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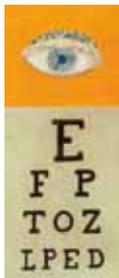
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# Retinopathy

## Screening recommendations

**Background**

Type 2 diabetes mellitus is an increasingly prevalent presentation in Australian general practice, where most patients receive their preventive care and management.

**Objective**

In this article we discuss the relevant issues for clinicians and the screening recommendations for diabetic and hypertensive retinopathy.

**Discussion**

Screening for diabetic retinopathy is a crucial component of preventive care, with early identification of change and timely treatment likely to prevent most blindness. Despite this, a quarter of Australians with diabetes are not appropriately screened. General practitioners must take a key role in initiating, delivering or monitoring their patient's diabetic retinopathy screening to reduce preventable blindness from diabetes mellitus. Hypertensive retinopathy indicates end organ disease but regular screening for hypertensive retinopathy is not routinely recommended.

■ **Diabetes is the chronic systemic disease responsible for most visual loss. Hypertension an important risk factor for diabetic retinopathy and hypertensive retinopathy is an important marker of end organ damage for hypertension.**<sup>1</sup>

**Diabetic retinopathy****Why screen the eyes of people with diabetes?**

General practitioners are on the front line in protecting their patients with diabetes from losing vision. According to BEACH data, type 2 diabetes (T2DM) is managed at an average of 2.9 per 100 encounters in general practice with ophthalmologists being the most common referral destination.<sup>2</sup> Diabetic retinopathy (DR) is the leading cause of preventable blindness in adults worldwide,<sup>3</sup> but early detection and appropriate treatment can prevent nearly all severe vision loss and blindness.<sup>4</sup> The AusDiab study found that 15.3% of people with diabetes (type 1 and 2) had DR.<sup>5</sup> For those with T2DM, it is estimated that between 25–35% have DR,<sup>6</sup> with around 6% having DR at the time of diagnosis. Treatment to prevent visual loss will ultimately be needed by 30% of those with T2DM and 50% of those with type 1 diabetes.<sup>7,8</sup>

As people with diabetes age and endure the illness for longer, DR becomes more common, with the duration of diabetes being the strongest predictor of DR.<sup>8</sup> Diabetic retinopathy has also been associated with higher HbA1c and systolic blood pressure.<sup>9</sup> However, recent randomised controlled trials aiming to maintain tight blood sugar control have not demonstrated improved outcomes for DR and other microvascular complications.<sup>10</sup> On the other hand, trials involving blood pressure reduction have demonstrated a reduction in DR.<sup>11</sup>

Advanced DR causes vision loss and blindness via two distinct mechanisms. The most common, diabetic macular oedema, occurs as the blood retinal barrier breaks down with subsequent blood vessel leakage and retinal thickening.<sup>12</sup> The other mechanism is via proliferative diabetic retinopathy (PDR) where neovascularisation occurs in response to ischaemia. This results in bleeding of new and abnormal vessels. Visual loss is associated with vitreal haemorrhage



or retinal detachment.<sup>12</sup> Laser photocoagulation remains the mainstay of treatment with reductions in severe visual loss by at least 50%.<sup>6</sup> Vision threatening disease owing to PDR or diabetic maculopathy was present in 1.2% of the AusDiab study population with diabetes.<sup>8</sup>

Early detection of DR through screening, coupled with appropriate treatment, can give impressive results. In one Swedish study of 276 people with diabetes who had been appropriately screened over 23 years, only one person was blind as a result of DR. The leading cause of blindness in this study was actually age related macular degeneration.<sup>13</sup> However, in the Australian population, at least 22% of Australians with diabetes have not seen either an ophthalmologist or an optometrist within the 2 year timeframe recommended by the guidelines.<sup>6,14</sup> There are clearly many people who do not access appropriate screening. Furthermore, people with DR were no more likely to have had a retinal examination than those without DR, despite being at increased risk of severe visual loss or blindness.<sup>15</sup>

### Who to screen and how often?

The general recommendation is that GPs need to ensure that their patients with diabetes have been appropriately screened with a dilated fundus and a trained examiner every 2 years.<sup>6</sup> However, many patients with diabetes will have an extra risk factor necessitating yearly screening as per National Health and Medical Research Council (NHMRC) recommendations (*Table 1*). This can be provided by suitably trained GPs, optometrists or where available, ophthalmologists. Some doctors remain concerned about mydriatic drops owing to risks of acute angle closure glaucoma. However, at a rate of 1–6 per 20 000 people, this is uncommon and has not been known to occur with 0.5% or 1% tropicamide drops, which are commonly used in Australian general practice.<sup>6</sup>

### How to screen?

Many GPs refer their patients to a private ophthalmologist or the local public hospital ophthalmology outpatient department for diabetic retinopathy screening. Ophthalmologists generally prefer biomicroscopy of a dilated eye with a special lens in conjunction with a slit lamp. Direct ophthalmoscopy even in the hands of ophthalmologists, is a less effective screening tool owing to limitations of the instrument itself.<sup>6</sup>

Optometrists are another option and have been shown in a number of studies to have safe levels of sensitivity and specificity for detecting diabetic retinopathy internationally<sup>6</sup> and within Australia.<sup>16</sup>

Appropriately trained GPs and physicians have been shown to safely detect DR. This can be achieved using retinal photography in primary care<sup>17,18</sup> and has been successfully used in the Australian Indigenous health context.<sup>19</sup> Tele-ophthalmology in conjunction with retinal photography is another option, especially for rural GPs working where access to an ophthalmologist is difficult. This usually involves the transfer of a digital image of the retina for assessment by a distant ophthalmologist.<sup>6</sup>

While prevention of DR through tight sugar control and blood pressure control are reasonable goals, GPs need to focus on ensuring their patients with diabetes access timely and appropriate screening and treatment with laser photocoagulation to prevent visual loss.<sup>20</sup>

### Hypertensive retinopathy

Hypertension is a risk factor for vision threatening events such as retinal vein and artery occlusion, retinal emboli, and ischaemic optic neuropathy, as well as DR. It has also been associated with glaucoma and age related macular degeneration.<sup>22</sup> Hypertension directly damages the retina, choroid and optic nerve manifesting initially as silver wiring of arterioles and arteriovenous nicking.

Table 1. National Health and Medical Research Council recommendations for special groups

Population	Screening recommendations
Children	Screen at puberty
Women with diabetes who become pregnant	Screen first trimester
Gestational diabetes	Only screen if diabetes persists after pregnancy
Indigenous Australians	Screen every year
Non-English speaking backgrounds	Screen every year
Visual loss (other reason)	Screen every year
Poor diabetic control	Screen every year
Hypertension	Screen every year
Hyperlipidaemia	Screen every year
Renal disease	Screen every year
Long duration of diabetes	Screen every year
Population	Management recommendations
Nonproliferative diabetic retinopathy is detected	Screen every 3–6 months
Proliferative diabetic retinopathy or macular oedema is detected	Ensure patient is seen by an ophthalmologist within 4 weeks
New vessels or vitreous haemorrhage	Ensure patient is seen within 1 week
Visual loss	Patient needs to be seen that day



Progression to moderate hypertensive retinopathy is characterised by flame or blot shaped haemorrhages, cottonwool spots, hard exudates and micro-aneurysms. Severe retinopathy would include these signs as well as optic disc swelling.<sup>22</sup> Hypertensive retinopathy, present in 3–14% of populations over 40 years of age, predicts cardiovascular outcomes such as stroke and myocardial infarction independent of blood pressure measurements.<sup>23</sup> Australian hypertension guidelines

recommend examining fundi in people with newly diagnosed hypertension looking for hypertensive retinopathy as evidence of end organ damage.<sup>24</sup> However, there is no evidence for regular retinal screening in people with hypertension<sup>22</sup> and it is not recommended by Australian nor international hypertension guidelines.<sup>24–26</sup>

Conflict of interest: none declared.

### Case study

Mr FS, aged 45 years, has attended your general practice over the preceding 10 years usually for minor ailments. His wife recently brought him in for a check up and you administer the AUSDRISK screening tool on which he scores 18: he is 45 (4 points); male (3 points); his father has T2DM (3 points); he takes an antihypertensive agent (2 points); he does less than 2.5 hours of physical activity a week (2 points); and his waist measurement is 108 cm (4 points).<sup>21</sup> You then make the new diagnosis of T2DM based on his fasting glucose test >7.0 mmol/L. As part of your GP Management Plan you refer him to your local ophthalmologist for initial screening, who writes back saying that there is no sign of diabetic retinopathy or other eye disease and that he should be rescreened in 2 years.

Over the next 5 years you repeat referral with each annual diabetic cycle of care but Mr FS only sporadically attends the ophthalmologist and by the time he is 50 years of age, it has been 3 years since his last visit. Mr FS is also disinclined to visit the local optometrist because he finds it difficult to take time off work. Around this time your general practice has expanded with an extra consulting room, your practice nurse is enthusiastic regarding preventable blindness, retinal cameras are a third of their original price, and you can easily access online training to read the photos. When Mr FS returns, you are taking and reading retinal photos in your GP surgery (Figure 1 normal retina). Over the next 10 years you notice the onset of mild nonproliferative diabetic retinopathy (Figure 2), which progressed to severe nonproliferative diabetic retinopathy (Figure 3) and eventually proliferative retinopathy requiring laser photocoagulation (Figure 4). By this time Mr FS has had diabetes for 21 years but owing to your vigilance with screening he has maintained visual acuity of 6/6 and goes into retirement without visual loss.

Figure 1. A normal retina

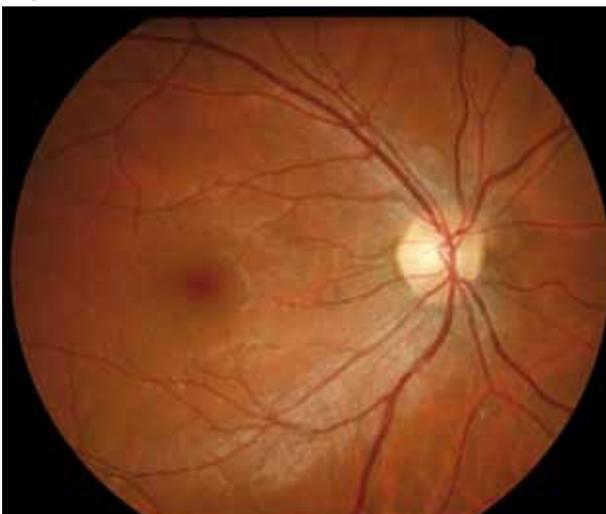


Figure 2. Retina showing mild nonproliferative diabetic retinopathy

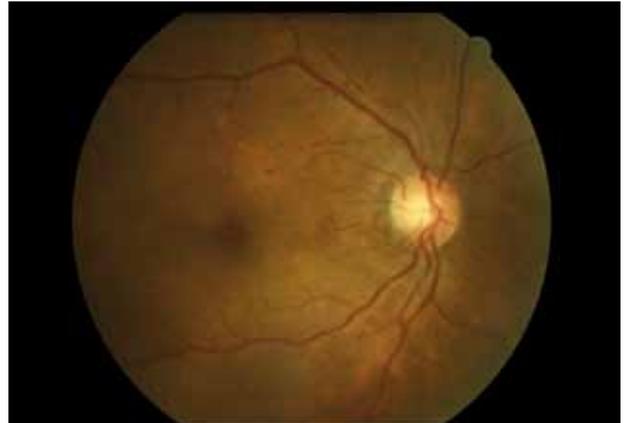


Figure 3. Retina showing severe nonproliferative diabetic retinopathy

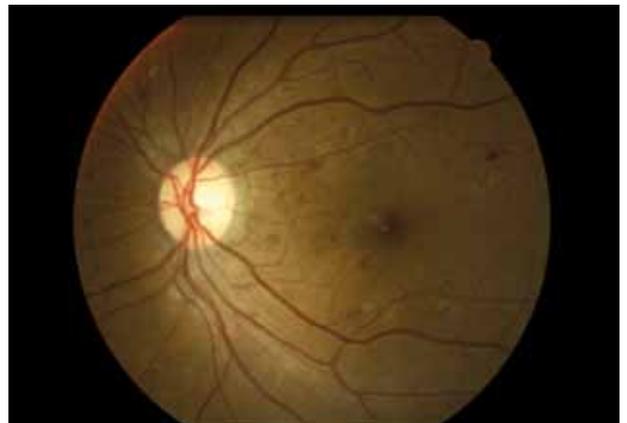


Figure 4. Retina showing proliferative retinopathy





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