



Tobacco and cardiovascular disease

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Objectives

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introduction

- Tobacco smoking is the leading preventable cause of death, responsible for more than 6 million deaths annually worldwide. On average, smokers lose 10 years of life compared with people who never smoke, and smoking was the leading determinant of adult deaths from non-communicable diseases



- in 2007. Among smoking-related deaths, cardiovascular disease (CVD) accounts for approximately one-third of cases in both Japan and worldwide .
- Even smoking only a single cigarette daily increases the risk of developing coronary artery disease (CAD) and stroke.



- The effects of tobacco smoking are not restricted to atherosclerotic CVDs. Smoking, especially current smoking, is associated with increased risk of hospitalization for incident heart failure



Effects of Constituents of Tobacco Smoke

- Tobacco smoking, both active and passive (i.e., secondhand smoke), increases the incidence of all phases of atherosclerosis, from endothelial dysfunction to various types of CVD.



- More than 7,000 chemicals, including nicotine, tar, and carbon monoxide, contribute to the development of CVD through increases in heart rate and myocardial contractility, inflammation, endothelial impairment, thrombus formation, and a decrease in the serum levels of high-density lipoprotein cholesterol.



Endothelial Dysfunction...

- Endothelial dysfunction is considered to be the first step in vascular disease.
- Components of cigarette smoke provoke endothelial injury and dysfunction long before clinical events. Healthy endothelium produces vasodilatory substances, including nitric oxide (NO), prostacyclin, and endothelium-derived hyperpolarizing factor.



- When the endothelium becomes injured, the synthesis and bioactivity of these vasodilators are impaired, and the balance between vasodilators and vasoconstrictors is destroyed.



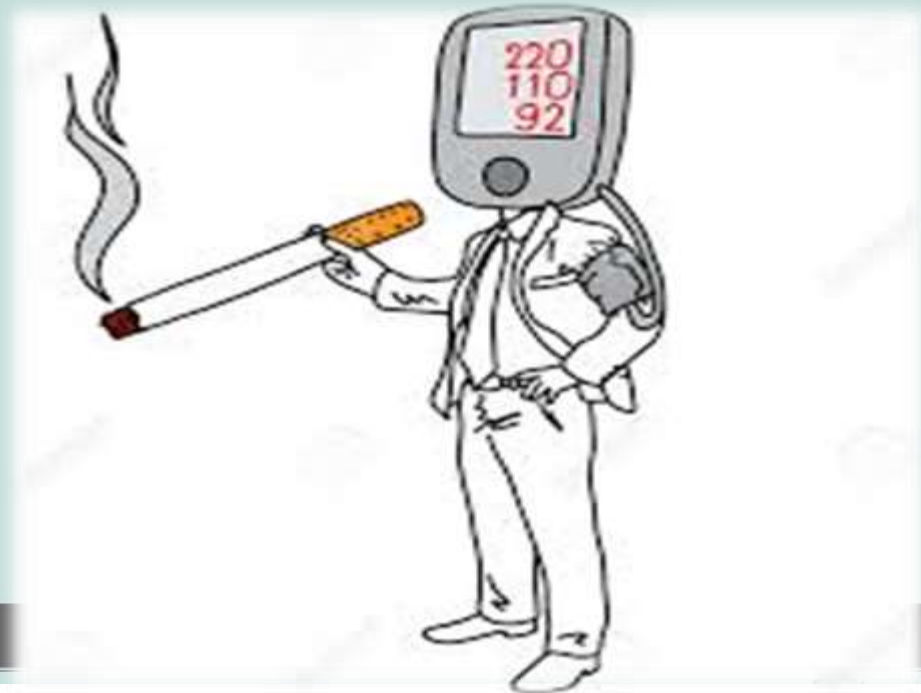
Impairment of Endothelial Progenitor Cells (EPCs)

- Normal endothelium plays an important role in the regulation of vascular tone. When the endothelium is injured, the damaged endothelial cells must be removed and replaced to maintain vascular tone.
- The researchers have revealed that the capacity for endothelial repair is reduced in smokers compared with nonsmokers.



Smoking and Hypertension

- The effects of smoking on blood pressure (BP) are complex. Smoking just a 1 cigarette increases BP acutely and transiently through sympathetic nervous activation.



- In 1 study, the average transient elevation in systolic BP after the first cigarette was approximately 20 mmHg. The half-life of nicotine after smoking is approximately 2 h .Therefore, when smoking continues, BP remains elevated.

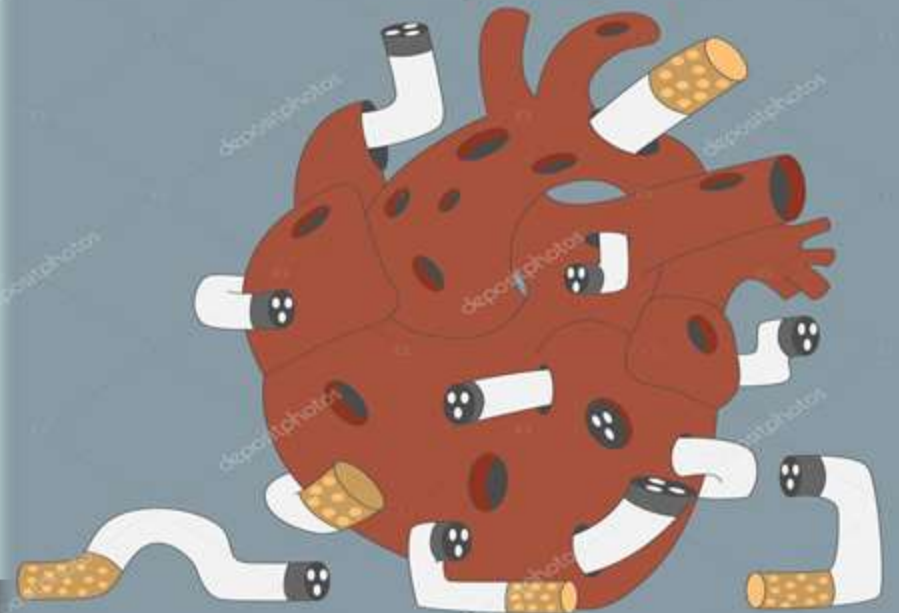


- The chronic effects of smoking on BP are unclear. However, current smokers with normal to high-normal BP (120–139/75–89 mmHg) are known to be at increased risk for CVD compared with nonsmokers with normal to high-normal BP.



Smoking and CVD

- Exposure to tobacco smoke increases the risk of coronary plaque rupture, thus promoting thrombus formation at the lesion, and leading to sudden onset of acute coronary syndrome (ACS),



- including sudden cardiac death. Moreover, tobacco smoking elicits coronary artery spasm with or without apparent significant coronary narrowing.



Beneficial Health Changes From Smoking Cessation

- Smoking cessation improves endothelium-dependent vasodilation and reduces the risk of morbidity and mortality of CVD.



- Several favorable changes occur after quitting smoking. In particular, BP decreases within 20 min, and within 2–12 weeks the number and function of circulating EPCs rebound and endothelium-dependent vasodilation improves.
- In addition, the risk of CAD and risk of death at 1 year after quitting are about half that of current smokers.



References

- Kondo, T., Nakano, Y., Adachi, S. and Murohara, T., 2022. *Effects of Tobacco Smoking on Cardiovascular Disease.*
- Ambrose, J. and Barua, R., 2022. *The pathophysiology of cigarette smoking and cardiovascular disease.*



**THANK YOU FOR YOUR
ATTENTION!**

