



## Alcohol, tobacco, physical activity, duration and type of exercise recommended

### *Alcohol, tabaco, actividad física, duración y tipo de ejercicio recomendado*

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The non-pharmacological treatment to reduce cardiovascular risk consists of lifestyle modifications. These include, mainly a diet with the appropriate amount of calories, abundant in vegetables and seafood, decrease sugary drinks intake, total tobacco withdrawal, performed exercise at least 30 minutes of moderate to intense physical exercise, the maintenance of a body mass index (BMI) between 20 to 25 kg/m<sup>2</sup>, and the limitation of alcoholic beverages consumption to one or two drinks per day in those subjects who are already habitual drinkers. The effectiveness of these behavior modifications increases if they are adopted early and are followed for the rest of life. It has been estimated that life span can be prolonged 14 years in women and 12 in men, when all recommendations are followed. Individually, the most significant benefit comes from physical exercise, which increases life expectancy by 8 years. On the other hand, the most harmful risk factor is tobacco smoke that shortens life by 9.5 years.<sup>1</sup> Patients between 45 and 64 years of age who comply for 20 years with lifestyle modifications like a healthy diet, exercise, not smoking, and body mass index between 20-25; have fewer cardiovascular events than those who did not comply (6% vs 45%).<sup>2</sup>

### ALCOHOL RISKS AND BENEFITS

Ethanol is the key and universal compound of all alcoholic beverages. At least 5,000 years ago, humans discovered how to make these

beverages from fermenting vegetables, founding its rewarding effects, and consumed them at the beginning in festivities, or for medicinal purposes, but later for simple pleasure. The abuse of consumption has been a significant social problem that led to its prohibition in the United States from 1920 to 1933, period in which, far from diminishing its consumption, it increased. Today it remains as a paramount health problem worldwide, causing 10% of all deaths in adults between 20 to 64 years of age, and being the cause of one third of all road accidents.

Several studies on long-term alcohol consumption have estimated that around 14 g of ethanol are found in a bottle of beer, a glass of wine or an ounce of distilled liquor. It is legally prohibited to drive a motor vehicle if the driver's blood has the alcohol content provided by the equivalent of two or two and a half drink. The level of alcohol in the body may vary according to BMI, food intake, gender, and individual metabolism. Alcohol metabolism mainly occurs in the liver, where alcohol dehydrogenase and aldehyde dehydrogenase, the most important enzymes involved, break down approximately 8 g of alcohol per hour. The oxidation affected other functions requiring the same enzymes, which produces an accumulation of lactate and acetyl coenzyme A, which directly increased free fatty acids and hepatic accumulation of triglycerides, decreasing at the same time the synthesis of methionine synthase, which in turn augments homocysteine concentrations.

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Drinking a small amount of alcohol exerts an anxiolytic and disinhibitory effect. However, a greater quantity can produce euphoria, but also central nervous depression, which can sometimes lead to death.

It is established that moderate alcohol consumption reduces the risk of coronary heart disease; however, high consumption increases the occurrence of hypertension, arrhythmias, coronary heart disease, heart failure, and cerebral vascular events. Common sense establishes the personal limits of responsible alcohol ingestion. The recommendations are not to exceed two drinks a day for regular consumers and drinking alcohol is not recommended in non-consumer persons, because benefit risk ratio has not been demonstrated, and for the peril of undue abuse consumption.

The meta-analysis of eight prospective studies that included 192,067 women and 74,919 men without apparent cardiovascular disease and diabetes, found an inverse relationship between alcohol consumption and the possibility of suffering from coronary heart disease,<sup>3</sup> once adjusted for different risk factors. This effect is mainly attributed to high-density lipoproteins (HDL) elevation, raising the subfractions of HDL 2 and 3, increasing apoprotein A1 synthesis and HDL's antioxidant capacity and its ability to reverse the cholesterol transport. Moderate alcohol consumption generally raises HDL without altering low-density lipoprotein (LDL) or triglycerides (TG); however, heavy consumption can elevate HDL and TG as well. A meta-analysis of studies that analyze lipid behavior in the face of alcohol consumption found that 30 g of alcohol per day raises C-HDL by a mean of 3.99 mg/dL, apoprotein A by 8.82 mg/dL, and TG's by 6.69 mg/dL without meaningful modification of C-LDL.<sup>4</sup>

A dangerous side-effect of alcohol consume is the elevation of blood pressure. More than seven drinks per week increase systolic and diastolic blood pressure between 1.5 and 3 mmHg and this increment become greater if consumption rises.<sup>5</sup> In this regard, alcohol consumption is related to a quarter of hypertension cases. Another adverse effect is heart toxicity, causing arrhythmias like atrial fibrillation (AF). High alcohol intake can

damage myocardial tissue. After a long period of exposure, the toxic effects of alcohol can lead to alcoholic cardiomyopathy, and this, in its terminal stage, cause heart failure. On the other side, alcohol intake can aggravate heart function, and could worsen the clinical conditions of patients that already suffer other type of heart disease and heart failure. The type of alcohol is also a factor that needs to be thoughtful regarding alcohol percentage content. Theoretically, red wine, due to its high polyphenol content (mainly resveratrol) could offer some additional benefits, but this effect must be proved. Total alcohol withdrawal is needed when there is a family or personal history of alcoholism, hypertriglyceridemia, pancreatitis, liver disease, bleeding disorders, heart failure, or poorly controlled hypertension, pregnancy, and medications that interact with alcohol. The recommendations should individualize, considering the risks and potential benefits. If there is no contraindication and the patient already drink alcohol, one or two drinks a day can be considered safe. Young people should be clearly warned about the potentially dangerous effects of alcohol consumption in the long term and should never prescribe it to improve cardiovascular risk.

#### DANGERS OF TOBACCO USE

According to the World Health Organization, tobacco use still is the main preventable factor of death in the world. Its consumption is associated with 71% of lung cancers, 30% of all cancer, 42% of chronic obstructive pulmonary disease (COPD), for at least 10% of coronary deaths, and it has been related to 60% of cerebral vascular events. Half of the smokers die from a tobacco-related disease. Increased sympathetic activity raises blood pressure and heart rate, facilitating a prothrombotic state, while tobacco toxicity leads to endothelial damage and cell dysfunction. Although nicotine is the most studied component, tobacco combustion generates more than 7,000 chemical elements of which at least 69 of them are carcinogenic, the main component is nicotine, considered the addictive element of tobacco, But tobacco fumes also contain acetic acid, ammonia, arsenic, cadmium, methanol,

toluene, carbon monoxide, carbonyls, benzene, phenol, cobalt, lead, carboxylic acid, N-nitrosamines, benzopyrene, nitrogen, carbon dioxide, acetaldehyde, methane, acetone, hydrocarbons, and others.<sup>6</sup> There are two phases during smoking, the tar-phase corresponds to the trapped material in the cigarette filter, that retains most of the tobacco particles with a size > 0.1 mm. The non-filtered particles containing a substantial number of free radicals can stay during long time in the mouth of smokers. The gas-phase is defined as the gaseous material that went through the cigarette filter, also containing a substantial number of free radicals, being more short-lived than tar material. The tobacco fume inhaled through the smoker mouth and then exhaled into ambient air is known as mainstream smoke, which contains more than 90% of gaseous material. The so-called sidestream smoke is the fume emitted from the burning end of a cigarette or cigar, which contains a greater proportion of toxic gas components. What is called environmental tobacco smoke results from the combination of majority sidestream smoke and a small proportion of exhaled mainstream smoke.<sup>7</sup> The regulation of banning smoking in enclosed spaces has been shown, in just one year, to reduce cardiovascular events by 39% and by 47% in three years.<sup>8</sup> Regarding serum lipid modifications, smoking has been linked to decreased HDL and its antioxidant capacity, increased triglycerides, LDL and lipid peroxidation. These effects are reversible when quitting smoking. In a study conducted over 21.8 years, with active or passive smokers and ex-smokers in comparison to non-smokers, the former raised their relative risk for coronary heart disease to 1.69 (95% CI: 1.32, 2.14), for a cerebral vascular event to 1.62 (95% CI: 1.08, 2.41), cardiovascular death to 1.49 (95% CI: 1.13, 1.96), non-cardiovascular death to 1.40 (95% CI: 1.08, 1.83) and death from any cause to 1.44 (95% CI: 1.19, 1.74).<sup>9</sup>

Recently, the fashion for e-cigarettes and vaporization equipment (vapers) has emerged. These devices work by boiling a liquid containing nicotine, flavorings and other additives, basically consisting of a nozzle, battery, coil, and reservoir for the liquid. According to the Center for Disease Control

and Prevention of the United States, by 2018, one in five students used e-cigarettes or vapers. The idea that this method is less harmful than smoking is wrong. Vapers increases the risk of cerebral vascular events by 29% and myocardial infarction by 25%. The damage has been attributed to oxidation and inflammation that these chemicals produced in the body. There are hundreds of devices and different chemical components (more than 7,500) have been identified, most of them flavorings or conservatives, of which their possible pathogenic effects are unknown. A fundamental problem from using these devices is the increase of severe lung infections, partly due to pulmonary and systemic immune system damages, producing acute eosinophilic pneumonia and a typical injury called «popcorn lung», leading to obliterating bronchiolitis. Some of the toxic chemicals studied found in e-cigarettes and vaporizers are: 2.3-pentanedione, tin, lithium, silver, iron, aluminum, silicon, chromium, and formaldehyde.<sup>10</sup>

## BENEFITS OF EXERCISE

Regular exercise prevents cardiovascular disease and prolongs better physical fitness, helping to get physical and mental well-being. Regular exercise has several beneficial effects like lowering systemic blood pressure, improving insulin resistance, and lessening serum concentrations of TG and LDL-c. Exercise also decreases fibrinogen and platelet adhesion, improves endothelial function, slows heart rate by decreasing sympathetic activity, diminishes oxygen consumption, and can promote the development of coronary microcirculation. All these effects benefit hypertensive, diabetic, coronary, and obese patients. Regular exercise is the most valuable lifestyle modification after tobacco withdrawal. Regarding cardiovascular exercise intensity: 30 minutes daily of moderate workout is enough to improve health in primary cardiovascular prevention. On the other hand, very intense exercise can lead to myocardial alterations, mainly fibrosis that can lead to arrhythmias like atrial fibrillation. In the Copenhagen city trial,<sup>11</sup> 17,589 healthy people were followed for 35 years, measuring the amount of exercise-

related to mortality compared to those who did not perform an exercise, the most significant reduction in mortality was 42% in those who work out between 1.2 and 4 hours per week, equaling between 5 to 6 Mets. More exercise did not significantly reduce mortality risk, and less exercise reduced mortality but to a lesser degree. Another problem with extreme exercise is that the possibility of coronary heart disease (CHD) is not regularly valued. For instance, CHD is the most common cause of death in marathon runners over 40 years old. During intense exercise in untrained people, the risk of death increases 56 times compared to other activities, in contrast to training people is whom increase only five times.<sup>12</sup> Sudden death in athletes under the age of 40 is mainly due to hypertrophic cardiomyopathy and cardiac channelopathies, while in older people the main cause is coronary atherosclerosis disease. All people over the age of 40 who perform competitive sports should be studied to rule out the possibility of coronary heart disease.

In patients with heart disease, any exercise produces benefits as it was showed by a systematic review and meta-analysis of 63 studies included 14,485 patients with coronary heart disease, with a median follow-up of 12 months. Exercise reduces the relative risk of cardiovascular mortality in 26% and hospital admissions in 18%.<sup>13</sup> The type of exercise is not essential in this regard, although thirty minutes of vigorous exercise produces the cardiac stimulation induced by 90 minutes of brisk walking. Exercise should be done according to individual preferences and physical conditions.<sup>14</sup> Moderate exercise should increase heart rate to 60% of the maximum rate expected for the age, while intense exercise should raise it to 80%. Even if it is suspended at a certain age, exercise produces benefits compared to people who have never exercised regularly before. However, it is most significantly beneficial, starting it at an early age and practicing throughout life.<sup>15</sup>

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