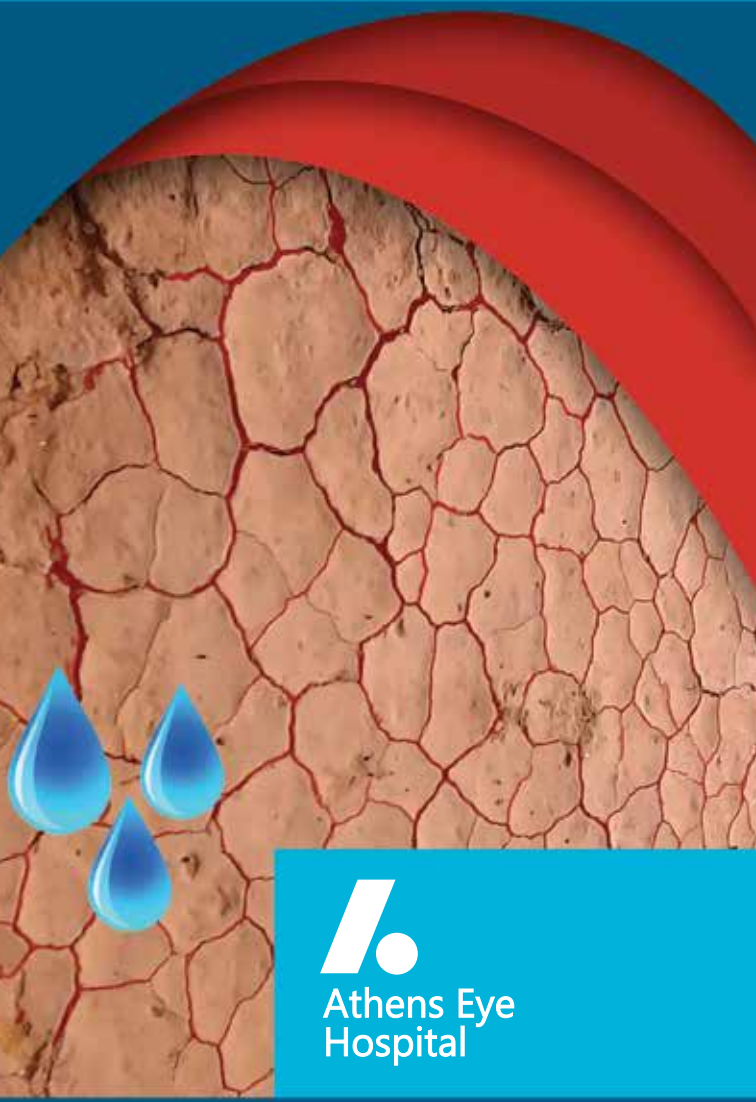
Are you suffering from Dry Eyes?

• redness • excessive tearing • blurry vision
• inflammation • sensitivity to light
• foreign body sensation



Athens Eye Hospital

DRY EYE CLINIC

Are you suffering from Dry Eyes?

The dry eye is a common and serious inflammatory disease. It comes with significant symptoms and can lead to severe damage of the eye.

What are typical symptoms of a dry eye?

- redness of the eye
- foreign body sensation
- burning
- sandy, gritty sensation
- excessive tearing
- sensitivity to light
- blurry vision
- tired eyes
- swollen eyelids
- agglutinated eyelids
- enhanced mucus secretion
- contact lens intolerance
- intolerance to cosmetics
- problems with computer work
- irritation from wind, smoke, air condition

The dry eye disease is a common, underestimated clinical condition that can significantly impact a patient's life. Approximately up to 34% of human beings are suffering from dry eyes! Surprisingly even excessive tearing can be a hint to a disturbed tear film as well.

Why is a healthy tear film so important?

The tear film consists of three different layers (lipid, water and mucin). The main work of the tear film is to moisture the ocular surface, the inner eye lid, conjunctiva and cornea. A dry ocular surface gets sore and dull and leads to low visual accuracy.

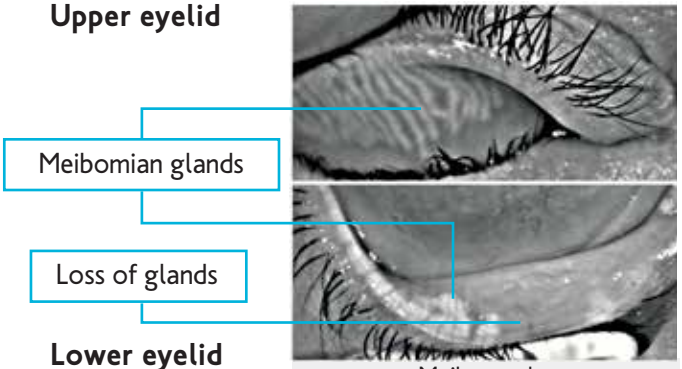
Patient suffering from dry eyes (swollen eyelids, redness of the conjunctiva, excessive tearing)

Moreover, a healthy tear film prevents the eye from infections by providing germicidals. This is necessary because the eye is obviously exposed constantly to environmental influences. The risk of eye infections is increased for people suffering from dry eyes.

Another key role of a healthy tear film is supplying the transparent cornea with oxygen, nutrients like glucose and the disposal of metabolism products. Having dry eye symptoms can be way more than a simple irritation of the ocular surface. It may lead to other, more severe, diseases of the eye and should be properly diagnosed by a professional.

What causes a Dry Eye?

The symptoms of dry eye lead to huge impact on life and discomfort for the suffering people. The causes and mechanisms involved in the development of dry eye disease can be diverse and there are several risk factors involved.



Meibography
(Pictures: Athens Eye Hospital)

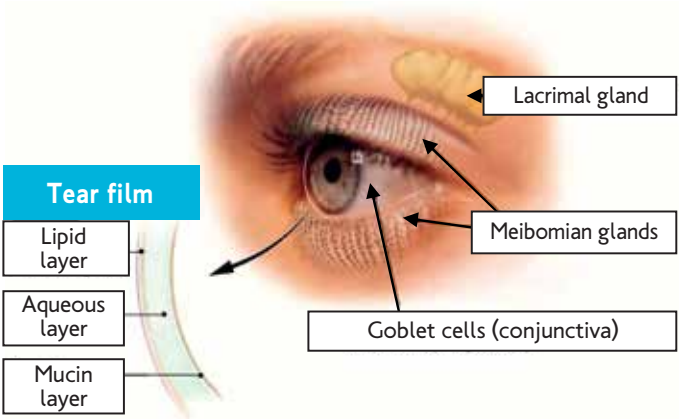
Common reason for dry eyes: meibomian gland defects

Risk factors for dry eye:

- female gender
- age-related reduction of tears
- postmenopausal estrogen therapy/androgen deficiency
- skin diseases (ex. rosacea)
- systemic diseases, autoimmune reactions
- vitamin a deficiency
- increased ozone and fine dust
- heating, smoke, windy conditions
- working with computers, tablets, handy
- use of contact lenses
- injuries, operations at the eye
- immunologic causes
- infestation with parasites, like demodex mites

How is the tear film constructed?

The tear film consists of three different layers. Every layer has its own purpose.



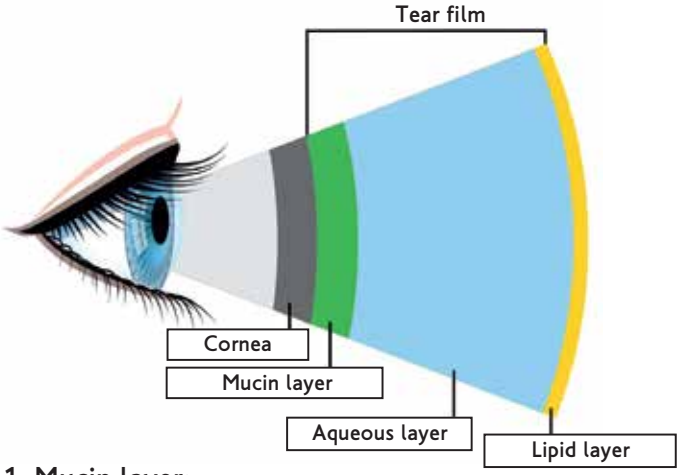
Lipid layer:
=› produced by the meibomian glands
=› responsible for preventing the aqueous layer from evaporating

Aqueous layer:
=› produced by the lacrimal glands
=› nourishes, protects and lubricates the eye

Mucin layer:
=› produced by the goblet cells
=› connects aqueous layer with the cornea

The fine-tuned regulatory system of the tear film, as a functional unit, reacts on external, endocrinological and cortical influences. If a disturbance of one of these components occurs, it may lead to destabilisation of the tear film, resulting in dry eye symptoms. Reasons for tear film instability are reduced secretion of tears, delayed clearness and a changed composition of the tear. Especially a changed composition or osmolarity is seen as an important pathogenic factor, leading to inflammations of the surface cells on the cornea and conjunctiva.

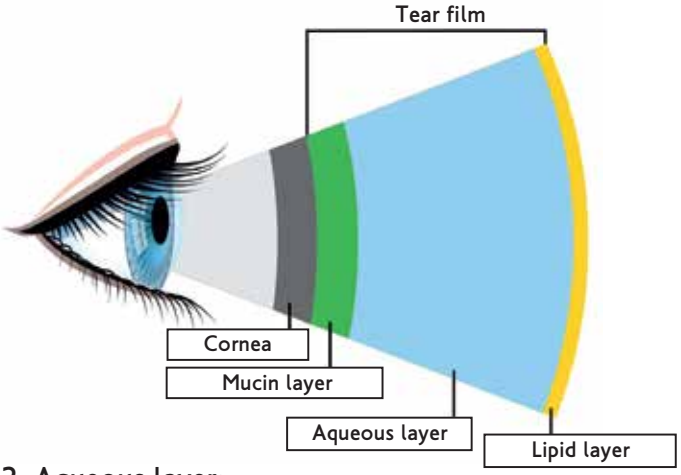
The 3 main compounds of the tear film:



1. Mucin layer:

The mucin layer is partly mixed with the overlying aqueous layer, allowing the aqueous layer to adhere to the hydrophobic membrane of the conjunctival and corneal epithelial cells. Thus it plays a vital role in tear film stability. By lowering the surface tension between these two layers, it acts as a wetting - and stabilising agent for the thin precorneal tear film between two eyelid blinks.

The 3 main compounds of the tear film:



2. Aqueous layer:

The aqueous layer (thickness about 8µm) represents the main part of the precorneal tear film. It consists to 98% of water, but also contains:

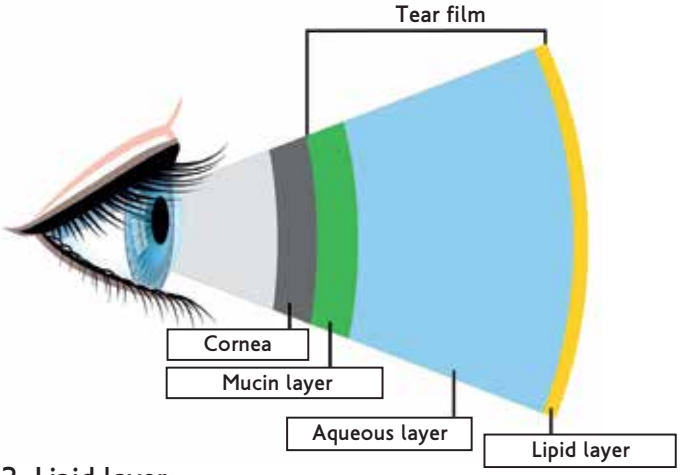
- water soluble gases: O_2 and CO_2
- electrolytes (sodium, chloride, magnesium, calcium, potassium etc.)
- hormones (prostaglandins, thyroid hormone, insulin, prolactin)
- organic molecules (glucose, urea, pyruvate)
- proteins (lysozyme & lactoferrin => antibacterial; interferon => antiviral)
- antibodies

99% of these proteins are synthesised by the main lacrimal gland

Role of the aqueous layer:

The main function of the aqueous layer is to nourish, protect and lubricate the eye. The aqueous layer carries nutrients and oxygen to the cornea and carries waste products away.

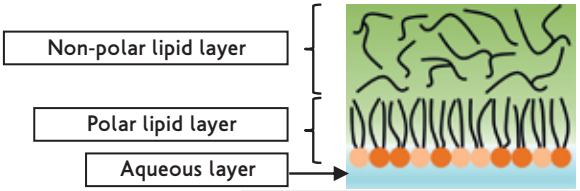
The 3 main compounds of the tear film:



3. Lipid layer:

It's the thin outermost layer, that is exposed to the air (thickness 0,1 - 0,2µm).
The lipid layer is produced by the meibomian glands.
Several factors may have an influence on secretion:

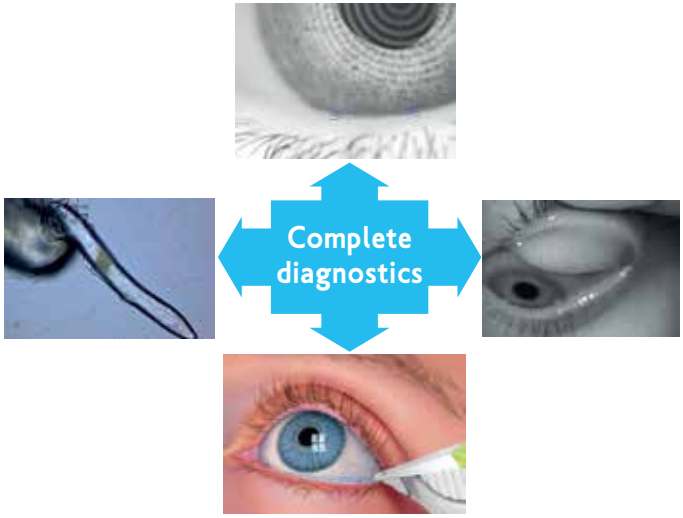
- blinking reflex
- hormonal (androgens)
- physical (feedback regulation according to surface tension)



Schematic closeup of the lipid layer

Role of the lipid layer:
The lipid layer reduces water evaporation (aqueous layer), preventing cooling and drying. Without this layer the tear film would get lost up to 20 times faster. The lipid layer also maintains surface tension and stabilises the tear film, "sealing" it on the eye and preventing tears from overflowing onto the cheeks.

Lid margin - Tear film department Dry Eye Clinic (diagnostics)



The “Lid margin - Tear film department”, which is housed within’ the Athens Eye Hospital, provides complete diagnostics, for people suffering from dry eye symptoms. The goal we have is to determine the exact cause of your symptoms, for individual treatment. The diagnostic area is based on international guidelines for dry eye and provides the highest international standards.

Keratograph for dry eye diagnostics

Lid margin - Tear film department Dry Eye Clinic (diagnostics)

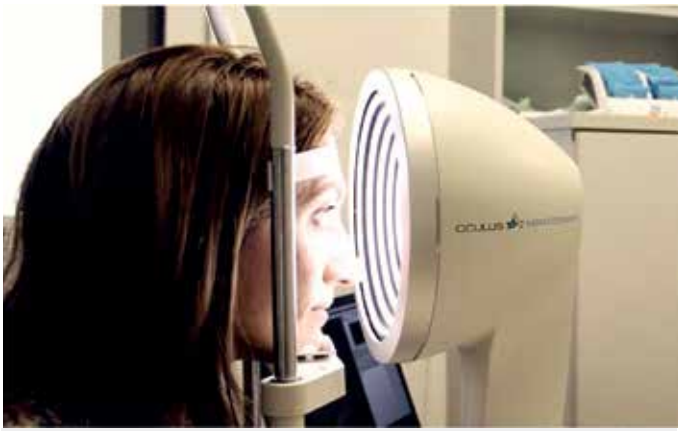
Diagnostics dry eye

- Evaporative dry eye
- Aqueous deficiency

An individualised therapy is offered to each patient. One of the key distinctions is wether the patient suffers from an aqueous deficiency (less water compound), or an evaporative form of dry eye (lack of lipids).

Evaporative dry eye
(less lipid compound)

Aqueous deficiency
(less water compound)



Dry eye diagnostics

Lid margin - Tear film department Dry Eye Clinic (diagnostics)

The role of “demodex” mites with dry eyes:

Demodex folliculorum

Demodex mites are ectoparasites, living on the human being. They are very common and usually located around the nose and the eyelids. These, 150-350µm, long parasites live and stay at the exits of hair follicles/eyelashes, or even at the exit passage of the meibomian glands. They feed themselves with cytoplasm and also from the surrounding secretions.

Eyelash with demodex infestation

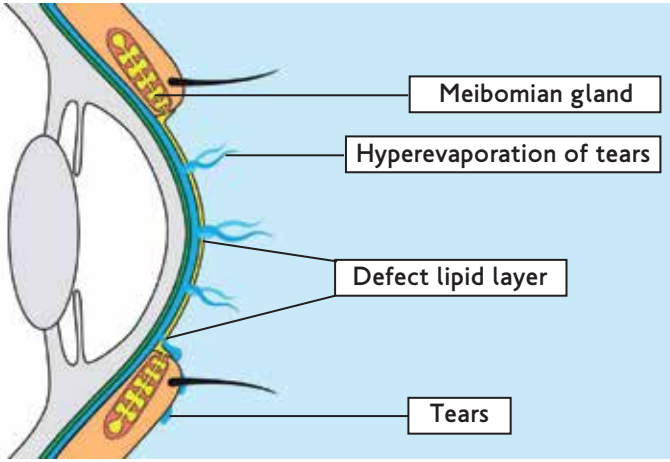
In the case of dry eye, they can play a role in meibomian gland dysfunction and chronic blepharitis/inflammations. The doctor can see a hint for demodex infestation at the lid margin (at the slit lamp). The lid margin is more red than usual and yellowish crusts, around single eyelashes, can be seen. The doctor can ensure the individual case with the help of a microscope.

B. oleronius (bacteria), which most probably functions as a co-pathogen in the development of blepharitis, is coexisting with demodex mites. B. oleronius produces enzymes, that are capable of splitting lipids, thus enhancing dry eye syndromes even more.

Lid margin - Tear film department Dry Eye Clinic (therapy)

Evaporative dry eye

More than 80% of the patients suffering from dry eye symptoms are lacking an appropriate lipid compound of the tear film. The result is an unstable lipid layer, thus an increased evaporation of the aqueous layer and/or a tearing eye.



Reasons for enhanced evaporation can be separated in an intrinsic and/or extrinsic form. Intrinsic means, that your own body is the reason of the problem. Extrinsic forms are caused due to environmental reasons, drug use, wearing contact lenses etc.

Lid margin - Tear film department Dry Eye Clinic (therapy)

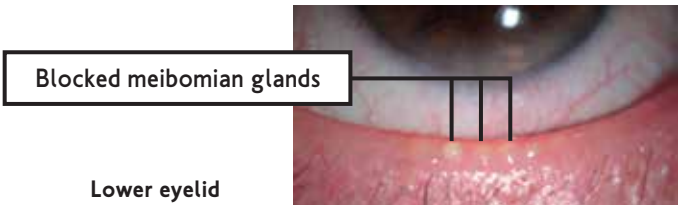
Evaporative dry eye

The evaporative, most common, form of dry eye disease has several risk factors. Some can be avoided and some need and can be treated by the

“Lid margin - Tear film department”

Risk factors for an evaporative dry eye:

- blocked meibomian glands, inflammation
- age and gender
- consistency of the meibum
- skin conditions (rosaceae, psoriasis etc.)
- wearing contact lenses
- medications => antidepressants, antihistamines...
- diseases like “Sjögren's syndrome”, rheumatoid arthritis, diabetes...
- allergies affecting your eyes
- vitamin A deficiency
- some toxins, mites at the lid margin
- eye injuries
- eye surgery
- smoking



Lid margin - Tear film department Dry Eye Clinic (therapy)

Evaporative dry eye

The therapy of an eye suffering from a hyperevaporative tear film has the goal of reactivating the meibomian glands, reduce inflammation and reduce risk factors.

Therapy options:

- hygiene and massage of the lid margin
- manual obstructions of glands
  => by a professional
- IPL light impulse therapy
  => reactivation of meibomian glands
  => enhance blood flow
  => reduction of inflammation
  => improve skin condition
  (reduce bacteria and mites)

IPL therapy with Lumenis M22

Lid margin - Tear film department Dry Eye Clinic (therapy)

Evaporative dry eye

The IPL (intense pulsed light) technology, used by the "Lid margin - Tear film department", is provided by the Lumenis M22. The pulsated, patient adjusted, light gets into the inner skin layers. So chronical inflammatory processes, bacteria and mites can be reduced/killed and the meibomian glands can be reactivated.
The IPL provided by the Lumenis M22 has "optimal pulse technology" (OPT). This means, that exactly the right amount of light is sent to your skin.
For an optimal result, four sessions (every four weeks) are recommended

IPL-studies showed positive effects on patients:

- enhanced skin flora
  => reduce harming skin bacteria
  => reduce/kill demodex mites
- enhanced blood flow
  => reduce "spider-veins", thus more effective blood flow and better skin appearance
- stimulates metabolism
  => metabolism of skin and lid margin/glands can be enhanced
  => production of anti-inflammatory substances is enhanced
  => improvement of dry eye symptoms!

Lid margin - Tear film department Dry Eye Clinic (therapy)

Aqueous deficiency

This form of dry eye disease is characterized from lack of tears, reduced tear production to complete lack of tear secretions. This leads to decrease of volume and breakups of the homogenous tear film can occur. The therapy of an aqueous dry eye starts with artificial tears and/or gels, designed to mimic the human tear film. Remoisturing the ocular surface is the key objective. In addition, food supplementations with nutritional substitutes may help as well. If your symptoms don't improve your dry eye specialist may prescribe a drug to help increase the tear glands production.

Autologous serum drops:

Our bio-pathological department can provide eyedrops, drawn from your own blood. These drops are rich of growth factors and can help restore your epithelial cell on the cornea.

Autologous serum is well tolerated and provides molecules, helping the proliferation of epithelial cell on the ocular surface. These cells help stabilise the tear film in a natural way, thus reducing dry eye symptoms.

Serum also provides other molecules like immunoglobulins, lysozymes etc., helping to reduce the bacterial load and risk of infections.

Autologous serum drops are used for patients with severe dry eye symptoms.

Aqueous deficiency

Advanced medical therapies:

Cyclosporine is an immunosuppressant, also used in ophthalmology. Cyclosporine blocks the release of inflammatory cytokines, thus provides a decrease of inflammation. It is used in severe cases of dry eye, often associated with immunological diseases.

Plaquenil: (hydroxychloroquine sulfate) is a drug, originally used to prevent or treat malaria. It can also be used to treat inflammatory diseases, like “Sjögren's syndrome”, which causes dry eyes.

Plaquenil lowers your immune systems response to infections. A rare side effect of plaquenil is damage of the retina. If you take plaquenil it is very important to have regular ophthalmological controls. Your ophthalmologist will check your retina for problems, before serious damage occurs.

Lid margin - Tear film department Dry Eye Clinic (therapy)

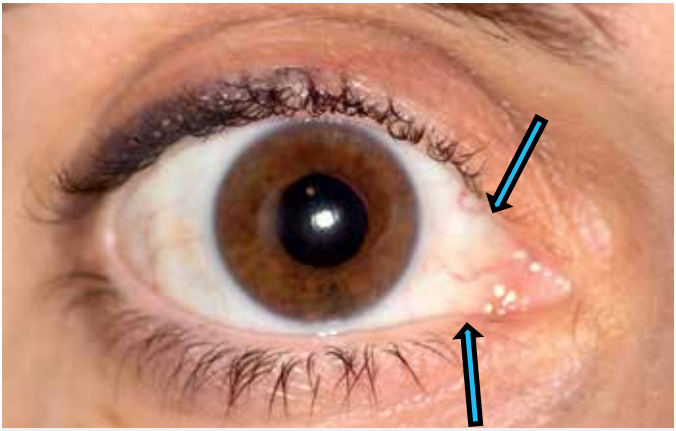
Aqueous deficiency

If a conservative approach has not the appropriate effect, a surgical intervention may be needed.

Punctal plugs:
Your doctor may decide to plug the drainage holes at the inner corners of your eyes. This can keep your own tears for longer periods. Most plugs are temporary, but your doctor may place permanent plugs if he/she thinks they're appropriate.

Consider surgery! There is a way to close the drainage holes at the inner corners of your eyes. This is a method to keep your tears in your eyes for a longer time

Punctal plug



Options for punctal plugs

Lid margin - Tear film department Dry Eye Clinic (therapy)

Aqueous deficiency

Always consider that your dry eye symptoms can be prevented or improved by changing the following:

- install a humidifier
- wear (sun-)glasses with side shields
- avoid direct breeze (from fans etc.)
- blink more and complete, if possible (computer work!)
- stop smoking, avoid smoke

Athens Eye Hospital

Athens Eye Hospital

45, Vouliagmenis Avenue
166 75 Glyfada

T (+30) 210 969 7000 / 964 7790
F (+30) 210 969 7001

Athens Eye Hospital

Athens Eye
West Attica Center

155, Thivon Avenue
121 34 Peristeri

T (+30) 210 5717 711 - 12
F (+30) 210 5717 713

www.athenseyehospital.gr
info@athenseyehospital.gr