

Modifiable Risk Factors in Cardiology Versus Glaucoma

What can you change?

BY GARY D. NOVACK, PhD

My long-term internist retired, and I became the patient of a new internist. As part of his evaluation, he recommended that, as a male in my mid-50s with a family history of cardiovascular disease, I be seen by a cardiologist. I had a full workup (lipids, resting and exercise electrocardiogram, echocardiogram, coronary calcium scan, etc.). I am fine, with little evidence of cardiovascular disease. My cardiologist and I had what I felt was a great conversation about my risk of future cardiovascular events. The well-known risk factors include family history, lipid levels (cholesterol, high-density lipoprotein, etc.), weight, hypertension, diabetes, smoking, and diet (Table 1). These are based upon large, long-term studies looking at clinically significant outcomes such as myocardial infarction, stroke, and death.^{1,2}

Although I cannot modify my family history, age, or sex, I could increase my exercise (although I already ride 5,000 miles per year on my road bike), modify my diet (fewer stops at the bakery while riding my bike), or lose weight (ideally, an outcome of the first two). I could also use any of a number of pharmacotherapies for lowering lipid levels (including an HMG-CoA reductase inhibitor, known as a statin, with its associated presumed anti-inflammatory effect).³ Were I to start pharmacotherapy, the cardiologist and I might have to consider genetic factors that could affect the efficacy and safety of the medication for me.⁴

My conversations with a cardiologist reminded me of the many discussions that I have read and heard regarding the risk factors for glaucoma and the outcomes of treatment.

DRAWING A COMPARISON

Many have compared glaucoma and cardiovascular disease, including Brandt in a recent editorial.⁵ The

known risk factors for conversion from ocular hypertension to glaucoma and those for further glaucomatous progression include family history, race, IOP, age, central corneal thickness, cup-to-disc ratio, existing structural or functional glaucomatous loss, female sex,^{6,7} and diabetes^{8,9} (Table 2). Chauhan et al recently proposed anti-cardiolipin antibody levels as a risk factor,¹⁰ and oxidative stress has also been presented as a risk factor in glaucomatous neurodegeneration.¹¹

The big difference from glaucoma is that I have a variety of factors that I can modify to decrease my risk of future cardiovascular events. In contrast, I could not positively modify my central corneal thickness, cup-to-disc ratio, age, visual field, sex, or family history. The only significant glaucomatous risk factor that I could modify would be my IOP. Admittedly, there are several ways to do that—pharmacotherapies (with a choice of several classes of medications and multiple agents within most classes), laser trabeculoplasty, or various invasive surgical procedures.

I have polarized the two specialties of cardiology and ophthalmology in an effort to be provocative. I understand that there are many similarities between the two specialties in that the patient population of each tends to be older and the goal of diagnosis and therapy is to provide a high quality of life for the patient for many years.

Perhaps an example more relevant to the ophthalmic community is myopia. A chronic condition with many morbidities, its major risk factors are known: the level of near activities and parental factors (including race), the preexisting refractive error, and the axial length of the globe.¹² Although one may modify one's near activities, most people would agree that preventing children from reading is not consistent with a high quality of life in later years. As with the other diseases mentioned herein, the parental factors are not modifiable. Several prophylactic

TABLE 1. MAJOR RISK FACTORS IN CARDIOVASCULAR DISEASE

Risk Factor	Modifiable?
Hypertension	Pharmacotherapy
Diabetes	Yes (glucose levels)
Tobacco smoking	Behavior
Lipid levels	Pharmacotherapy
Male sex	No
Genetics (family history, race)	No

treatments have been evaluated in controlled trials to attenuate the development of myopia in children. Progressive addition lenses were more effective than single-vision lenses, although the effect of treatment was of limited clinical significance.¹³ Atropine, a nonselective muscarinic antagonist, was also effective.^{14,15} Because patients experience profound mydriasis and loss of accommodation, however, atropine therapy has not been widely adopted. More recently, an M1-selective muscarinic antagonist, pirenzepine, has been shown to be effective in children in the United States and Asia, with minimal typical untoward ocular muscarinic effects.^{16,17} Pirenzepine is not currently being developed for business reasons.

CONCLUSION

Regarding my risk of cardiovascular events, I will keep trying to attenuate the modifiable risk factors that I can. With respect to glaucoma, the identification of risk factors has been useful in understanding the disease and its treatment. Although IOP currently appears to be the only modifiable risk factor, continued research, such as that of Chauhan et al¹⁰ and Tezel,¹¹ may identify additional risk factors that are modifiable and (perhaps) thus further reduce the risk of glaucomatous progression. □

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**TABLE 2. MAJOR RISK FACTORS IN GLAUCOMATOUS DISEASE**

Risk Factor	Modifiable?
IOP	Pharmacotherapy, laser trabeculoplasty, invasive surgery
Central corneal thickness	No
Cup-to-disc ratio	No
Age	No
Visual field ^a	No
Female sex	No
Diabetes	Yes (glucose levels)
Genetics (family history, race)	No

^aVisual field refers to existing functional glaucomatous loss.

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