

دخانیات و آنوریسم آئورت

Tobacco & Aortic  
Aneurysm ( AA)

---

# Tobacco

- Wild plants belonging to the Nicotiana genus : America
- Used by Indians for many centuries in religious and healing practices
- exported tobacco products to Europe in the 16<sup>th</sup> century
- In the 17th and the 18th century tobacco was widely chewed or smoked in pipes
- paper cigarettes were introduced in the last decades of the 19th century
- used in many forms (hookah tobacco, chewing tobacco, cigars, pipes, bidis, and kreteks) and newer nicotine delivery devices (e-cigarettes, vape-pens, e-hookahs, and heated tobacco products [HTPs])



# Factes

---



- Tobacco kills up to half of its users.
- Tobacco kills more than **8 million people** each year. More than 7 million of those deaths are the result of direct tobacco use while around 1.2 million are the result of non-smokers being exposed to second-hand smoke.
- Over 80% of the world's 1.3 billion tobacco users live in **low- and middle-income** countries.
- In 2020, 22.3% of the global population used tobacco, 36.7% of all **men** and 7.8% of the world's women.



- ❑ the number one cause of preventable death worldwide
- ❑ In 2019, tobacco product use was the **leading risk factor for mortality in men**, and the seventh leading risk factor for women
- ❑ It harms nearly every organ, does not affect all organs to the same extent
- ❑ lung and cardiovascular systems appear to be most vulnerable, and **cardiovascular** diseases (CVDs; including stroke) are the leading cause of death among smokers
- ❑ Tobacco use and secondhand smoke exposure remain **major causes of cardiovascular mortality**, contributing to approximately 17% of all cardiovascular deaths globally, about 3 million deaths per year

- 
- , tobacco products are used by 1.3 billion people worldwide
  - 6.5 trillion cigarettes are sold around the world each year
  - higher usage persists among individuals with low income or education

---

❖ The risk of CVD due to smoking is in general **lower** than the risk of lung cancer:

9- to 10-fold higher risk of developing lung-cancer

4-fold higher risk of COPD

the relative CVD risk varies from 1.3 to 4

❖ Smokers are at a particularly **high risk** of developing **abdominal aortic aneurysm, AF, HF, PAD, SCD**



❖ Risk of nonfatal acute myocardial infarction (MI) increases by 5.6% for every additional cigarette smoke

**TABLE 28.1** Relative Risk of Cardiovascular Disease in Current and Former Smokers

CARDIOVASCULAR DISEASE	RELATIVE RISK OR ODDS RATIO	
	CURRENT SMOKER	FORMER SMOKER
Atrial fibrillation <sup>a</sup>	1.32 (1.12-1.56)	1.09 (1.0-1.18)
Abdominal aortic aneurysm <sup>b</sup>	4.87 (3.93-6.02)	2.10 (1.76-2.50)
Heart failure <sup>c</sup>	1.75 (1.54-1.99)	1.16 (1.01-1.96)
Sudden cardiac death <sup>d</sup>	3.06 (2.46-3.82)	1.38 (1.20-1.60)
Stroke <sup>e</sup>	1.92 (1.49-2.48)	1.30 (0.93-1.81)
Peripheral artery disease <sup>f</sup>	3.94 (2.04-7.62)*	
Nonfatal MI <sup>g</sup>	2.95 (2.77-3.14)	1.87 (1.55-2.24)
Ischemic heart disease mortality <sup>h</sup>	1.79 (1.59-2.02)	
Diabetes <sup>i</sup> all-cause mortality	1.48 (1.34-1.64)	
Cardiovascular mortality	1.36 (1.22-1.52)	
Coronary heart disease	1.54 (1.31-1.82)	
Stroke	1.52 (1.25-1.83)	
MI mortality after PCI/CABG <sup>j</sup>	1.15 (0.81-1.64)	1.19 (1.03-1.38)
Lung cancer <sup>k</sup>	8.93 (4.9-16.28)*	
COPD <sup>l</sup>	4.01 (3.18-5.05)	
Asthma <sup>m</sup>	1.61 (1.07-2.42)	

# Mechanism

---

- have not been clearly identified
- key targets of smoking is the endothelium
- endothelial cell damage , diminishes endothelium-mediated relaxation, and long-term smoking is associated with impaired endothelium-dependent relaxation
- decrease in the bioavailability of nitric oxide
- independent predictor of new coronary lesion formation
- consistent increase in intimal-medial thickness of the carotid artery
- promote atherosclerosis
- affecting lipid metabolism
- mild-to-moderate insulin resistance
- thrombosis and coagulation



# Cont....

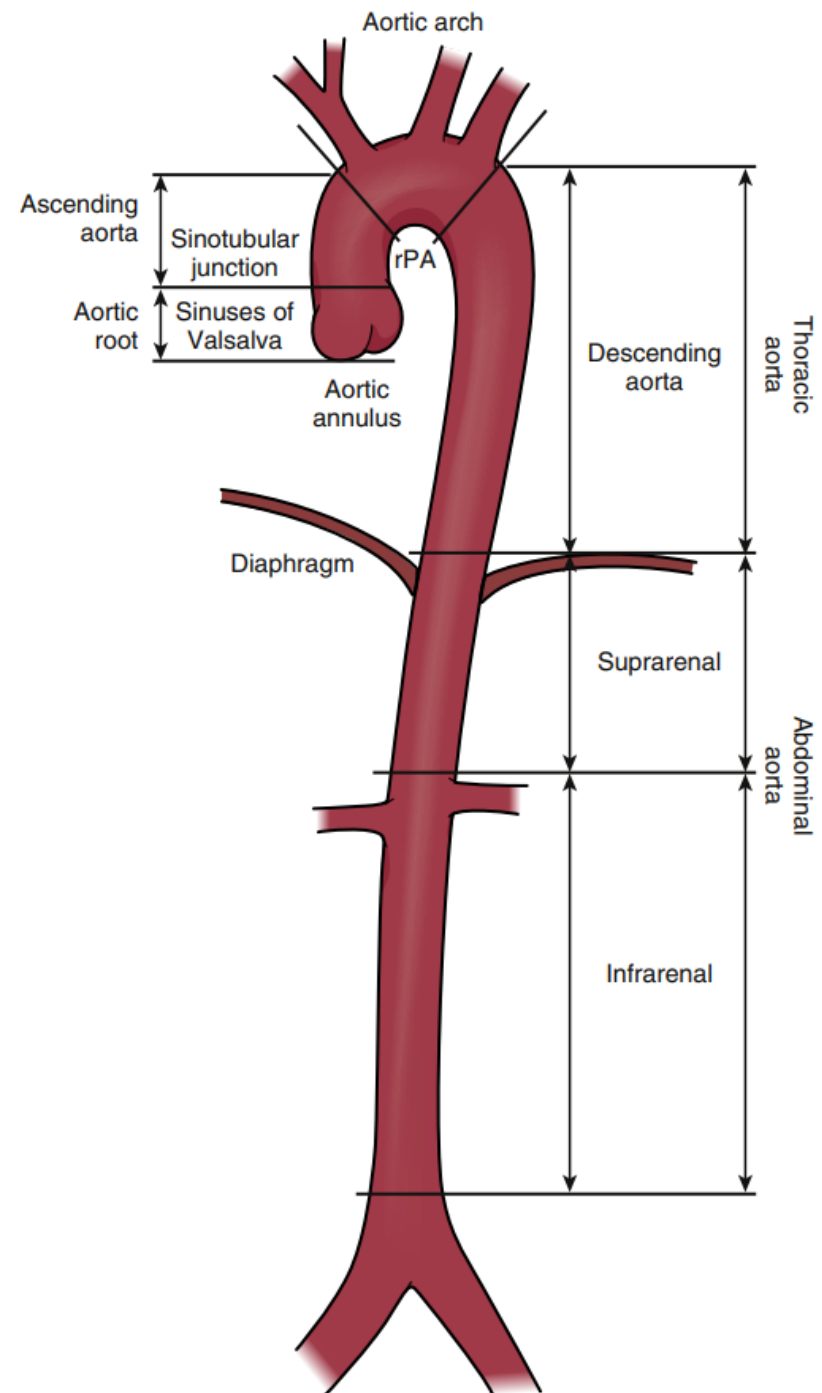
---

- ❖ Tobacco smoke contains 3000 to 7000 different chemicals, many of which react avidly with a wide range of biomolecules
- ❖ particulate matter (PM): may be responsible for the cardiovascular risk of smoking
- ❖ Free radicals
- ❖ major portion of the toxicity of cigarettes could be attributed to volatile organic compounds (VOCs) such as acrolein
- ❖ VOCs : in e-cigarette
- ❖ Nicotine:
  - potent sympathomimetic drug
  - affect vascular function, cardiac contractility, and lipid metabolism
  - increase the risk of arrhythmias, plaque rupture, and sudden cardiac death

# Aorta

---

- largest artery in the body
- Thoracic and abdominal components
- Aortic root
- Begins at the aortic valve
- Right and left coronary arteries arise from the sinuses of Valsalva
- The thoracic aorta :ascending, arch, and descending segments
- The abdominal aorta into the suprarenal and infrarenal segments
- The aorta ends by bifurcation into common iliac arteries



# AORTIC ANEURYSMS

---

- Pathologic segment of aortic dilatation that expands and can eventually rupture or dissect
- diameter of at least 50% greater
- fusiform or saccular
- Fusiform aneurysms, the more common type, are symmetrically dilated with involvement of the entire aortic circumference

# Abdominal Aortic Aneurysm

---

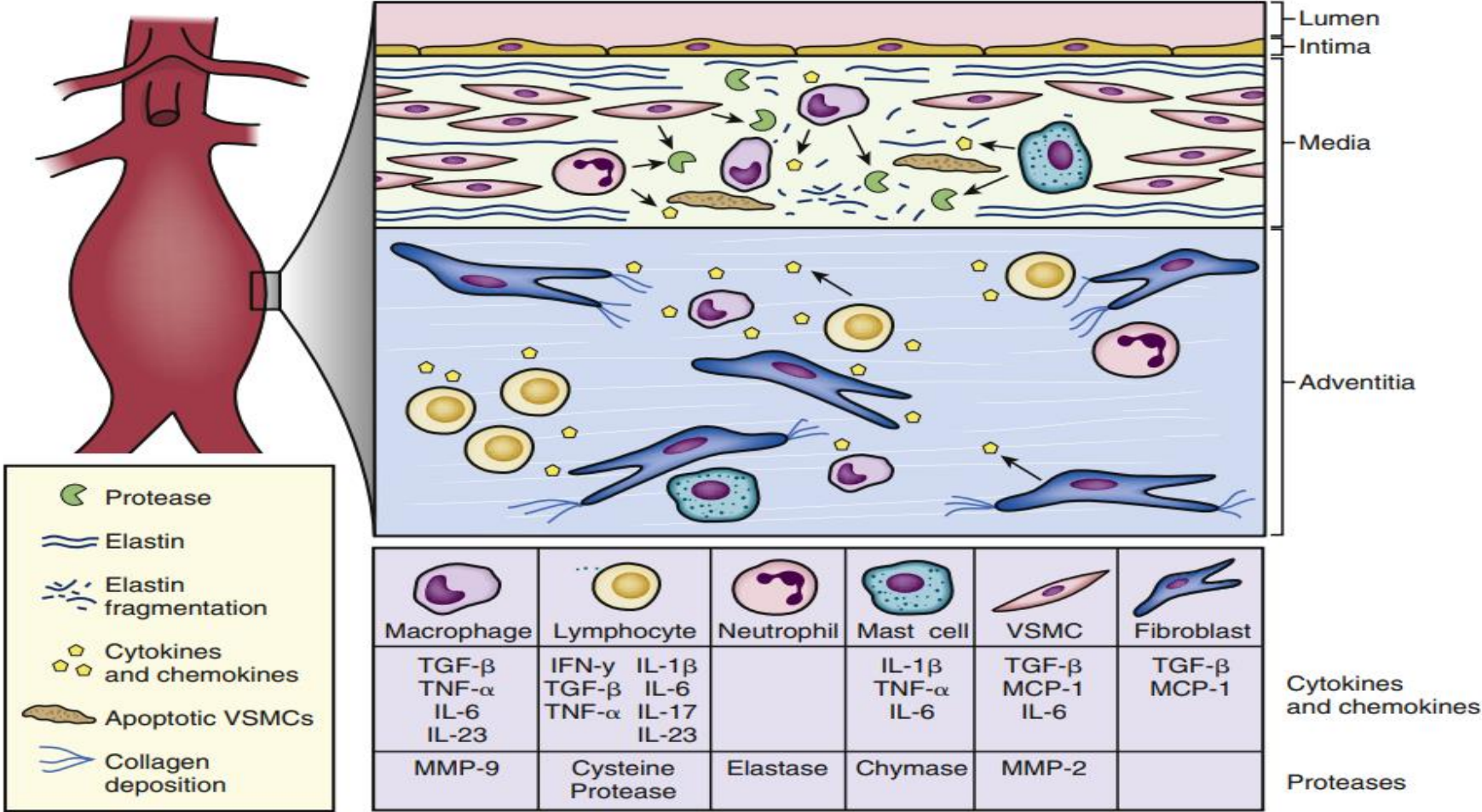
- Abdominal aorta greater than 3.0 cm in diameter
- Most common form of aortic aneurysms
- 2.3% of those 75 to 79 years old
- Most ( 80%): infrarenal aorta
- Approximately five times more prevalent in men
- Associated strongly with age, with most occurring in those older than 60 years and even higher risk in those older than 75 years
- Strongly are associated with **cigarette smoking**
- current smokers are seven times more
- Smoking also increases AAA growth rate

# AAA: cont....

---

- ❖ Other risk factors include emphysema, hypertension, and hyperlipidemia
- ❖ Family history is a potent risk factor for AAA: important heritable component
- ❖ The major complication of AAA is acute rupture
- ❖ 150,000 to 200,000 deaths each year worldwide

# Pathogenesis



# Clinical Features

---

- ❖ AAAs develop insidiously over a period of several years and rarely cause symptoms in the absence of distal thromboembolism, rapid expansion, or rupture
- ❖ The vast majority of AAAs are small
- ❖ Most AAAs are detected by screening studies or as an incidental finding on imaging studies performed for another purpose
- ❖ Physical examination is insensitive
- ❖ pulsatile epigastric or periumbilical mass
- ❖ Only 30% to 40% of AAAs are noted on physical examination
- ❖ Symptoms may occur due to impending rupture or expansion and include pain radiating to the back or genitals or distal embolization from mural thrombus



# Diagnostic Imaging

---

- ❖ Ultrasound
- ❖ Computed Tomography
- ❖ Magnetic Resonance
- ❖ Imaging/Aortography

# Screening

---

- ❖ low in the general population
- ❖ High when risk factors are present
- ❖ Screening for AAAs with ultrasound, coupled with repair of AAAs above a size threshold, has reduced risk of AAA rupture and AAA-related deaths
- ❖ The U.S. Preventive Services Task Force recommends a one-time ultrasound screening for AAAs in men 65 to 75 years of age with a history of smoking and selective screening for those who never smoked
- ❖ Society for Vascular Surgery (SVS) recommends a one-time screening for AAAs in all men  $\geq 65$  years and for women  $\geq 65$  years with a history of tobacco use or a family history of AAAs

# Natural History

---

- ❖ AAAs expand gradually and variably with an average growth rate of 2.2 mm
- ❖ Factors associated with risk of AAA rupture : current smoking, female gender, emphysema, HTN, and immunotherapy after organ transplantation
- ❖ Risk of rupture was 9% per year for AAA between 5.5 and 5.9 cm, 10% for those 5.0 to 6.9 cm, and 33% for those 7.0 cm or greater

# Ruptured Abdominal Aortic Aneurysm

---

- ❖ Peritoneal : Acute hemorrhage, severe abdominal pain, and hypotension
- ❖ Retroperitoneum : temporarily contained periaortic hematoma, with severe abdominal or back pain that may radiate to the flank or groin
- ❖ Approximately 30% to 50% of patients with ruptured AAAs die before hospitalization
- ❖ additional 30% to 40% die after reaching a hospital

# Managemen

---

- ❖ Surveillance/Medical Therapy
- ❖ Surgery
- ❖ Open surgical repair (OSR) or EVAR, with EVAR

# Thoracic Aortic Aneurysms

---

- ❑ Aortic diameters greater than 40 mm in adults
- ❑ Aortic root or ascending aortic aneurysms : most common (approximately 60%), followed by aneurysms of the descending aorta (approximately 35%) and aortic arch
- ❑ Causes of TAAs : heritable disorders, congenital disorders, degenerative (atherosclerotic), mechanical, inflammatory, and infectious diseases
- ❑ Risk factors for TAAs : smoking, hypertension, age, chronic obstructive pulmonary disease (COPD), coronary disease, and family history