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Smoking and eye disease

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Introduction

Tobacco smoke is composed of as many as 4,000 active compounds, most of them toxic and potentially damaging to the eye. Smoking can cause or worsen several eye disorders, in particular Age-related Macular Degeneration (AMD), which may lead to blindness.

Benefits of stopping smoking

Stopping smoking can halt or reverse damage to the eyes, depending on the severity and type of disease. In the case of AMD, former smokers have only a slightly increased risk compared with never smokers.¹ Stopping smoking reduces the risk of developing cataracts.² A US study found that, compared with men who continued to smoke, those who had quit 10 years or less before study entry had an approximately 20% reduced risk of cataract diagnosis.³ A review of AMD studies found that smoking cessation was associated with a marked, non-linear decrease of the risk of progression to AMD.¹⁴

A study of ophthalmologists and optometrists in the United States found that the potential role of eye care professionals in providing stop smoking advice to their patients has been under recognised, citing negative attitudes to stop-smoking interventions amongst eye care professionals as a possible cause. The study authors recommend tailored training for eye care professionals⁴

Cataract

A cataract is a clouding in the lens of the eye which causes blurred vision and, if left untreated, can lead to vision loss.⁵ Cataracts often develop as part of the normal ageing process.

Smoking is a major risk factor in the development of cataracts.^{2 6} A review of the evidence revealed that smoking increases the risk of a particular type of cataract - nuclear cataract. Compared with never smokers, smokers of 20 or more cigarettes per day are at least twice as likely to develop nuclear cataract.⁷ A smoker's risk of cataract increases with the amount smoked and cataracts are more serious in heavy smokers than in light smokers.²

Although the exact mechanism by which smoking causes cataracts to develop is not fully understood, it is probable that the destruction of antioxidant nutrients by tobacco smoke is a leading contender. Antioxidants help maintain lens transparency. Increased cadmium levels in cataractous lenses of smokers may also affect lens enzymes such as superoxide dismutase and glutathione peroxidases, which can lead to oxidative damage.⁸ Cigarette smoking may also break down other micronutrients critical to

healthy eye tissues.⁶

Age-related macular degeneration (AMD)

Age related macular degeneration (AMD) affects the macula, the small central area of the retina at the back of the eye which is responsible for clear, central vision. When the macula is affected, vision becomes blurred, distorted and dark in the centre (this is called a scotoma). Although peripheral vision is not affected by AMD, loss of central vision means that every day activities such as reading, driving and watching television cannot be performed. AMD is the leading cause of blindness in people over the age of 55 in the western world.⁹

Smoking is the major preventable risk factor for AMD. Smoking causes oxidative damage in the retina, reduces blood flow in eye tissue, and promotes ischaemia, hypoxia, and micro-infarctions.¹⁰ Smokers are more likely to suffer from all types of AMD, more likely to relapse after laser treatment and more likely to develop the disease ten years earlier than non-smokers.¹¹

Evidence from key large population-based studies has shown that smoking doubles, at least, the risk of developing AMD compared to never smokers¹²¹³,¹⁴ It has been estimated that smoking accounts for between 40,000 and 60,000 cases of AMD with sight loss in people aged 70 and over in the UK, of which around 17,800 are blind.¹⁵¹⁶¹⁷

If detected in time, treatment for some forms of wet AMD can reduce or delay sight loss. There is evidence to suggest that quitting smoking significantly reduces the response to laser treatment of wet AMD.¹⁴

Smoking and Diabetic Retinopathy

Diabetic retinopathy is an eye complication associated with diabetes in which the blood vessels that supply the retina are damaged by high blood sugar levels. When these blood vessels become damaged, they may leak fluid or blood and grow scar tissue which can distort the images the retina sends to the brain. This can eventually lead to blindness.¹⁸ Smoking may accelerate the development of, or worsen, this condition further because smoking also damages blood vessels. A possible mechanism leading to damage of the retina is smoking-induced hypoxia. This condition is a result of diminished oxygen in the blood, with a corresponding increase in carbon monoxide.¹⁹²⁰ For further information about smoking and diabetes see [ASH Fact Sheet: Smoking and Diabetes](#).

Thyroid eye disease

In Graves' disease, the thyroid gland becomes overactive, secreting too much thyroid hormone. An eye disorder known as thyroid eye disease is a most serious complication. Protrusion of the eyes, double vision, and loss of vision, sometimes causing blindness can occur. The Royal College of Ophthalmologists has estimated that around 400,000 people have thyroid eye disease in the UK.²¹ There is strong evidence for a causal association between smoking and the development of thyroid eye disease.²² People with Graves' disease who smoke have a four-fold increased risk of developing these eye complications compared to non-smokers.²³ Smokers also have a higher risk of the more advanced eye problems and the risk is elevated in heavy smokers. The reason for smokers' increased risk of eye disorders in this condition is not fully understood but it is believed to be due to a smoking-induced impairment of the immune system.⁶

Optic Neuropathy

Anterior ischaemic optic neuropathy is an eye disease that results in a sudden, painless loss of vision, often leading to permanent blindness. It

occurs because of reduced blood flow in the arteries to the eyes. Atherosclerosis – clogging of the arteries – may be responsible for this disease. Smokers are at a 16-fold increased risk of developing this disease compared with non-smokers. Furthermore, smokers develop optic neuropathy at younger ages: in one study smokers were found to develop the disease at an average age of 51 and nonsmokers at an average age of 64.⁶ A study of an epidemic of optic neuropathy in Cuba (50,000 sufferers between 1991 and 1993) found an association between increased risk of the disease and tobacco use, particularly pipe smoking.²⁴

Passive smoking and eye disease

Nonsmokers often complain of eye irritation when exposed to tobacco smoke. There is currently limited evidence about the risks of passive smoking and eye disease. One major study found that passive smoking was associated with increased risk of late AMD although the association was not statistically significant²⁵ while a more recent study found that passive smoking almost doubled a person's risk of developing AMD.²⁶ Children born to women who smoke during pregnancy are prone to developing strabismus (squinting).²⁷ Experience from other conditions suggests that passive smoking causes the same diseases as active smoking but at a reduced risk.²⁸

Public Awareness

Public awareness about the risk of eye diseases associated with smoking is very low. According to one poll, only seven percent of people knew that AMD could affect eyes. A recent study of teenagers in the UK found that only 5% identified smoking as a cause of blindness but that fear of blindness was a strong motivating factor in quitting smoking.²⁹ However, seven out of ten smokers say they would stop or reduce consumption if they thought smoking could harm their eyesight.³⁰

Education campaigns

Mass media campaigns in Australia and New Zealand have been very successful in raising awareness about the risk of eye diseases associated with smoking. In 2000, the Australian National Quit campaign ran an advertisement as part of a series entitled "Every cigarette is doing you damage" which explicitly addressed AMD.^{31 32} The Australian government now requires that one of the mandatory pictorial pack warnings is about AMD.³³

On 1st October 2008, the UK introduced picture warnings on cigarette packets.³⁴ However, these warnings do not include information about smoking and blindness. [The AMD Alliance](#) International and partners - the [Royal National Institute of Blind People](#), the [British Medical Association](#) and the [Royal College of Ophthalmologists](#) - are campaigning for warnings about AMD to be included on tobacco packaging and for smoking and blindness to be included as part of the EU-wide 'HELP for a life without tobacco' mass media campaign.³⁰

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