



Macular Degeneration

Macula Risk® Age-Related Macular Degeneration DNA Test

Age-related macular degeneration (AMD) is the leading cause of blindness in individuals over 50 years of age in developed countries. AMD affects approximately 1 in 23 individuals in the United States (13 million total), with approximately 2 million having the advanced form of the disease. AMD is a progressive disorder that can lead to irreversible loss of central vision. Not all individuals with early AMD progress to advanced AMD and vision loss. Macula Risk® testing helps identify individuals at increased risk for advanced AMD so treatment can be optimized.

AMD is a multifactorial condition with a strong genetic contribution and interaction with environmental factors. Sequence variations (SNPs) in specific genes, age, and history of smoking are independent risk factors for the development and progression of advanced AMD.

Macula Risk® is a genetic test that detects eight SNPs within four different genes (and eight haplotypes in one of the genes) that are associated with an increased risk of developing advanced AMD. Risk assessment provided by the test takes into account genotype results, history of smoking, and age. Approximately 20% of the general population has above average risk.

Benefits of Macula Risk® Testing:

Macula Risk® is the most powerful genetic test available for identifying individuals at increased risk for advanced AMD.

- This test serves as an important prognostic tool
- Early identification of patients at high risk for developing advanced AMD may prevent vision loss or slow down the progression of the disease through individualized treatment, including use of new therapies
- Eye care professionals can personalize medical management based on the patient's age and risk
- Knowledge of increased risk and poor prognosis can encourage patients to adhere to their eye examination schedule, follow the recommended treatment plan, and make lifestyle modifications
- Relatives of individuals affected with AMD can learn their risk and participate in screening and preventive measures
- Macula Risk® testing can also identify individuals with a low risk for developing advanced AMD

Indications for Macula Risk® Testing:

- Individuals diagnosed with early or intermediate AMD
- Relatives of individuals with AMD

Our Macula Risk® Test Service Provides:

- Genotype analysis by polymerase chain reaction/fluorescent hybridization probe technology to detect specific gene variations in the CFH, C3, ARMS2, and mitochondrial ND2 genes
- Identification of eight specific CFH haplotypes, which provides more accurate risk assessment than testing for the Y402H CFH SNP alone
- Risk assessment combining genotype results and smoking status to provide an individual's risk for the development of advanced AMD
- Detailed reports with genetic interpretation, recommendations, and education
- Genetic consultation for eye care professionals, patients, and families by board-certified genetic counselors

Specimen Requirements:

- Saliva sample, sent at room temperature, OR
- Cheek cell sample, sent at room temperature, OR
- Blood sample, 3 ml in an EDTA (lavender top) tube, sent at room temperature

Turnaround Time:

- 2 - 4 weeks

Please call Kimball Genetics for more information.

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650 S. Cherry Street, Suite 225, Denver, Colorado 80246 • Tel: 800-320-1807 • 303-320-1807 • Fax: 303-388-9220

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Age-Related Macular Degeneration

Clinical Features of AMD

Age-related macular degeneration is a progressive disorder of the eye resulting in damage to the photoreceptors in the central region of the retina (macula).

As an individual ages, fatty waste deposits called drusen build up beneath the retina. In AMD, excessive numbers of drusen can lead to damage of the retinal tissues, chronic inflammation, and loss of photoreceptors (geographic atrophy). This form is called dry (non-neovascular) AMD. In its early stages, there may be no symptoms or minimal vision loss. Some individuals progress to the advanced stage of dry AMD. In this stage, gradual central vision loss occurs over a period of a few months to years. Ninety percent of individuals with AMD have dry AMD.

Approximately 18% of individuals with dry AMD progress to wet (neovascular) AMD. This advanced form of AMD is characterized by the growth of abnormal blood vessels, stimulated by expression of cytokines. These new blood vessels are very fragile and may leak blood, fluid, and fatty wastes under the retina, causing vision to become distorted. Advanced neovascular AMD leads to progressive central vision loss that can be gradual or may occur suddenly over a period of days to weeks. Ten percent of individuals with AMD have wet AMD.

Risk Factors for AMD

Genetic risk factors: Genetic errors affecting the complement and oxidative pathways have an important role in the pathogenesis of AMD. Specific variations in the complement factor H (CFH) gene appear to interfere with the normal inhibition of the complement system. Specific variations of the complement C3 gene have been shown to increase activation of the complement pathway, which leads to inflammation and damage to the macula. AMD-associated genes involved in oxidative pathways include the age-related maculopathy susceptibility 2 (ARMS2) gene and the mitochondrial ND2 gene. Variations in these genes can lead to increased free radical production, oxidative damage, and cell death (apoptosis) in the eye.

Environmental risk factors: Smoking, obesity, female sex, hypertension, cardiovascular disease, elevated levels of inflammatory cardiovascular disease markers (C-reactive protein and interleukin-6), high dietary intake of vegetable fat, low dietary intake of antioxidants and zinc, decreased physical activity, and sunlight exposure have been shown to be associated with an increased risk of AMD.

Preventive Approaches

For individuals at an increased risk of developing advanced AMD, frequent monitoring by an eye care professional leads to early detection of AMD, which may result in prevention of vision loss or slower progression of the disease. Lifestyle modifications such as cessation of smoking, decreased dietary fat intake, maintaining a healthy weight and blood pressure, and increased intake of antioxidants through diet and supplementation appear to decrease the risk of developing advanced AMD.

Treatment of AMD

Currently, 80% of patients with AMD present too late when vision loss has already occurred. Research studies demonstrate that treatment is more effective with early detection of AMD.

Laser treatment (photocoagulation) and photodynamic therapy have been shown to help preserve vision in individuals affected with neovascular AMD.

Newer therapies including intravitreal injection of anti-vascular endothelial growth factor agents such as ranibizumab (Lucentis®) and bevacizumab (Avastin®) can prevent conversion to wet AMD and can be very effective if the disease is caught before vision loss. Individuals with vision loss may demonstrate improvement of visual acuity.

References

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