

## WHAT IS AGE-RELATED MACULAR DEGENERATION?

The macula is the central part of the retina in the eye. Age-related macular degeneration (AMD) is a progressive disease that results in changes to the macula. These changes can end up causing central vision loss. Loss of central vision impairs residents' ability to read, drive and perform activities of daily living, and reduces quality of life. AMD is a leading cause of blindness in the Western world.

AMD can be "dry" (atrophic) or "wet" (neovascular). The dry form involves deposits of material (drusen) in the macula and atrophy of parts of the retina. Dry AMD does not always result in vision loss. The wet form involves growth of abnormal blood vessels beneath the retina. Wet AMD is less common than dry AMD (around 10% of those with AMD). However, wet AMD accounts for most of the cases of vision loss (80%).

### WHAT ARE THE RISK FACTORS FOR AGE-RELATED MACULAR DEGENERATION?

- Age (>50 years of age; risk becomes more pronounced > 65 years of age)
- Smoking
- Family history
- Previous cataract surgery
- Cardiovascular disease



## AMD IS ONE OF THE LEADING CAUSES OF VISION LOSS IN PEOPLE 50 YEARS OR OLDER

Dry AMD usually progresses slowly, however, the rate of progression varies. Patients with dry AMD may go on to develop advanced dry AMD and/or wet AMD. Smoking may increase the chance of progressing to advanced AMD.

### WHAT ARE THE SIGNS AND SYMPTOMS?

Patients with early AMD often do not have symptoms. Those with dry AMD may develop gradual vision loss in one or both eyes. They will often express difficulty reading or driving initially. Patients who develop wet AMD will complain of blurred vision or distortion of straight lines (e.g. residents may perceive edges of doors as curved). They may also notice a dark spot in their central vision. These changes can occur acutely (e.g. over days to weeks). Wet AMD will often first appear in one eye only.

### HOW IS AGE-RELATED MACULAR DEGENERATION DIAGNOSED?

Diagnosis is made by ophthalmic evaluation and diagnostic testing. In patients who do not have symptoms, diagnosis is often incidental during routine eye exams. With dry AMD, drusen are visible on a dilated eye exam and areas of retinal atrophy may also be seen.

Patients with wet AMD will often first complain of visual disturbances and clinical examination (dilated eye exam) will show fluid or hemorrhaging beneath the retina. Additional testing is used for wet AMD. Fluorescein angiogram and optical coherence tomography are used to diagnose and characterize wet AMD. A complaint of vision disturbance should prompt further evaluation (including history, rate and extent of vision loss). Residents reporting rapid vision loss should

have an urgent ophthalmic examination. There is no universal classification system for severity of AMD. Some studies have categorized AMD as follows: (1) no AMD, (2) mild or borderline dry AMD, (3) intermediate dry AMD or (4) advanced dry AMD (atrophy of macula) or wet AMD.

## HOW IS AGE-RELATED MACULAR DEGENERATION TREATED?

### DRY AMD

Smoking cessation is recommended for residents with AMD.

There are limited treatment options available for dry AMD. Antioxidant vitamins plus zinc (see Table 1) decrease the chance of progression to advanced AMD and vision loss. The benefit may be greater in patients with moderate or advanced AMD compared to patients with earlier stages of dry AMD.

The AREDS2 vitamin and zinc formulation is recommended to reduce the chance of progression in dry AMD. The original formulation (AREDS) is no longer routinely recommended as it contains beta-carotene. Beta-carotene supplementation may increase risk of lung cancer (particularly in smokers but also potentially in non-smokers). Never smokers may be treated with the original AREDS formulation as an alternative.

### WET AMD

Vascular endothelial growth factor (VEGF) inhibitors (injected into the vitreous cavity of the eye) have been shown to decrease the chance of progression of wet AMD and may stabilize or reverse vision loss. Four VEGF inhibitors are available in Canada (see Table 2). The most commonly used are bevacizumab and ranibizumab. VEGF inhibitors are the standard of care for wet AMD in patients with active disease (ongoing leaking fluid, recent loss of vision). A vitamin and zinc supplement (AREDS2 formulation) is also recommended in wet AMD as it reduces the chance of progression of the disease.

### MONITORING

Residents can self-monitor their vision using the Amsler grid. If they notice any changes in their vision, they can follow up with their physician or eye care professional.

## PREVENTING AGE-RELATED MACULAR DEGENERATION

While antioxidant and zinc supplements have been shown to be effective in treating AMD, their role in preventing or delaying onset of AMD has not been established. A diet rich in fruits and vegetables may reduce risk of developing AMD and is therefore encouraged. Smoking cessation is recommended as smoking increases risk of developing AMD.



**TABLE 1. AREDS Supplements**

Supplement	Ingredients	Comments
AREDS (Vitalux AREDS and generics)	Vitamin C 250mg + vitamin E 200 IU + copper 1mg + zinc 40mg + lutein 5mg + beta-carotene 12 500 IU	Recommended dose is 2 caplets per day May cause gastrointestinal upset Beta-carotene supplementation has been linked to an increased risk of lung cancer, particularly in smokers but also in non-smokers
AREDS2 (Vitalux Advanced AREDS2 and generics)	Vitamin C 250mg + vitamin E 200 IU + copper 1mg + zinc 40mg + lutein 5mg + zeaxanthin 1mg	Recommended dose is 2 caplets per day May cause gastrointestinal upset

**TABLE 2. VEGF Inhibitors**

Medications	Comments
Aflibercept (Eylea®)	Adverse effects uncommon overall; most common adverse effects are mild eye pain and subconjunctival hemorrhage (resolves spontaneously)
Bevacizumab (Avastin® - used off label)	The most serious adverse effect (~1/1000) is bacterial endophthalmitis, which requires immediate medical attention (symptoms include severe vision loss, pain, redness)
Ranibizumab (Lucentis®)	Typically dosed as 1 injection every 4 to 8 weeks; schedules differ between agents; most patients require 6 to 8 injections during the first year of therapy then fewer afterwards (dependent on disease activity)
Pegaptanib (rarely used)	