alcohol
Salt
Refined sugar
Caffein
Red meat
Sweets
White bread
Sweet sodas
Fat food
Salami and ham
Seasoned cheese

Red meat and overweight damage the eyes

A recent study published in the *American Journal of Epidemiology* highlights a correlation between red meat intake and the onset of a severe disease affecting the retina, age-related macular degeneration, which can even lead to blindness. For example, people who consume more than 10 servings of red meat per week have 50% more chance that the retina will deteriorate with age, compared to those who consume less than 5 portions. Another study concerning this disease was performed by the University of Melbourne: the researchers have found that even weight gain in middle age men can cause macular degeneration development.

The authors of the research explained that obesity is a pre-inflammatory state and that the actual inflammation is directly involved in its onset of the pathology. The research was carried out on approximately 21,000 people between 40 and 65 years old, whose waist circumference was monitored in relation to the onset of the pathology: in men, the risk of developing macular degeneration increases by 75% for each 0.1 increase of the waist circumference /glutes circumference ratio.

Physical activity

Practicing physical activity every day is the secret to be healthy in general, but also, to protect eyesight. It keeps the muscles active and helps to maintain the proper metabolism. Eye health is linked to the proper functioning of body organs, including cardiovascular system, hepatic metabolism, brain performance, which are positively stimulated by regular sports activity. Which sport to choose? There is not a real rule for this.

A **daily fast-paced walk of about 30 minutes** is enough to have an immediate overall benefit and to feel really good.

Eye hygiene

Tears are able to clean and disinfect the eye, thanks to substances such as lysozyme. However, **eyelashes and eyebrows must be cleansed** as well; they have the natural function of "collectors" of external elements capable of damaging the eye, such as airborne dust or particles. These are real barriers that must be **washed with plenty of water** and the make-up should be cleaned with detergents that completely remove cosmetics. The products choice is also important: make-up must be tested and its safety must be guaranteed from a quality point of view. Therefore, it is recommended to choose hypoallergenic products or "for sensitive eyes" even if these do not eliminate the risk of allergic contact dermatitis.

Thus, in summary, it is good to wash your face with running water more than once a day or at least to perform a **full wash in the evening** for general eye hygiene, and to always use **quality cleansing products** to remove eye make-up.

Acanthamoeba keratitis, how to avoid it?

People that wear contact lens, especially those who abuse and neglect contact lenses hygiene, must pay particular attention to an insidious enemy: the **Acanthamoeba**.

This protozoan is typically found in soil, air and rivers, lakes or seas, and at times, we can also find it in showers, for example in beach resorts. This amoeba can sneak inside the lens and stay there, since lens are rich in water. If there is a small lesion in the cornea, the microorganism can penetrate it and cause keratitis: this is an inflammation of the cornea that is very long-lasting and difficult to eradicate and cure. The eye becomes swollen, red and painful, with a whitish patina visible to the naked eye. At the moment, there are no authorized drugs available for the treatment of Acanthamoeba keratitis, but are usually administered off-label combinations of anti-amoebic agents, such as biguanides and diamidines.

How to prevent the disease:

- implement good hygiene of contact lenses: they are still foreign objects, which may carry infectious agents;
- do not wear contact lenses for too many hours a day;
- never sleep with contact lenses;
- remove the lenses at any sign of discomfort;
- avoid using contact lenses on the beach, especially when you swim in the sea;
- do not clean contact lenses with inappropriate liquids such as saliva: use only the appropriate saline solution.

Few simple moves to protect the eyes

Indoor

- Better to avoid reading or writing in low light conditions: to not strain the eyes and keep them in a state of visual rest, the light must be directed on the text when writing and the room must have a **background light**.
- If you read in bed, the head must not be bend in weird angles to avoid straining the cervical. The book should be kept at **30-40 centimeters distance** and slightly below your front visual axis. The light source must be placed behind or on the side, never above the person reading.
- Reading and writing on the computer is not harmful, as long as **every two hours we take a break** to rest the eyes for a couple of minutes.
- Do not abuse contact lenses especially if they are soft: wear them for a **maximum of 6-8 hours a day**. About 15% of contact lens users show sign of intolerance and allergy (irritation, photophobia, etc) due abuse.
- **Avoid** eyes exposure to **ultraviolet (UV) radiation produced by tanning lamps**: in case of sun lamps use, never forget to protect your eyes with the special goggles.
- If your eyes are irritated, clean them with a sterile disposable cleansing tissue and instill a drop of artificial tear; repeat the instillation several times if needed.
- As for television, if there is a vision defect glasses are needed to correct it, as the TV should **never be watched from less than two meters distance**.

Outdoor

Outside the house, we must be **pay extra attention to sun radiation** which, only if taken judiciously, especially UV rays, can be beneficial.

The electromagnetic spectrum includes all the radiant energy that comes from the sun and that reaches the earth's surface, after passing through the filtering action of the atmosphere (ozone, oxygen and other components). However, we are going towards a critical period from a climatic point of view: we are, in fact, in front of a much less shielded sun. For this reason, it is recommended to **use lenses that protect us from ultraviolet radiation (UV-A and UV-B)**, which are the main responsible for damages to the eye tissues. Furthermore, the harmful effect of UV rays adds up to the natural aging processes that progressively affect the eye over the years. Also **blue radiation** (visible, but with a wavelength close to ultraviolet) can be dangerous: they can cause damage to the retina and they have been recognized as partly responsible for age-related maculopathy. For all these reasons it is important to protect your eyes from sunlight with special glasses.



The importance of sunglasses

Nature has equipped our eyes with some defenses against light radiation: that's why in case of excessive light, you can close your eyelid and, in an independent and automatic manner, the pupil narrows, limiting the amount of light that can get into the eye. However, this is not always enough to protect the eye. **Prolonged sun exposure**, in fact, especially if it occurs in the hours when the light is more intense, can be harmful to the eye; it is therefore fundamental to **not stare directly into the sun. Colored lens (sunglasses)** of varying density can reduce the amount of visible light that reaches the eye and limits glare, but it must also be able to **protect us from harmful UV radiation and from blue light**. This ability is given by appropriate filters, which are intrinsic in the material that constitute the lens and that have nothing to do with the substances that color them.

Colored glasses, more or less dark, only protect the eyes from the intensity of ambient light; if you also want protection from ultraviolet radiation you have to wear lenses with UV adsorber. The most used materials are the organic ones (CR 39, polycarbonate, nylon and others); these lenses are lighter and safer in case of trauma. Both lenses made of organic material and those in mineral glass have a good sun protection action, even though glass lets in more UV radiation than plastic.

Lenses are not all the same

Photochromic lenses

They change the intensity of their own color, and consequently the light filtration, based on the intensity of the radiation passing through them.

Polarized lenses

They allow the passage of light radiation only in one direction; they are mainly useful at the seaside, at the lakes, at the rivers and all the times that the road is wet from the rain.

Anti-glare glasses

They are suitable for people who are often photographed or filmed with frontal lighting, as they decrease the reflection that normally forms on the glasses. However,

visual advantages from an optical point of view have not been yet demonstrated.

How to protect children's eyes from sunlight?

To protect children, and not only children, from the sun it is important to use **safe and effective glasses, with the CE mark**, avoiding unbranded unreliable devices, which could create a false sense of protection. Glasses should absolutely be used by children in conditions such as high mountains where the rays are more incident, or at the seaside where there is the glare of the water or on the snow, in addition to a hat with visor. In fact, the sun's rays are not always completely filtered by the lenses.

How to choose sunglasses?

For a careful purchase of sunglasses, you need to check for the presence of all the characteristics listed in the UNI EN 1836: 2008 standard. Each sunglass belongs to a category, based on protection from visible sunlight:

- 0 → category 0 filters 20% of sun rays
- 1 → category 1 filters from 20% to 57% of sun rays
- 2 → category 2 filters from about 57% to 80% of sun rays
- 3 → category 3 filters from about 80% to 90% of sun rays
- 4 → category 4 filters over 90% of sun rays.

Italian sunglasses are generally considered the best in the world for design, durability and visual quality.



For more information

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Linee guida SOI

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S.I.C.O.P Società Italiana Chirurgia Oftalmoplastica

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American Academy of Ophthalmology

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