Retina Picture Quiz: Questions (Figs. 1 to 6)

David Yorston

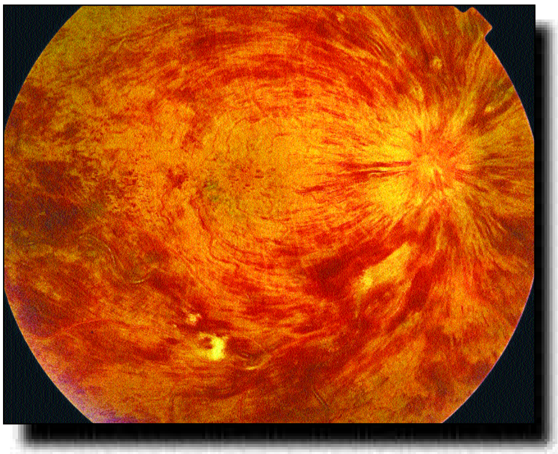

Fig 1: 55 year old man. Open angle glaucoma in left eye. Noticed loss of vision in right eye on waking this morning. VA right eye 2/60.

Fig 2: 23 year old woman. Headache for two months. Worse on waking. VA 6/6 in both eyes.

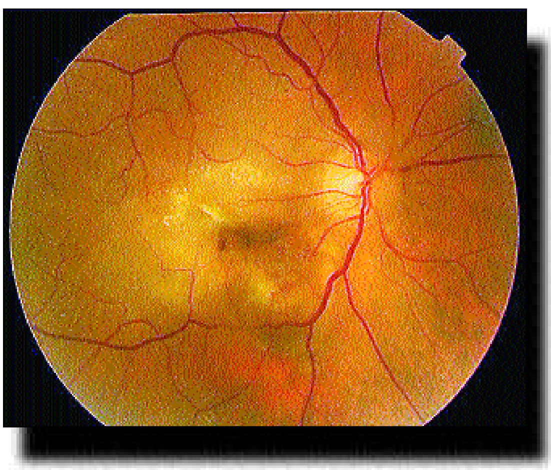

Fig 3: 75 year old man. Noticed distortion of vision in right eye, then loss of central vision. VA right eye 2/60.

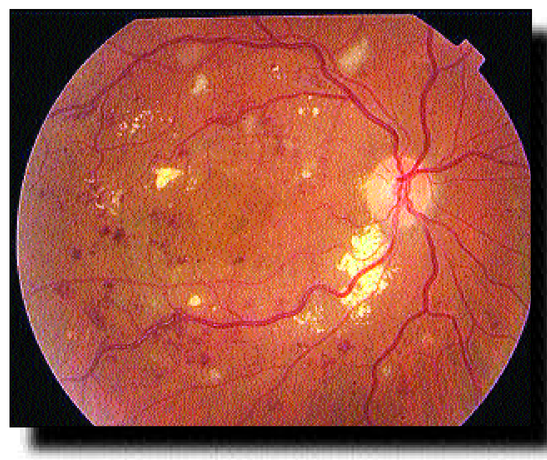

Fig 4: 65 year old man. Gradual loss of vision right eye for one year. Also polydipsia and polyuria. VA right eye 6/18.

Fig 5: 58 year old woman. Sudden loss of vision in right eye one week ago. Floaters in right eye two weeks previously. VA right eye HM.

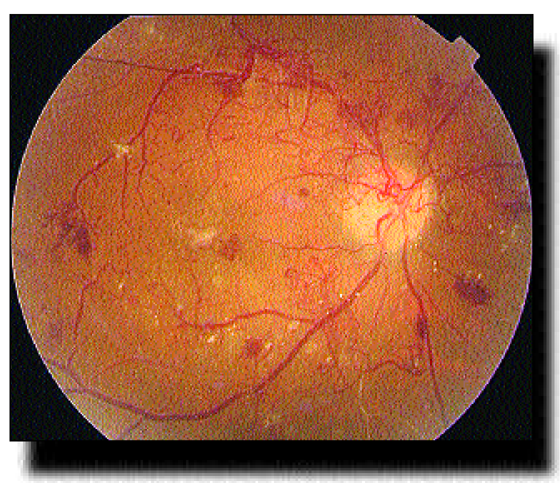

Fig 6: 28 year old woman. Type 1 diabetic for 13 years. VA right eye 6/12.

Retina Picture Quiz: Answers (Figs. 1 to 6)

David Yorston

Fig. 1: Central retinal vein occlusion

The large number of haemorrhages, the white cotton wool spot, and the poor vision all suggest that this is probably an ischaemic CRVO. There is a high risk that this will progress to rubeotic glaucoma within the next three months. If iris new vessels are detected, then pan-retinal laser can prevent secondary glaucoma. A high IOP greatly increases the risk of CRVO, so it is important to treat the glaucoma in the other eye.

Fig. 2: Papilloedema

There is a swollen optic disc. As the vision is normal it is unlikely to be optic neuritis, so the most likely diagnosis is papilloedema. Possible causes include raised blood pressure, and benign intra-cranial hypertension as well as intra-cranial space occupying lesions.

Fig. 3: Age-relatedmacular degeneration

There is a sub-retinal scar (retinal blood vessels pass in front of the paler scar tissue) under the macula. The dark area is due to haemorrhage. Fibrous and vascular tissue has grown from the choroid under the retina at the macula, destroying the photoreceptors at the fovea, and causing irreversible blindness. This is the commonest cause of blindness in Europe and North America.

Fig. 4: Diabetic maculopathy

Diabetic retinopathy may occur before the patient knows he has diabetes. This patient has multiple haemorrhages and cotton-wool spots, due to capillary closure, as well as hard exudates, which indicate leaking capillaries. Laser treatment at this stage reduces the risk of further loss of vision over the next five years.Diabetes is becoming a problem in developing countries and health education programmes must raise awareness of the loss of vision due to diabetes.

Fig. 5: Retinal detachment

The wrinkled surface of the retina, and the loss of the normal red reflex are characteristic of a retinal detachment. The flashes and floaters are caused by a vitreous detachment, which caused the retinal break that led to the retinal detachment. The macula is already detached, but surgery to re-attach the retina will at least restore navigational vision.

Fig. 6: Proliferative diabetic retinopathy

There are active new vessels arising from the optic disc and from the retina. Untreated, there is a high risk of blindness within five years. This can be greatly reduced by urgent pan-retinal laser treatment. Screening for diabetic retinopathy and offering appropriate treatment is essential to reduce loss of vision.

☆ ☆ ☆

Technology for VISION 2020

Mould In Optical Instruments

Rod D Watkins
PhD MAppSc DIC
Scan Optics
32 Stirling Street
Thebarton, SA 5031
Adelaide
Australia

Mould can damage optical instruments beyond repair within only a few weeks. There is a good deal of information available on the treatment of mould in buildings, because common respiratory problems and allergic reactions can be caused by mould. Knowledge is also available in the field of conservation of books and fine art because of the high cost of mould damage. However, very little information is available on mould in optical instruments and the management of mould is often ignored by equipment manufacturers and users.

Moulds are plant organisms which form cobweb-like branching arms, from which spores project into the air (see Glossary). Moulds are very common and very widely dispersed. There are 250,000 species of mould, many of which can damage optical instruments. Among the moulds commonly found in instruments are members of *aspergillus, penicillium* and *trichoderma* species.

Conditions of Growth

Although moulds grow in almost every environmental condition on the planet, most prefer temperatures of 20–30°C and relative humidity in excess of 90%. Moulds can germinate from nutrients stored in the spore, but, for growth, they need an additional source of nutrients such as protein, carbohydrate and cellulose. The mould network produces a microclimate close to the supporting surface which can trap dust particles containing nutrients, and can maintain the conditions of temperature and humidity needed for growth. In conditions of high humidity and moisture, many of the nutrients come directly from water vapour in the air.

According to the International Organisation for Standardisation,[1] moulds cannot grow on the glass optical surfaces of lenses, prisms, mirrors or filters without access to other sources of nutrient – such as textile fibres and dust, grease and fingerprints, or varnish. This usually comes from the edges of the optical surface, from contamination left in the joint between the lens and the mounting cell during cleaning, or from varnish or other material in the mounting cell. Figure 1 shows the typical cobweb growth of a mould mycelium from the edge to the centre of a glass surface.

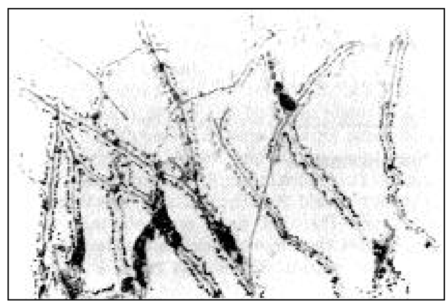

Fig. 1: Typical mould network extending from the edge to the centre of a glass surface (from Kaneko[2])

Mould can grow very quickly. It takes only a few days for mould spores to germinate, and only a few weeks to extend hyphae and grow extensively. Many regions of Africa, South-East Asia and Latin America provide ideal conditions of temperature and humidity for rapid mould growth. Even so, within these regions, the individual risk of damage to instruments varies widely. Some optical instruments are kept in operating rooms, clinics or laboratories which are continually air conditioned and so the humidity never reaches the level needed for mould growth, while others are not. Some instruments have internal fungicidal protection, while others do not. Each instrument must be individually assessed for risk, based on its environment and on the importance of mould damage to it.

In countries where the conditions for mould growth are optimum, mould is often