JOJ Ophthalmology
ISSN: 2473-5477

Juniper Publishers
key to the Researchers

Research Article
Volume 5 Issue 5 - December 2017
DOI: 10.19080/JOJO.2017.05.555671

JOJ Ophthal


# Age Related Macular Degeneration-A Summary

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**Submission:** November 17, 2017; **Published:** December 11, 2017

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**Abstract**

Age related macular degeneration (AMD) is progressive non-curable disease primarily affecting the elderly. As with many diseases, genetic predisposition greatly increases the likelihood of developing the syndrome with the disease manifesting itself in families. The development of AMD is also strongly linked to obesity and smoking. Most of the current treatments involve the injection of a biologic into the posterior segment of the eye for the remainder of a person's life. These products have been shown to effective in maintaining clarity of lines of vision. Supplements have also been recommended and shown promise in delaying disease onset in some individuals.

**Keywords:** Macula; VEGF; Retina; Eye

## Introduction

AMD as a disease can manifest itself as either wet or dry. Wet AMD occurs when blood vessels grow from the choroid located behind the retina. Vascular endothelial growth factor (VEGF) triggers the development and intrusion of these blood vessels which can cause retinal detachment. Growth through Bruch's membrane leads to fluid leakage near the macula. The fluid contains protein and with this leakage causes vision loss and photoreceptor damage. This more severe form of AMD accounts for about 10% of the total number of AMD cases [1]. The other more common, and less severe form, dry AMD occurs when drusen accumulates between the retina and choroid. Over time drusen degrades the retinal pigment layer. The loss of the associated rods and cones in the eye causes vision degradation. The appearance of drusen does not always lead to AMD [3]. It appears as white or yellow-white areas under the retinal pigment epithelium. The pigments may remain small and not affect vision to a great extent. Major signs may include pigmentary alterations and loss of lines of vision from the center outward. As such there is blurred or distorted vision. There may be a loss of contrast sensitivity, especially as related to color. The macula comprises only about 2% of the retina, but is responsible for about 50% of the visual cortex process information, so when the macula is compromised in any way, severe quality of life issues may result.

### Risk Population

The greatest factor for developing AMD is age [3]. It is estimated that around 8 million Americans reaching age 54 will develop AMD and of those 13% will develop advanced AMD. This percentage will increase with the disease development within families [5]. Smoking is also a risk factor for AMD development as it is for cardiovascular disease. Research has also shown a tenuous link to Caucasian females, who appear to have a greater statistical risk for AMD development [4]. But this link is tenuous [1,4,5]. Other risk factors include hypertension, obesity, increased cholesterol levels and elevated HDL cholesterol.

## Treatment

### Drug Therapy

The first approved AMD drug treatment was Macugen (pegaptanib) [6]. It is comprised of a small sequence of mRNA and is administered by injection into the posterior segment of the eye and is designed to modulate or negatively impact blood vessel development by interfering with VEGF. Additional approved posterior segment injection therapies are Avastin (bevacizumab) and Lucentis(ranibizumab). Bevacizumab (Avastin) has also been approved as a cancer treatment and is a monoclonal antibody molecule [7]. The Fc region of the antibody is not present. All these injectable products are delivered through the posterior segment. The common primary negative side effect is discomfort during the injection. Aflibercept formulated as EYLEA is a more recent therapy for wet AMD. Once injected these drugs are free to interact with VEGF-receptor sites on cells. The effect is to prevent or slow down the growth of blood vessels into the retinal and macula space. All the drugs listed above are

prescribed for monthly or bi-monthly use under a physician's care.

### Supplements

Dietary supplements are also used as effective treatment options. Lutein and Zeaxanthin have been shown to modulate the onset of AMD [8]. The compounds may be taken as a supplement in pill form, or from eating green vegetables such as spinach. They modulate the disease processes for oxidant and light exposure by reducing the inner eye exposure to short wavelengths of light, thus preventing damage to cell components including nucleic acid, by oxidant damage. These two supplements (along with Omega-3) are currently being marketed by Bausch and Lomb as Ocuvite as once-a-day oral capsule or tablets. They were effective at preventing AMD related vision loss. In a subsequent study, Age-Related Eye Disease Study (AREDS) was designed to evaluate various supplements such as Vitamins C and E and beta-carotene on the progression of AMD and cataract. These compounds had no effect on cataract. However, they were effective at preventing AMD related vision loss. In a subsequent study Age-Related Eye Disease Study 2 (AREDS 2), lutein and zeaxanthin were evaluated for their ability to prevent AMD progression. These supplements taken together were found to be an effective substitute for beta-carotene in modulating AMD disease progression.

### Laser Surgery

Laser surgery is an effective treatment in severe, acute cases where action to preserve vision must be taken immediately. Laser treatment will delay the development of choroid neovascularization by a few months in patients with unilateral advanced AMD [9], however the symptomology will return in time.

## Conclusion

AMD is a progressive disease with no overt signs or symptoms until actual visual loss occurs. There are specific risk factors such as age, smoking, obesity and importantly, genetic factors which lead to development of the disease [10]. While age and genetics seem to be the strongest links for disease development overweight, chronic smokers are also at risk. A combination of all these factors age, genetic, smoking and obesity increase the risk greatly for potential onset of the disease. The treatment options which are available are effective in modulating the process of the disease in at least some people. Increased public awareness coupled with better diagnostic techniques and improved treatment methods are the best techniques available at this time to prolong an individual's quality of life through the course of the disease. Relative to new drug therapies, as product costs decline these current therapies should be more readily available for use [11].

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 How to cite this article: Clyde S. Age Related Macular Degeneration-A Summary. JOJ Ophthal. 2017; 5(5): 555671. DOI: 10.19080/JOJO.2017.05.555671

DOI:.10.19080/JOJO.2017.05.555671