Smoking and Cardiovascular Disease

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There can be no doubt that, with the sole exception of advanced age, smoking is today the most significant cause of cardiovascular disease and the most common cause of death worldwide: and it is preventable. One billion people will die during the 21st century from a smoking-related cause. Coronary heart disease causes 35-40% of smoking-related deaths.[1,2]

The relation between smoking and cardiovascular disease has been proved in a multitude of studies, such as the British Doctors Study[3] and the Framingham Study.[4] Smoking contributes to a greater degree to acute thrombotic events than to atherogenesis. This is more apparent in young and middle-aged individuals, where it is considered responsible for around 50% of acute myocardial infarctions (AMI).[5]

Younger people who smoke more than 20 cigarettes per day have a 5.6 times greater risk of AMI than do non-smokers of similar age.[6] In general, the cardiovascular risk increases with the number of cigarettes smoked daily, but the relation is not linear.[7,8]

Let us focus on the cardiovascular risk in smokers compared with non-smokers.

Coronary artery disease

Smokers have 3 times the risk of suffering a non-fatal AMI[7] and are at increased risk (relative risk [RR] 2.3, 95% confidence interval [CI] 1.2-4.0) of sudden cardiac death.[9]

Peripheral arterial disease

Smokers are 7 times as likely to develop the disease;[10] the onset of symptoms comes a decade earlier, while they are twice as likely to need amputation[11] compared with non-smokers.

Abdominal aortic aneurysm

Smoking increases the likelihood of developing abdominal aortic aneurysm. Specifically, smoking up to 1 pack per day increases the risk threefold, 1-2 packs per day fivefold, and more than 3 packs sevenfold, compared with non-smokers.[12]

Stroke

Smoking is considered as a significant risk factor for ischaemic stroke, haemorrhagic stroke and subarachnoid haemorrhage, and the risk increases with the number of cigarettes smoked per day.[13]

Pathophysiology

Cigarette smoke includes more than 4,000 chemical substances,[14] including polycyclic aromatic hydrocarbons and oxidative gases, most of which exert a cardiotoxic effect. The precise nature and the toxic mechanism of many of those substances have not been fully clarified.[15]

Nicotine

Nicotine is a sympathomimetic substance that promotes the release of catecholamines and other neurotransmitters, acting centrally and peripherally. Apart from its cardiovascular effects (increase in heart rate, blood pressure and cardiac output),[15] it also has metabolic ones, such as an increase in lipolysis, leading to increased levels of circulating free fatty acids.[16] Recent studies have shown that nicotine itself does not play a significant role in the development of cardiovascular disease. Its primary role consists in the fact that *it is the substance that causes addiction and tobac-*

co dependence, with the result that smokers are exposed to the other noxious substances contained in tobacco smoke.[17-19]

In brief, the mechanisms that are involved in the process of causing acute cardiovascular events (atherogenesis-thrombosis) in smokers include:

- Development of a state of hypercoagulability leading to thrombosis (platelet activation and aggregation, coagulation factor activation, increased fibrinogen levels, increased tissue factor levels).[20-24]
- Endothelial dysfunction with a reduction in NO release and bioavailability.[25,26]
- Creation of a chronic inflammatory state (increase in white cells and C-reactive protein values).

Recently, genetic variations were discovered that influence the development of atherosclerotic disease in some smokers.[28] Thus, it may be explained why only a percentage of lifelong smokers die early from smoking-related cardiovascular disease, whereas others are resistant.[5]

Passive smoking

Passive smokers have an increased probability (25%) of developing coronary artery disease of whatever form,[29] and a greater probability (30%) of dying from it.[30] They are also at increased risk of stroke.[31-34] It is estimated that 8% of cardiovascular deaths are related to passive smoking.[35]

The smoke inhaled by passive smokers is "sidestream" smoke from other people's cigarettes and has a different composition from the "mainstream" smoke inhaled by active smokers. Sidestream smoke is much more toxic, with toxin concentrations (oxidative gases) many times higher than those of mainstream smoke.[14] Thus, while the damage mechanism of passive smoking is similar to that of active, the results of exposure to it are disproportional. It is estimated that, whereas spending time around smokers is equivalent to getting 1% of the smoke exposure experienced by someone who smokes 20 cigarettes per day, the added risk for the development of a cardiovascular event is as much as one third of that of the pack-per-day smoker.[6]

Benefits from smoking cessation

Stopping smoking almost completely eliminates the risk of developing smoking-related cardiovascular disease; in fact, it is the most effective and life-saving preventive measure we have at our disposal.[22,36-40]

People who stop smoking reduce their 5-year risk of death from an acute coronary syndrome by 61%, and from stroke by 42%.[41] Within 2 weeks of smoking cessation, platelet aggregation[42] and fibrinogen levels[43] are already reduced. The lipid profile starts to improve (increase in HDL, decrease in LDL).[44,45] Improvement is also seen in haemodynamic parameters (significant reduction in mean blood pressure, heart rate, and arterial compliance).[46]

In patients with already manifested cardiovascular disease (previous infarction, stroke, coronary intervention) smoking cessation reduces the risk of death and other endpoints by 35-40%;[35] thus, it is equivalent to the administration of full medical therapy including aspirin, statins, beta-blockers, and angiotensin converting enzyme inhibitors.

In patients with peripheral arterial disease, smoking cessation significantly slows the progress of the disease.[39]

The benefits of smoking cessation, apart from the above, have been shown in "natural experiments" in various countries, such as our neighbour Italy (Rome area)[47] and Scotland,[48] where the institution and strict application of a ban on smoking in public places in 2005 and 2006, respectively, had the following results:

- Improvement in air quality in enclosed areas (reduction of mean concentrations of small and very small particles).
- Reduction in the detectable proportion of nicotine in the urine of non-smokers working in those areas.
- Reduction in the number of smokers (mainly men).
- Significant reduction in cigarette consumption, with a parallel increase in nicotine replacement products.
- Reduction in daily hospital admissions and deaths (15%) in and out of hospital.
- Significant reduction in the number of acute coronary events (Rome 8-11%, Scotland 17%) in all age groups except the elderly (>75 years).
- Those who received the greatest benefit were the relatively young (35-64 years), men, and individuals of lower socio-economic level.

Sadly, for many doctors in Greece, the attempt to get their patients to stop smoking is not a part of routine practice. Cigarette smoking is still—unfortunately—considered by the majority of Greeks as a "bad habit", or a "lifestyle choice", rather than as a dependency-related disease that commonly requires therapy. Treating physicians have not been sufficiently trained in the ways to persuade patients to stop smoking, or make

the excuse that they do not have the time for it,[49,50] despite the fact that even a short discussion, lasting just 1 minute, is sufficient to persuade 40% of patients to quit.[51,52]

Nicotine replacement therapies are underused in Greece. The Ministry of Health and Welfare recently announced measures for banning smoking in public places, with the first implementation of the relevant legislation to start from July 1, 2009. Now we will see various "moulders of public opinion", without any scientific background, taking on the role of defenders of "individual freedom", while in reality—even unwittingly—acting as advocates for those who get rich from the deaths of others. All physicians—especially cardiologists—must take on the role that, according to Rudolf Virchow (1821-1902) is reserved for them by history: as the "natural lawyer of the poor".[53]

The position of all members of the Hellenic Cardiological Society must be clear.

- **Banning smoking in public places has been scientifically proved to have measurable, beneficial consequences for health.**
- **Since coronary heart disease is the main cause of death in Greece, even a small reduction in its incidence, as a result of a legislative smoking ban in public places, would have a significant impact on public health as well as public finances.**
- **We support the measures and we ask for their implementation without dilution.**

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