

# Microvascular complications: Diabetes-related eye disease

## Recommendations

Recommendation	Reference	Grade*
Individuals with type 2 diabetes should be screened and evaluated for retinopathy by an optometrist or ophthalmologist at the time of diagnosis	1 Diabetes Canada, 2018	A, level 1
Follow-up screening interval for people with retinopathy should be tailored to the severity of retinopathy	1 Diabetes Canada, 2018	D, consensus
The recommended interval for those with no or minimal retinopathy is 1–2 years	1 Diabetes Canada, 2018	A, level 1
Examine higher risk patients (eg longer duration of diabetes; suboptimal glycaemic management, blood pressure or blood lipid control; people from a non-English-speaking background) who don't have diabetic retinopathy at least annually	2 NHMRC, 2008  3 RANZCO, 2019	None provided Level I evidence; level IV regarding people from non-English-speaking background Consensus
Conduct annual diabetic retinopathy screening for Aboriginal or Torres Strait Islander people with diabetes	2 NHMRC, 2008	None provided Level IV evidence
Results of eye examinations and the follow-up interval plan should be communicated clearly to all members of the diabetes healthcare team	1 Diabetes Canada, 2018	D, consensus
To delay onset and progression of diabetic retinopathy, people with type 2 diabetes should be treated to achieve optimal control of: <ul style="list-style-type: none"> <li>• blood glucose</li> <li>• blood pressure</li> </ul>	1 Diabetes Canada, 2018	A, level 1A A, level 1A
Fenofibrate, in addition to statin therapy, may be used in people with type 2 diabetes to slow the progression of established retinopathy	1 Diabetes Canada, 2018	A, level 1A
Individuals with sight-threatening diabetic retinopathy should be assessed by an ophthalmologist	1 Diabetes Canada, 2018	D, consensus
Pharmacological intervention, laser therapy and/or vitrectomy may be used to manage diabetic retinopathy	1 Diabetes Canada, 2018	A, level 1A
Women with pre-existing type 2 diabetes who are planning for pregnancy or pregnant should be counselled on the risk of development and/or progression of diabetic retinopathy	4 American Diabetes Association, 2019	B
Eye examinations should occur before pregnancy or in the first trimester in patients with pre-existing type 2 diabetes; patients should then be monitored every trimester and for one year postpartum as indicated by the degree of retinopathy	4 American Diabetes Association, 2019	B
The presence of retinopathy is not a contraindication to aspirin therapy for cardioprotection, as aspirin does not increase the risk of retinal haemorrhage	4 American Diabetes Association, 2019	A

\*Refer to 'Explanation and source of recommendations' for explanations of the levels and grades of evidence.

## Diabetes-related retinopathy

### Clinical context

Diabetes-related retinopathy (DR) occurs as a result of microvascular disease of the retina. It affects up to one in three people with diabetes, and can cause visual impairment and blindness.<sup>5</sup> DR also impairs quality of life and ability to manage diabetes.<sup>6</sup>

Three distinct forms of DR are:

- macular oedema, which includes diffuse or focal vascular leakage within the macula
- DR caused by microvascular changes
  - non-proliferative DR includes micro-aneurysms, intra-retinal haemorrhage, malformation and tortuous vessels; may be asymptomatic
  - proliferative DR – abnormal vessel growth on the optic disc or retina
- retinal capillary non-perfusion.

**Sight-threatening DR** includes:

- severe non-proliferative DR
- proliferative DR
- foveal-threatening diabetic macular oedema.

Non-proliferative DR affects 19.3% of people with diabetes, while 2.1% may have proliferative DR and 3.3% may have macular oedema.<sup>7</sup> Proliferative DR and macular oedema are associated with elevated cardiovascular disease risk.<sup>8</sup>

### In practice

Risk factors for the onset or progression of DR include:

- existing DR
- poor glycaemic control
- raised blood pressure
- duration of diabetes >10 years
- microalbuminuria
- dyslipidaemia
- anaemia
- pregnancy.

Visual impairment due to diabetes can be avoided for the vast majority of patients through good screening and care. This involves regular review of fundi, early detection and optimisation of therapy.

Monitoring for diabetic eye disease involves assessment of:

- changes in visual acuity (with correction)
- lens disease – for example, cataracts ([refer below](#))
- fundal disease – for example, fundoscopy with dilation or retinal camera, or refer to an optometrist or ophthalmologist.

Screening methods and intervals for retinopathy are shown in Box 1.

Strategies for delaying the onset and progression of DR include:

- optimising blood glucose.<sup>9–11</sup> Refer to the section ‘[Glucose monitoring](#)’ for suggested glycated haemoglobin (HbA1c) targets. Note that intensive glucose control in people with DR that is more severe than moderate non-proliferative DR on the International Clinical Diabetic Retinopathy Disease Severity Scale may not be beneficial<sup>12</sup>
- controlling blood pressure<sup>13</sup>
- adding fenofibrate – indicated for the reduction in the progression of DR in patients with type 2 diabetes who have existing DR. Fenofibrate does not replace controlling blood pressure, blood glucose and blood lipids as strategies to delay the progression of DR<sup>14,15</sup>
- ophthalmological specialist care
  - laser therapy
  - intraocular anti-vascular endothelial growth factor (VEGF) agents – ranibizumab, aflibercept and off-label use of bevacizumab (refer to the Pharmaceutical Benefits Scheme for further information)
  - vitreo-retinal surgery.

[KeepSight](#) is a free online reminder system for people with diabetes about their next diabetes eye examination. It is managed by Diabetes Australia and Vision 2020.

The National Diabetes Services Scheme (NDSS) and Diabetes Australia send alerts and reminders to people with diabetes registered on the NDSS to have their eyes checked.

**Box 1. Screening for retinopathy in type 2 diabetes****When to initiate screening<sup>3</sup>**

- At diagnosis

**Screening methods<sup>1</sup>**

- Seven-standard field, stereoscopic-colour fundus photography with interpretation by a trained reader
- Direct ophthalmoscopy or indirect slit-lamp fundoscopy through dilated pupil
- Digital fundus photography

**If retinopathy is present<sup>1,3</sup>**

- Grade retinopathy severity, refer to ophthalmologist as appropriate, and establish appropriate monitoring intervals ( $\leq 1$  year)
- Sight-threatening retinopathy may be treated with laser, pharmacological or surgical therapy\*
- Review glycaemic, blood pressure and lipid control, and adjust therapy to reach targets as per guidelines
- Screen for other diabetes complications

**If retinopathy is not present**

Rescreen every year:<sup>3</sup>

- people with duration of diabetes  $>15$  years
- suboptimal glycaemic control (HbA1c  $>8\%$  or 64 mmol/mol)
- systemic disease – poorly controlled hypertension, lipids; other diabetes complications; foot ulcers
- Aboriginal and Torres Strait Islander people
- people from a non-English-speaking background

Rescreen every two years:<sup>3</sup>

- all other patients with type 2 diabetes

Review glycaemic, blood pressure and lipid control, and adjust therapy to reach targets as per guidelines

Screen for other diabetes complications

For more information, refer to the Royal Australian and New Zealand College of Ophthalmologists (RANZCO) [screening and referral algorithm for diabetic retinopathy](#).

\*Treatment options include fenofibrate, laser therapy, intra-ocular anti-VEGF agents, vitreoretinal surgery.

## The role of retinal photography

Retinal photography is technically simple and is now usually performed within the Australian community by general practitioners, optometrists and ophthalmologists. Training is required to ensure quality of image interpretation.

Aboriginal health services are providing their own retinal photography services with support through telemedicine to promote access to screening.

People whose retinal images suggest they may be at increased risk of having, or at some point developing, sight-threatening retinopathy should be referred for assessment by an ophthalmologist.

Retinal photography may serve as a screening tool for retinopathy; however, it is not a substitute for a comprehensive eye exam.<sup>4</sup>

Note: A [Medicare Benefits Schedule \(MBS\) item number](#) for retinal photography with a non-mydiatric retinal camera is available for general practice use.

## Other ophthalmological effects

### Refractive errors

Refractive errors occur as the lens shape alters with changes in blood glucose concentrations and results in blurred vision. Correction of refractive errors should be postponed until blood glucose levels are stabilised. Detection is done with pinhole test – blurred vision due purely to refractive error corrects with the pinhole test.

### Cataracts

Cataracts occur prematurely in people with diabetes. Patients present with blurred vision and glare intolerance, and may find night vision a particular problem. Over time, interpretation of colours becomes more difficult.

Clinically, the light reflex is reduced, and fundus may be difficult to see.

Surgical treatment is recommended when reduced acuity is affecting lifestyle and independence.

### Maculopathy

Maculopathy other than oedema is difficult to diagnose ophthalmoscopically; however, it is the most common cause of vision loss in people with diabetes.

### Glaucoma

The incidence of glaucoma in people with diabetes is approximately twice that of the general population. All patients with type 2 diabetes should be monitored for glaucoma.<sup>16</sup>

### Ischaemic optic neuropathy

Ischaemic optic neuropathy is a cause of sudden vision loss and has a poor prognosis for sight.

### Sudden blindness

Sudden loss of vision is an emergency, and may be caused by:

- central retinal artery occlusion
- retinal detachment
- vitreous haemorrhage.

These conditions can occur independently of diabetes. Urgent contact with an ophthalmologist or timely assessment by a specialist team is indicated.

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