

Angiography

Angiography is a diagnostic procedure that allows the eye care professional to clearly see the blood vessels at the back of the eye, including the retina, choroid, and/or optic nerve.

It entails the injection of a fluorescent or indocyanine green (ICG) dye into a vein in the person's arm and taking a series of images (angiograms), as the dye passes through the blood vessels in the eye. Fluorescein angiography is used for studying the retinal circulation, whereas ICG is better suited for studying the deeper choroidal circulation.

In a health eye, the retinal vessels do not allow the dye molecules to passively diffuse out to the eye. In particular, the macula which contains a high quantity of melanin, hardly allows any transmission of the dye molecules.

However, most retinal structures that are affected by various eye diseases, allow the dye molecules to leak out giving rise to a flush that can be seen in the developed angiograms.

The differences in impermeability to fluorescein or ICG combined with the ability to visualize the vascular patterns and/or the damaged vessels allow the eye care professionals to identify the troubled areas.

Why it is performed

Angiography is used to:

- Identify and locate blood vessel abnormalities (such as new sub-retinal vessel growth and/or leaking vessels) in the retinal vascular structures (e.g., the macula or choroidal layers) caused by various eye diseases, such as diabetic retinopathy or age-related macular degeneration.
- Examine the extent of the vascular abnormalities to plan a proper treatment.
- Evaluate the success of treatment, such as a laser photocoagulation of leaking vessels.

Fluorescein angiography is frequently used for evaluation of patients with diabetic retinopathy, occlusive diseases such as arterial occlusions and retinal vein, and evaluation for wet macular degeneration.

ICG angiography is frequently used when blood is present in the macula caused by the wet form of age-related macular degeneration (AMD).

How to prepare

No special preparation is required for the fluorescein angiography examination.

How it is performed

Before the fluorescein angiography examination is performed, a special dye, fluorescent or indocyanine green (ICG), is injected into a vein in the person's arm. The dye circulates throughout the bloodstream, including the delicate vessels in the retinal structures.



Shortly after the dye is injected, the patient is asked to position his or her head in the head mount of the fundus camera (as illustrated above).

The dye fluoresces inside the retinal blood vessels under illumination of a light projected from the fundus camera, making the vessels stand out. A sequence of photographs (angiograms) of the retina is taken using the camera.

After the test, the ophthalmologist makes a careful interpretation of the angiograms. If the results of the angiography examination are inconclusive, the procedure may be repeated. The angiography examination typically takes several minutes.

Results

The results vary significantly depending on the condition being studied and the patient.



Fluorescent angiogram

The angiograph above illustrates the type of results that may be obtained during the angiography examination.

How it feels

After the dye is injected into the blood stream, some people may experience mild reactions, such as itching, excessive sneezing, flushing of skin, or slight nausea. These reactions, however, pass quickly following administration of the dye.

Taking the pictures (angiograms) with the use of the fundus camera is painless.

What the risks are

The angiography examination is safe. After the dye is injected into the blood stream, some people may experience:

- Yellowish tints on the skin that last several hours.
- Darkening of urine for up to 24 hours following the examination.

As the fluorescein dye does not contain iodine, it may be used in patients who have allergy to iodine. The ICG dye however, is formulated with iodine; therefore, it is not advised for people with iodine allergy.

Allergic reactions, such as itching or a skin rash, are very rare and treatable with oral or injectable antihistamines, depending on symptoms. Severe allergic reactions, such as anaphylaxis, are extremely rare.

Despite these minor risks, fluorescein angiography is a valuable technique for evaluating the retina, optic nerve, and choroid. The importance of detecting problems in the retina, optic nerve, and/or choroid early far outweighs the drawbacks of angiography.