

Excerpted Large Group Slides  
for Case #4

The patient with  
coronary artery disease (CAD)

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## Overview

- 1. Introduction to atherosclerosis and angina**
- 2. Pathophysiology**
- 3. Epidemiology**
- 4. Diagnosis**
- 5. Management**

**Further Reading (for home)**

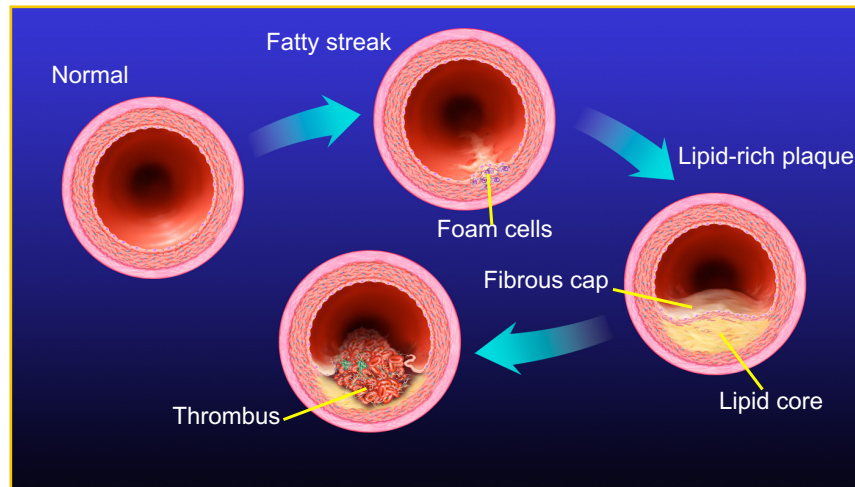
- 6. Complications of acute myocardial infarction**

## Part 1: Introduction

**Objectives:**

- 1. Define atherosclerosis**
- 2. Define angina**
- 3. Presentation of angina**
- 4. Define anginal equivalents**

# Atherosclerosis



## Atherosclerosis: A Systemic Process

Atherosclerosis can affect many vascular territories

System	Manifestation
<b>Cardiac</b>	Myocardial infarction, angina pectoris, heart failure, and coronary death
<b>Cerebral</b>	Stroke, transient ischemic attack, dementia
<b>Peripheral</b>	Intermittent claudication, non-healing ulcers, limb loss
<b>Aortic</b>	Thoracic or abdominal aortic aneurysm, dissection, rupture, and death

# What is “Angina”?

Classic Chest discomfort

- Chest pain
- Chest heaviness or pressure
  - “Like an elephant sitting on my chest”

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**Angina:** any chest discomfort likely to represent cardiac ischemia

## Typical Angina

- Substernal discomfort of a characteristic quality
- Provoked by exertion or emotional stress
- Relieved by rest or nitroglycerin

## Atypical Angina

- Atypical angina fulfills 2 of these criteria.

# Associated Symptoms

Other symptoms during an anginal episode

- Increase the diagnostic certainty of CAD
- May indicate the severity of disease
- Shortness of breath (dyspnea)
- Feeling faint or lightheaded (pre-syncope)
- Radiation of pain to the neck, jaw, arms, back, abdomen
- Nausea with or without vomiting
- Sweating (diaphoresis)
- Anxiety

## Anginal Equivalents

- Associated symptoms can occur in the **absence** of actual chest discomfort
- Often, true cardiac ischemia is occurring
- At higher risk of this presentation:

Older Patients

Patients with Diabetes  
(often diminished pain sensation)

Women

## Part 2: Pathophysiology

Objectives:

1. Describe the balance between supply and demand
2. Describe vasospasm
3. Describe the spectrum of CAD

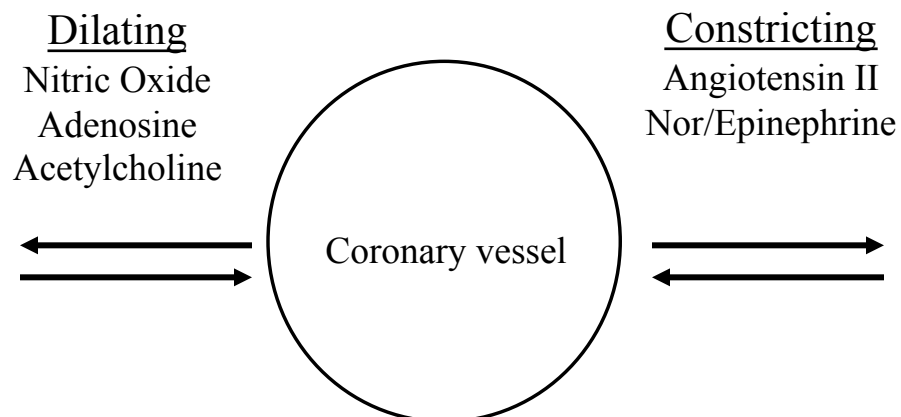
## The Coronary “Balance Sheet”

<u>Supply</u>		<u>Demand</u>
Oxygen	→	Myocardial contraction
Glucose		Electrical conduction

Coronary blood flow → Myocardial Function

Whenever supply is inadequate for demand,  
**ischemia** occurs, usually felt as **angina**

## Normal Coronary Physiology

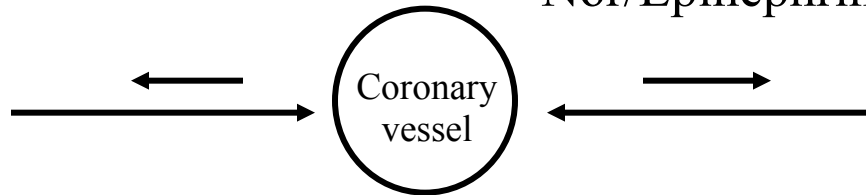


The coronary endothelium is a dynamic structure which responds to signals and controls coronary artery vasoconstriction and dilation.

## Vasospasm

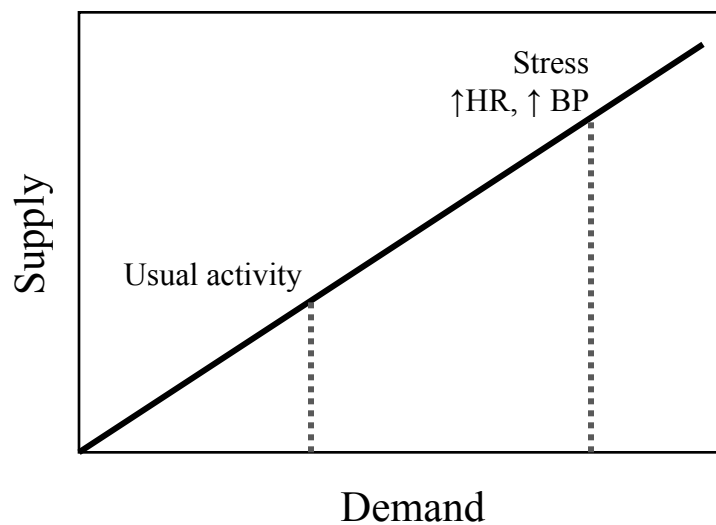
Dilating  
Nitric Oxide  
Adenosine  
Acetylcholine

Constricting  
Angiotensin II  
Nor/Epinephrine

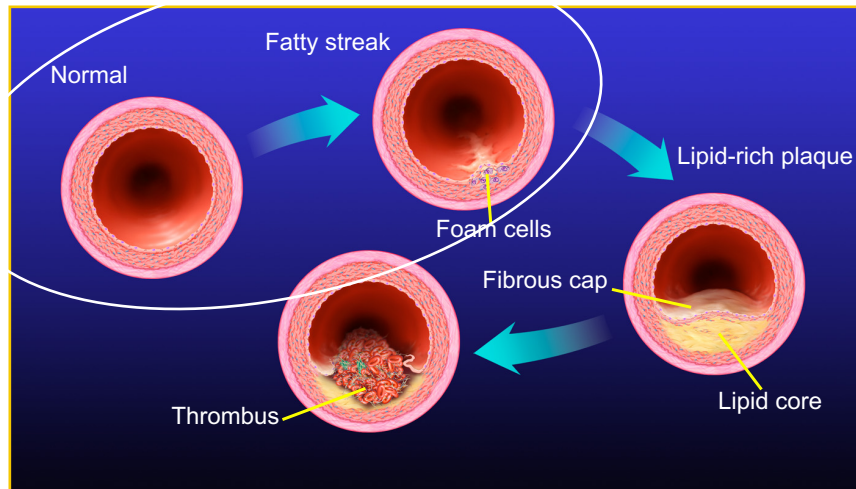


In the absence of atherosclerosis = **Prinzmetal's angina**  
Usually with atherosclerosis and **endothelial injury**

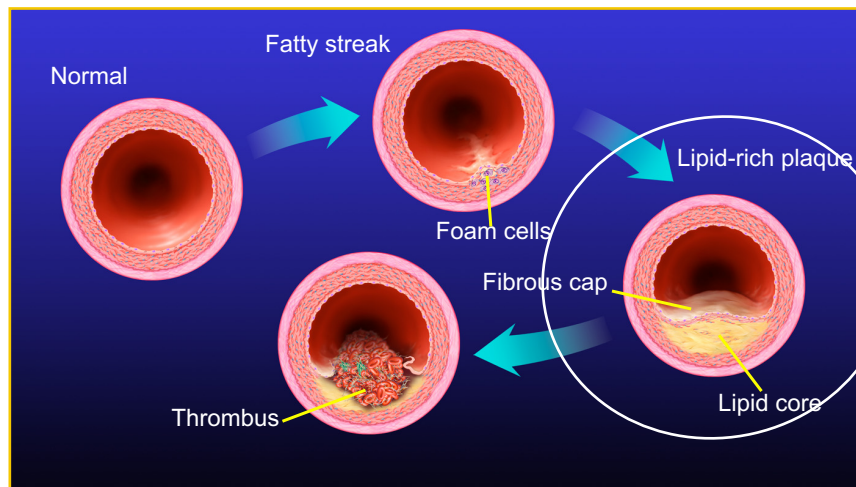
## Ideal: Supply = Demand



## No symptoms (Supply = Demand)

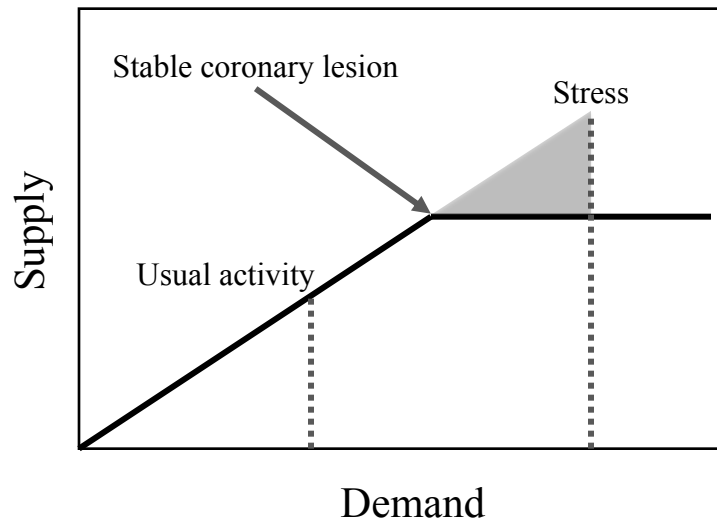


## Stable Angina (Demand > Supply)

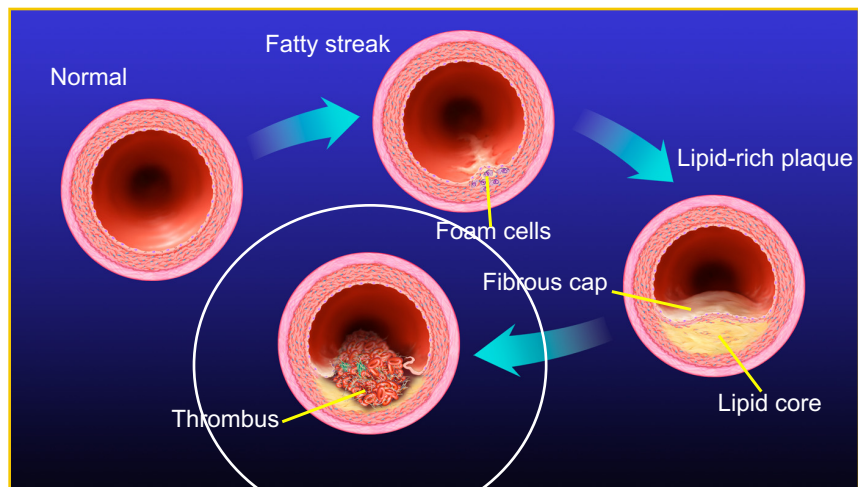




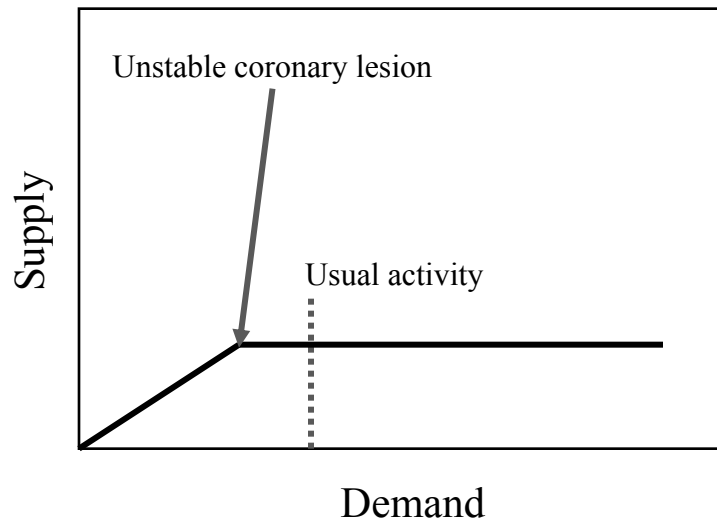
## Ischemia: Demand > Supply



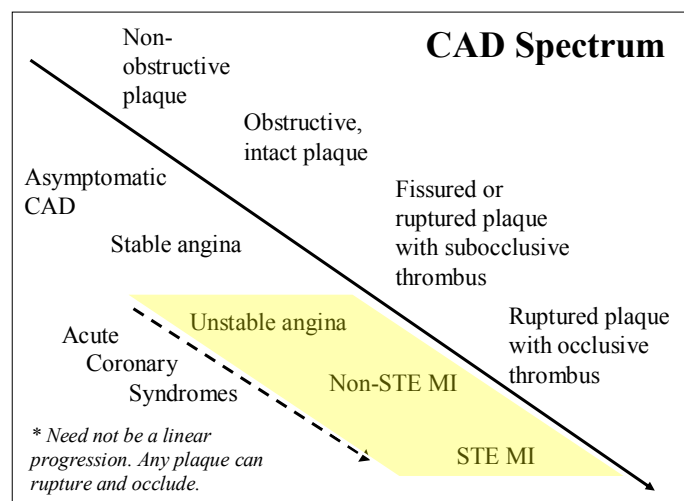
## Acute Coronary Syndromes (eg, Myocardial Infarction)



## Ischemia: Supply < Demand



## Summary



## Part 3: Epidemiology

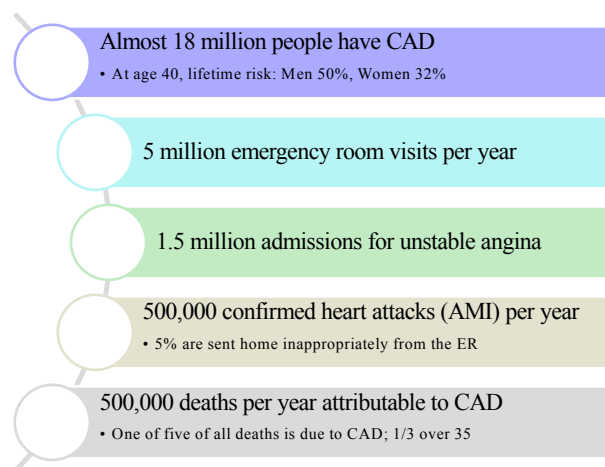
Objectives:

1. Understand who gets the disease
2. List the risk factors for atherosclerosis
3. Describe novel markers of CAD
4. Calculate ASCVD Risk

ASCVD = Atherosclerotic Cardiovascular Disease

## How big is the problem?

Unites States Data



Without exception, CAD is the leading cause of death for adult men and women, and for all races

## Risk Factors for Atherosclerosis

Non-modifiable risk factors	Prevalence	Independent increase in risk
Age	13% of people 65 or older 80% of CAD deaths occur $\geq$ 65 years old	5% per year increase in risk after age 30
Male sex	50%	Develop CAD 10 years earlier than women
Family history of premature CAD $\ddagger$		

## Risk Factors for Atherosclerosis

Modifiable risk factors	Prevalence	Independent increase in risk
Dyslipidemia <ul style="list-style-type: none"> <li>• High total chol</li> <li>• High LDL</li> <li>• Low HDL</li> <li>• High TG</li> </ul>	100 million people: total > 200 40-50% have LDL over 130	2x
Smoking	26 million men (27%) 23 million women (22%)	1.5-2x
Hypertension	58-65 million people (~ 30%) Only 27% adequately treated	1.5-2x
Diabetes mellitus	Increasing; about 5%	1.5x 2/3 die of CV disease

## Risk Factors for Atherosclerosis

<b>Modifiable risk factors</b>	<b>Prevalence</b>	<b>Reduction in CAD with treatment</b>
<b>Obesity</b>	Varies	Via BP, chol, ?Inflammation?
<b>Dietary factors</b>	Varies	Via cholesterol
<b>Thrombogenic factors</b>	Multiple	Proven (Aspirin)
<b>Sedentary lifestyle</b>	Varies	Likely

## Part 4: Diagnosis

### Objectives:

1. Describe the **pre-test likelihood** of CAD based on:
  - a. presentation
  - b. risk factors
  - c. physical exam
  - d. electrocardiogram
2. Describe **non-invasive tests**: “functional” studies
  - a. stress types of stress
  - b. types of imaging
3. Describe the **anatomic diagnosis** based on:
  - a. coronary angiogram
  - b. pathology

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