

## CHAPTER 5 SEX- AND GENDER-UNIQUE MANIFESTATIONS OF CVD

## CWHHA ATLAS ON THE EPIDEMIOLOGY, DIAGNOSIS AND MANAGEMENT OF CARDIOVASCULAR DISEASES IN WOMEN



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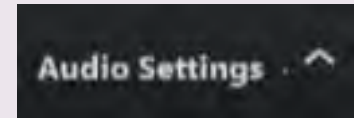
# WELCOME & HOUSEKEEPING



To notify the presenters and moderators if you are having any technical difficulties



To ask questions through session



To check your audio settings by clicking "Test speaker and microphone"





# DISCLOSURE STATEMENT

We do not have an affiliation (financial or otherwise) with a commercial organization that may have a direct or indirect connection to the content of this presentation.



# Learning Objectives

**At the end of this webinar, you will be able to:**

- Be aware of how heart disease can be experienced by sharing in one woman's personal journey.
- Understand the symptoms of ischemic heart disease for women and diagnosis.
- Summarize sex- and some gender-associated, and unique aspects and key features of the manifestations of cardiovascular disease (CVD) in women.



# Canadian Women's Heart Health Alliance (CWHHA)

**LAUNCHED IN 2018**

**Over 120 members!**



**Mission:** Disseminate education and best practices re: Women's cardiovascular (CV) health among **healthcare providers and women with lived experience.**



**Goal:** Eliminate knowledge gaps in specific CV issues and develop new practice considerations in care for women, thereby improving the health of Canadian women.



# CWHHA WORKING GROUPS



Advocacy



Training and  
Education



Knowledge Translation  
and Mobilization



Health Systems  
and Policy

# Sex and Gender Definitions

## SEX



- Biology – chromosomes at birth (female/male)
- Encompasses hormones, genes, anatomy, physiology, etc.

## GENDER



- Socially influenced determination (man/woman)
- Is culturally specific and temporal





# CANADIAN WOMEN'S HEART HEALTH ALLIANCE **ATLAS**

## Epidemiology, Diagnosis, and Management of Cardiovascular Diseases in Women



- 9 unique “chapters”
- CJC Open
- Editor: Dr. M. Graham
- 1<sup>st</sup>: published April 2020
- Annual chapter updates
- “Living document”

Norris CM ..... Mulvagh SL. CJC Open 2020

# THE CANADIAN WOMEN'S HEART HEALTH ALLIANCE ATLAS ON THE EPIDEMIOLOGY, DIAGNOSIS, AND MANAGEMENT OF CARDIOVASCULAR DISEASE IN WOMEN -- CHAPTER 5: SEX- AND GENDER-UNIQUE MANIFESTATIONS OF CARDIOVASCULAR DISEASE

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# Bobbi Jo's STORY



**BOBBI JO GREEN**

Woman With Lived Experience  
Edmonton, AB

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## CHAPTER 5 | SEX- AND GENDER-UNIQUE MANIFESTATIONS OF CVD

### ISCHEMIC HEART DISEASE (IHD)

Symptoms of IHD vary between sexes. There are also sex and age-related differences in symptom presentation, pathophysiology, and outcomes.

Non-obstructive atherosclerotic mechanisms, including coronary microvascular dysfunction, vasospasm, and spontaneous coronary dissection are under-recognized causes of angina and myocardial infarction in women.

### OBSTRUCTIVE & NON-OBSTRUCTIVE CORONARY ARTERY DISEASE

Obstructive coronary artery disease most often affects post-menopausal women, who often have a higher cardiovascular risk burden than men.

Detecting atherosclerosis, even in the absence of obstructive lesions, is important in order to improve risk stratification and treatment of ischemic heart disease in women.

### HEART FAILURE (HF)

Up to 40% of those with heart failure with reduced ejection fraction (HFrEF) are women, who often have a high burden of comorbidities.

Women with HFrEF have better survival, but higher prevalence of depression, stroke, and reduced quality of life.

Heart failure in women more commonly manifests as heart failure with preserved ejection fraction (HFpEF).



### VALVULAR HEART DISEASE

Sex-specific pathophysiology in valvular heart disease is mostly unknown despite emerging evidence for distinct characteristics of valve lesions and therapies in women.

### CARDIOMYOPATHIES

Women are much more likely to develop stress cardiomyopathy (Takotsubo). Women may be more susceptible to auto-immune myocarditis and restrictive cardiomyopathies. Peripartum cardiomyopathy exclusively affects women, with differences in characteristics according to ethnicity.

### ARRHYTHMIA

Sex differences in clinical manifestations of arrhythmia are associated with normal cyclical hormonal changes in women.

### VASCULAR ARTERIAL DISEASE

Women are at increased risk of complications when diagnosed with aortic aneurysmal and peripheral arterial disease.

### STROKE AND VASCULAR COGNITIVE IMPAIRMENT

Women have unique risk factors that make them vulnerable to stroke across the lifespan, particularly during pregnancy and post-menopausal aging. Stroke can lead to vascular cognitive impairment later in life.







**HER HEART MATTERS**

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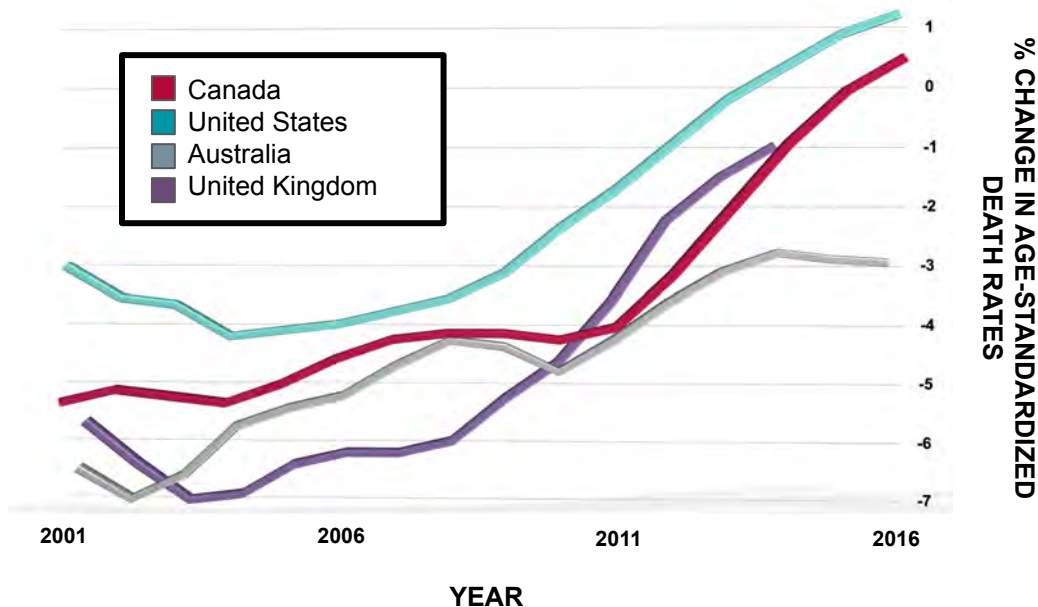
Heart disease is on the rise and is the **leading cause of death** for women worldwide.

### QUESTIONS?

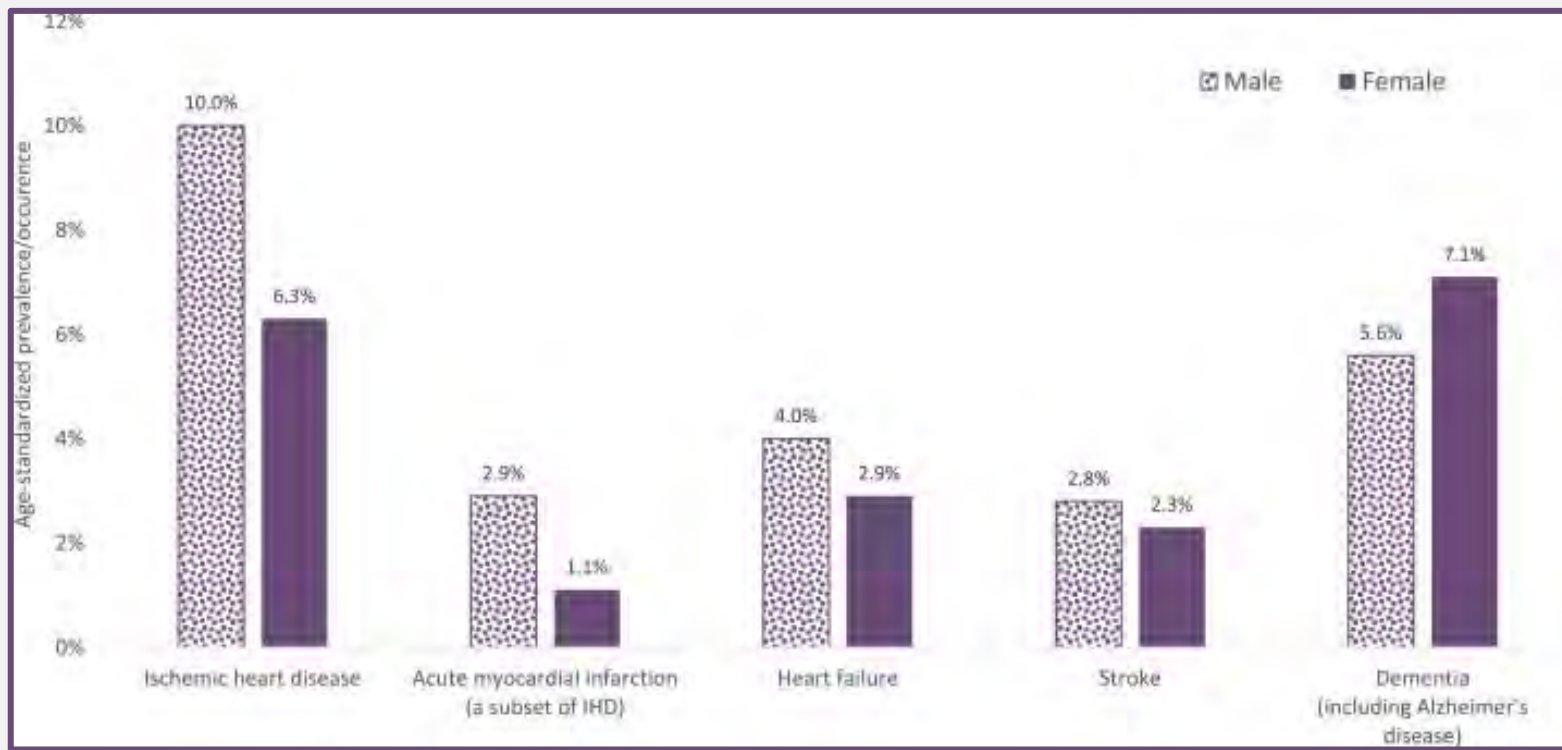
Visit [WearRedCanada.ca](http://WearRedCanada.ca) or your healthcare provider.

## KEY MESSAGE # 1

### VITAL STATISTICS FROM THE WORLD HEALTH ORGANIZATION MORTALITY DATA

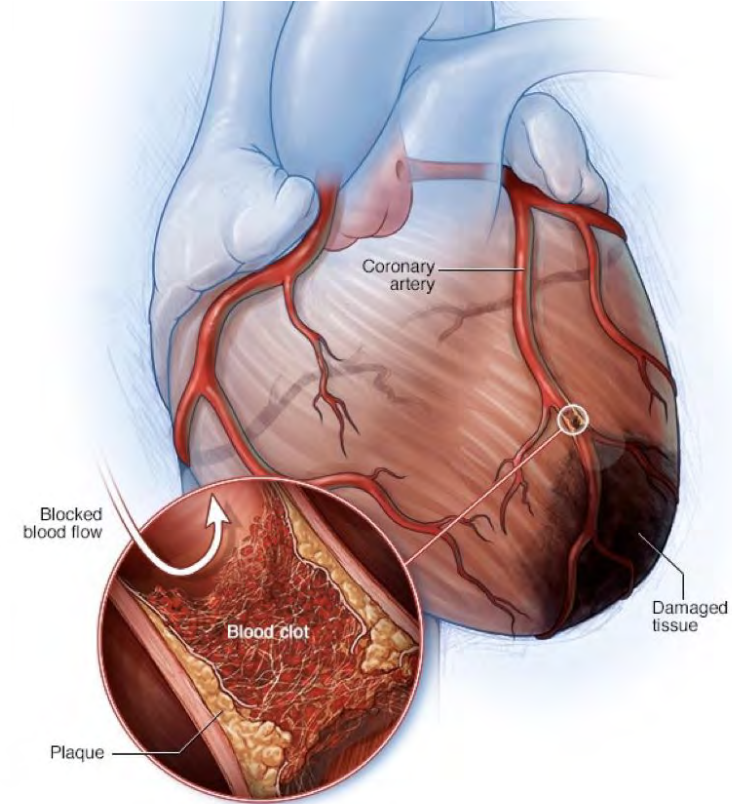


# Age-Standardized Prevalence/Occurrence of Major Cardiovascular Diseases in Canada, by Sex



# Ischemic Heart Disease

- Stable angina
- Acute coronary syndrome (heart attack)
- Higher mortality in younger women
- 3x higher mortality than breast cancer
- Longer diagnostic delays



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## KEY MESSAGE # 2

Heart attack symptoms are **not recognized** in over **50%** of women.

**3+**

Women are more likely to present with **3 or more** symptoms in addition to chest pain.



If you think someone is having a heart attack, **seek immediate medical attention.**



### **SYMPTOMS OF HEART ATTACK MOST OFTEN REPORTED BY WOMEN**

- Chest pain or discomfort (ex. pressure, tightness, or burning)
- Pain in the jaw, neck, arm, or back
- Abnormal excessive sweating
- Shortness of breath
- Stomach pain or discomfort, or feelings of nausea or indigestion

### **OTHER ACCOMPANYING OR ASSOCIATED SYMPTOMS**

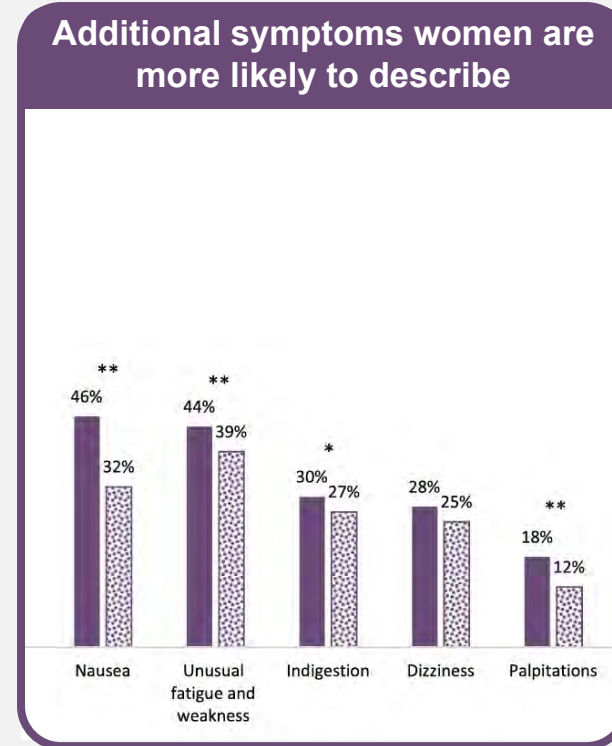
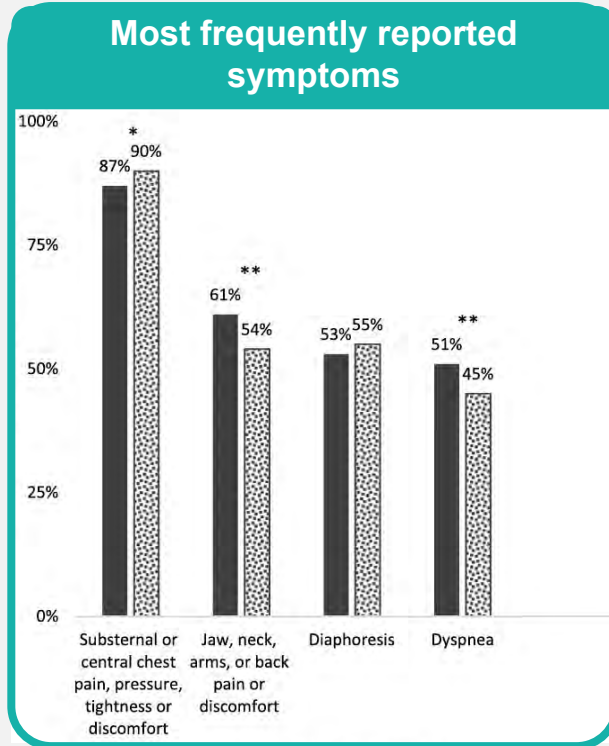
- Unusual weakness or fatigue
- Back, shoulder or right arm pain
- Sleep disturbance
- Dizziness or light-headedness
- Fast or irregular heartbeat



# Symptoms

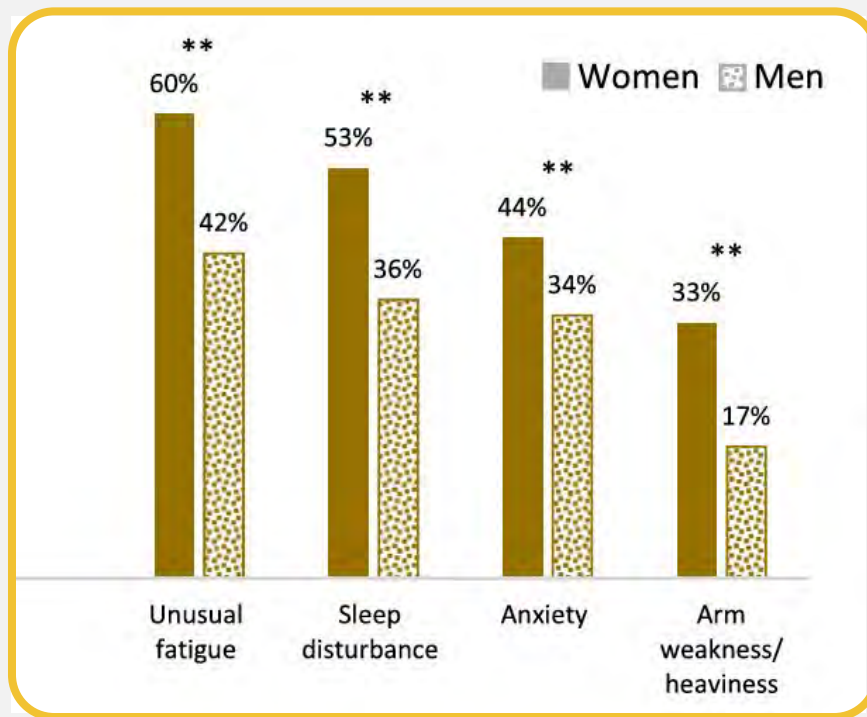
■ Women ■ Men

Proportion of the time  
symptom is reported





# Frequently Reported Prodromal Symptoms



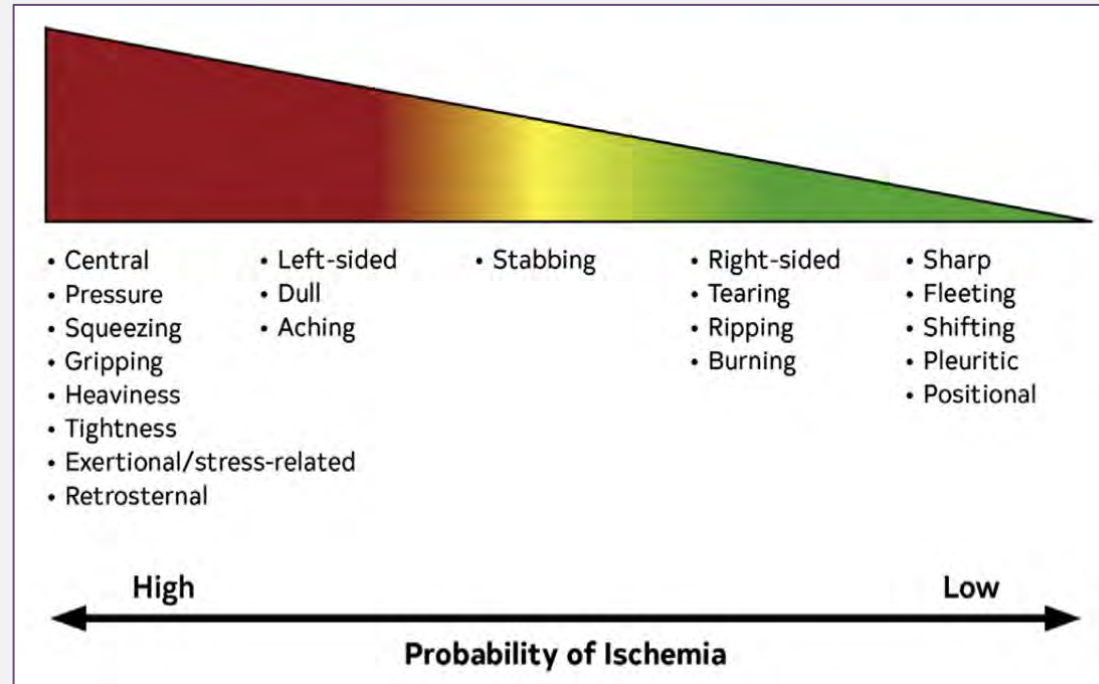
# Terminology

~~Atypical vs. Typical chest pain~~



Cardiac vs. Possibly cardiac vs. Non-cardiac

# Index of Suspicion That Chest “Pain” is Ischemic in Origin on the Basis of Commonly Used Descriptors



Aggarwal et al. *Circulation: Cardiovascular Quality and Outcomes*. 2018;11:e004437



**HER HEART MATTERS**

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# KEY MESSAGE # 4



Women can  
be at  
**greater risk** for  
heart  
disease  
than men.

**The following conditions lead to a greater risk of heart disease:**



**Certain pregnancy complications**  
(ex. Premature birth, diabetes or hypertension during pregnancy, preeclampsia)



**Earlier menopause**  
(Average age of menopause 50-52)



**Polycystic ovary syndrome**



**Systemic inflammatory and autoimmune disorders**  
(ex. Rheumatoid arthritis, lupus)



**Cigarette smoking**  
(Women have 3x higher risk of heart attack due to cigarette smoking compared to men)



**Diabetes mellitus**  
(Women living with diabetes are 3x more likely to die from heart disease compared to men)

**Questions? Visit [WearRedCanada.ca](https://www.WearRedCanada.ca) or your healthcare provider.**





**HER HEART MATTERS**

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# KEY MESSAGE # 3

Causes of heart disease can be different for women than men.



## Common causes of heart disease:

- Coronary artery disease
- Valvular heart disease
- Arrhythmia (irregular heart beat)

## Women are more likely than men to have:

- Spontaneous coronary artery dissection (SCAD)
- Coronary vasospasm
- Microvascular dysfunction (small-vessel disease)
- Takotsubo (stress-induced) cardiomyopathy (disease of the heart muscle)
- Peripartum cardiomyopathy (weakened heart during or after pregnancy)

Some health providers may be less aware of the differences between women and men.

**Questions? Visit [WearRedCanada.ca](https://www.WearRedCanada.ca).**



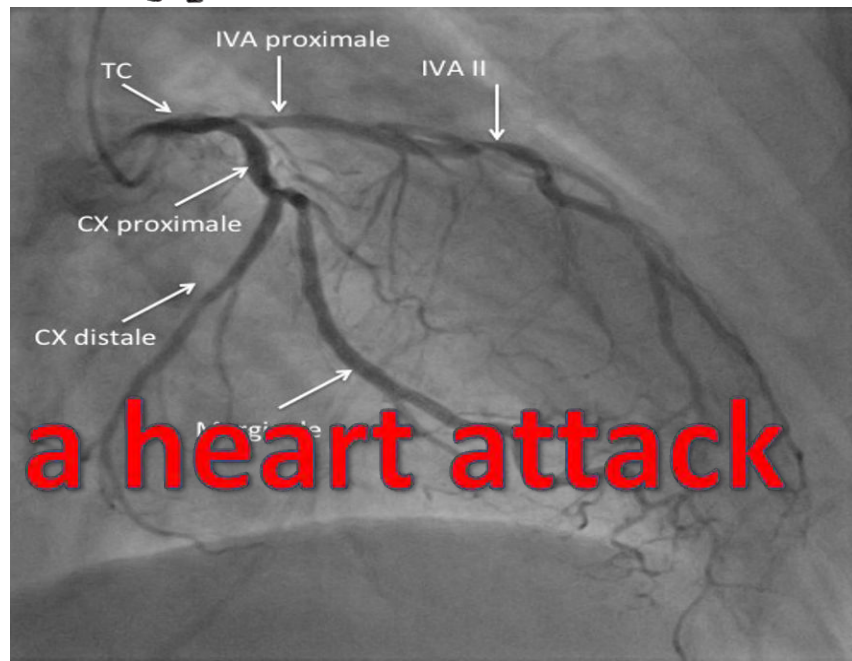
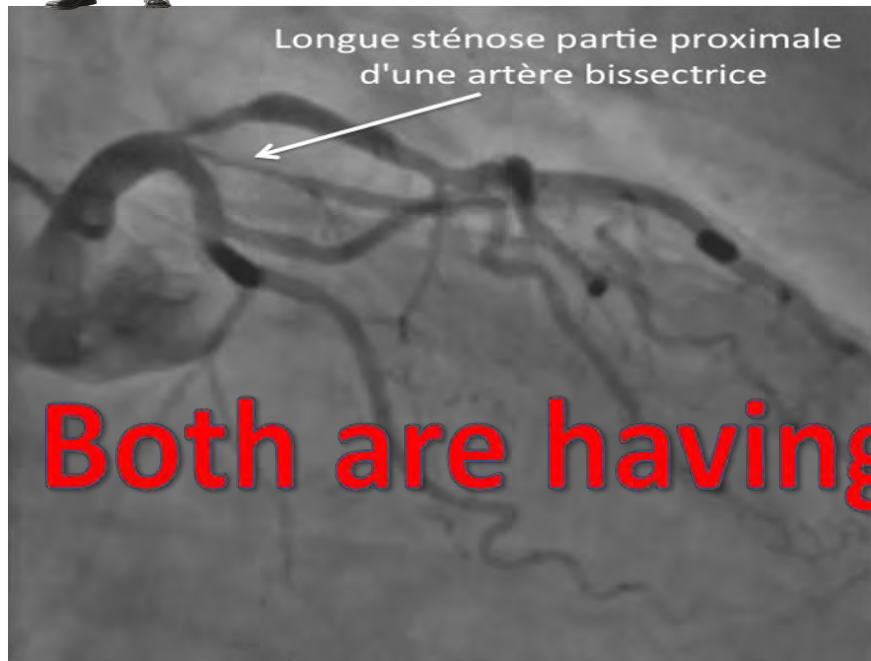




Classic findings

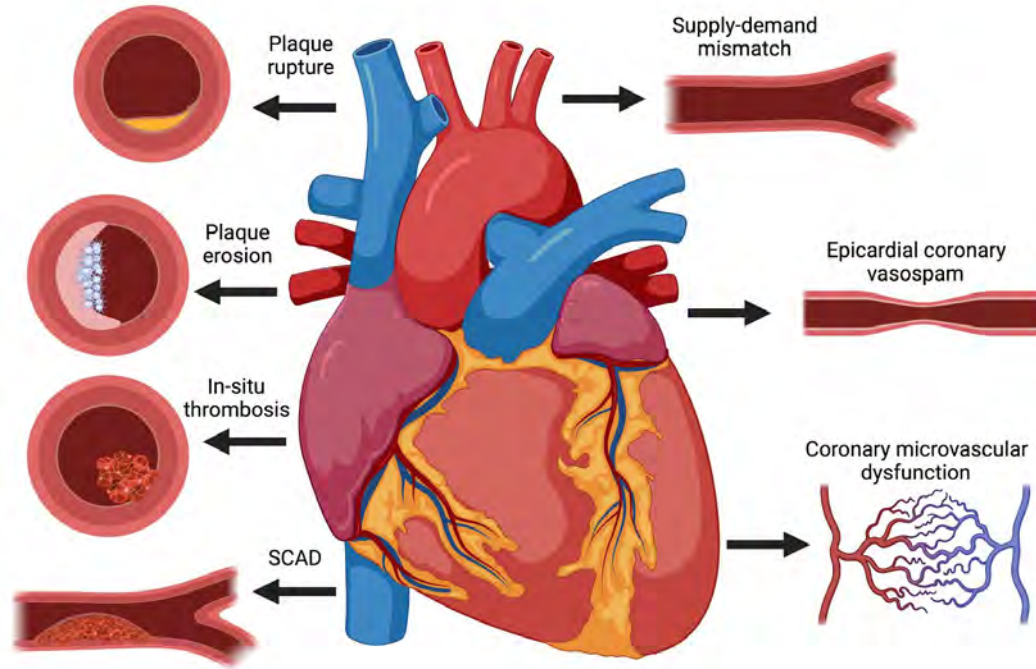


No visible lesion



**Both are having a heart attack**

# Myocardial Infarction (MI) with Non-obstructive Coronary Artery Disease (MINOCA)



*Tamis-Holland et al, 2019, Circulation, 139(18): e891-e908*

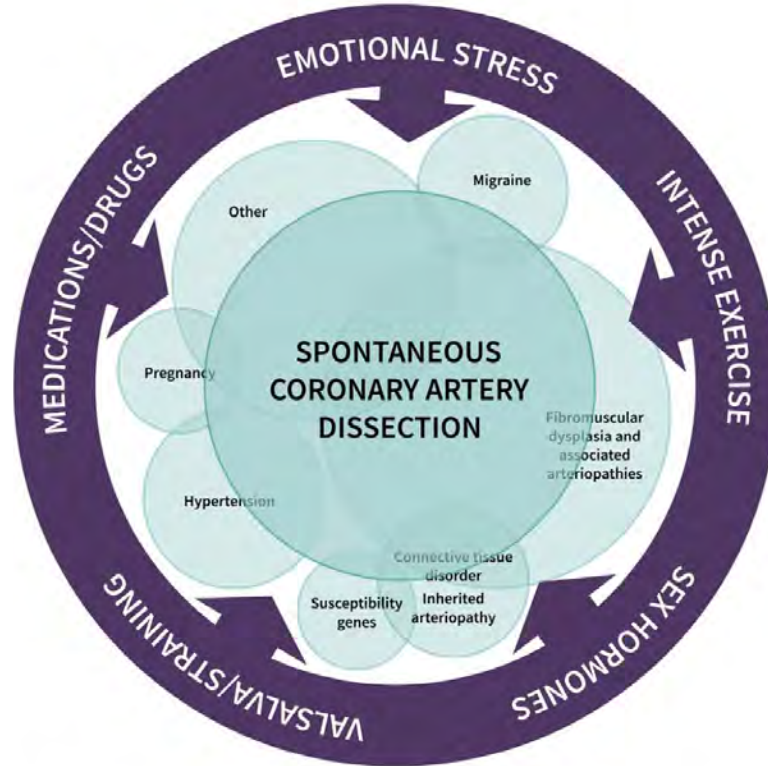
# Myocardial Infarction (MI) with Non-obstructive Coronary Artery Disease (MINOCA)

Potential underlying mechanisms of MINOCA	Diagnostic testing
<ul style="list-style-type: none"><li>• Coronary plaque disruption (eg, plaque rupture, or ulceration, erosion, calcific nodules)</li><li>• Epicardial coronary vasospasm</li><li>• Coronary microvascular dysfunction</li><li>• Spontaneous coronary artery dissection</li><li>• Hypercoagulable disorders</li><li>• Coronary emboli</li><li>• Paradoxical emboli</li><li>• Takotsubo or other cardiomyopathy</li><li>• Myocarditis</li></ul>	<ul style="list-style-type: none"><li>• Coronary angiogram</li><li>• IVUS</li><li>• OCT</li><li>• Coronary Vasoreactivity testing (acetylcholine, ergonovine)</li><li>• Coronary function testing (CFR, IMR)</li><li>• Myocardial PET</li><li>• Coronary angiogram</li><li>• IVUS</li><li>• OCT</li><li>• Hypercoagulable work-up</li><li>• TTE, TEE, bubble contrast echocardiography</li><li>• Cardiac MRI</li></ul>

Testing and treatment differs based on the underlying diagnosis and cause. Therefore, it's important that work up be thorough.



# Associated Conditions and Risk Factors for SCAD



*Modified from Hayes et al. with permission from Elsevier.*



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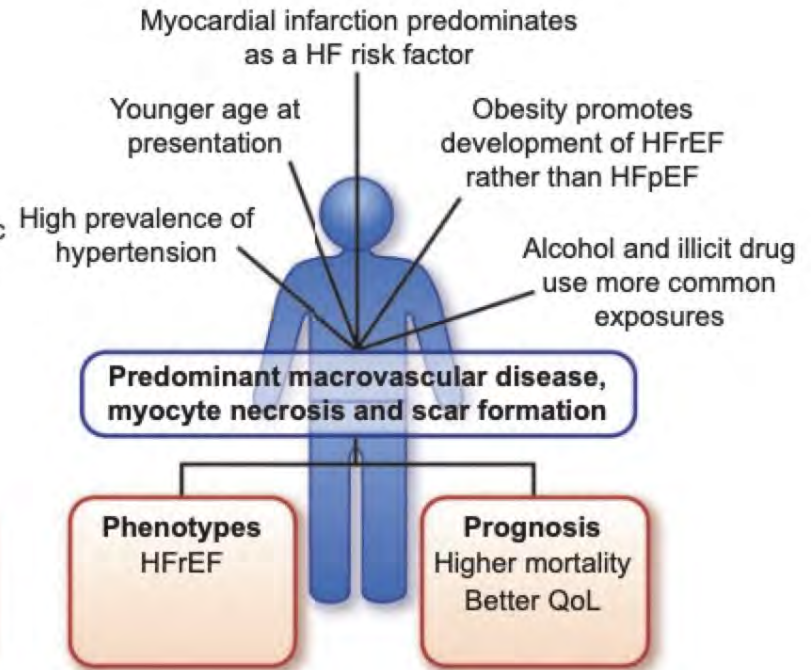
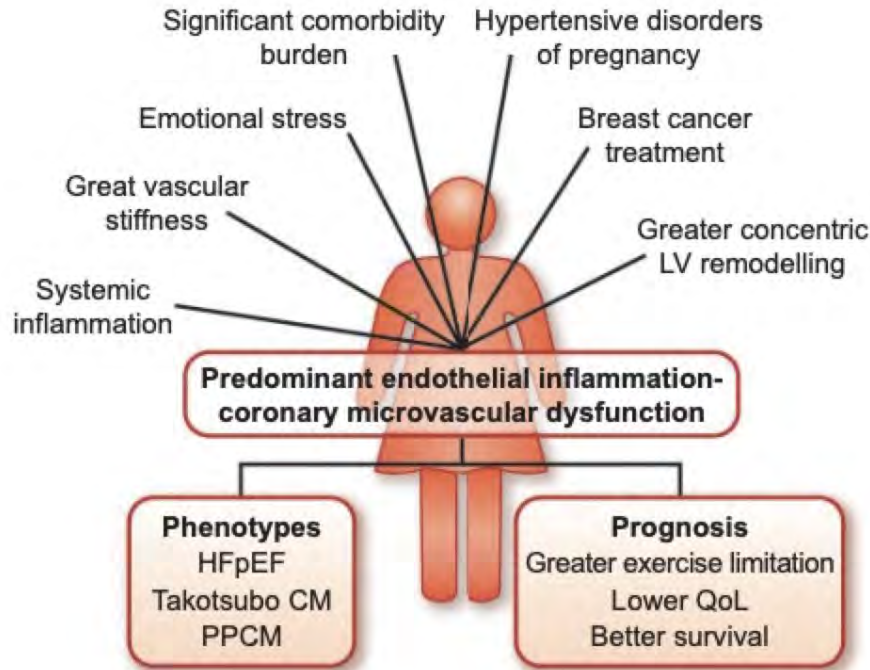
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# Heart Failure



- Second cause of hospitalization, third cause of death in women
- Symptoms
  - Shortness of breath, fatigue, swelling
- Underlying mechanisms
  - Heart is too stiff (HFpEF) - more frequent in women (55%)
  - Heart is too weak (HFrEF) (29% women)
- Causes
  - Previous heart attacks (ischemic)
  - Toxic: alcohol, illicit drugs, chemotherapy
  - Valvular heart disease
  - Genetic
  - Cardiomyopathies

# Heart Failure

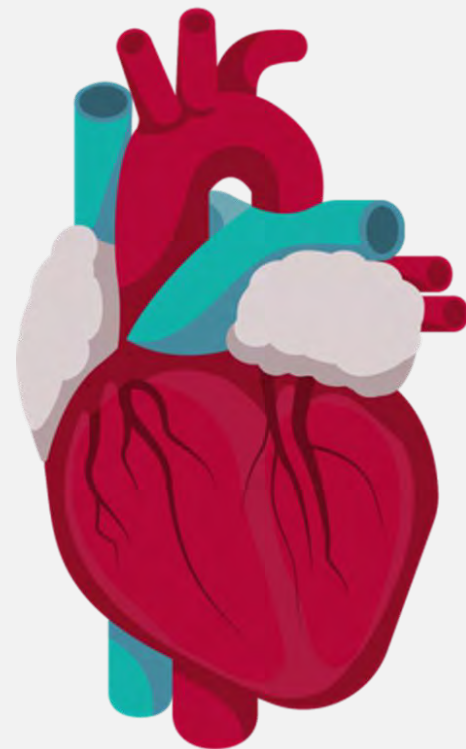


Lam CSP. Eur Heart J. 2019;40(47):3859-68c. 10.1093/eurheartj/ehz835  
Accesible en ligne: <https://academic.oup.com/eurheartj/article/40/47/3859/5652224>



# Cardiomyopathies

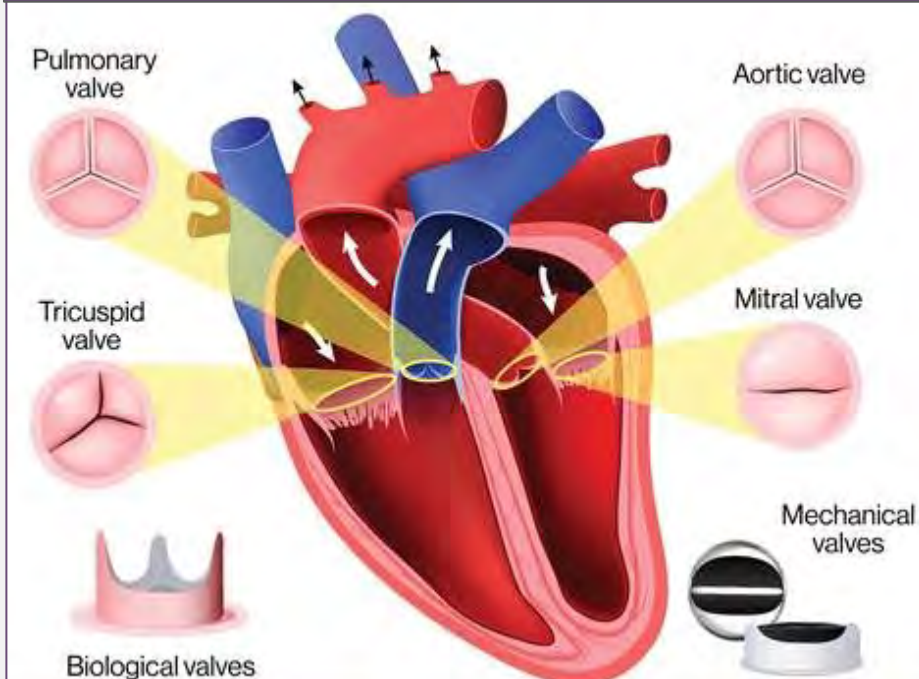
- Takotsubo cardiomyopathy (“Broken Heart syndrome”)
  - 90% of cases in post-menopausal women
  - Psychological or physical stressor
  - Poorly understood
  - Complete recovery common, but risk of complications and recurrence
- Peripartum cardiomyopathy
  - Late in pregnancy or in the 6 months following delivery
  - Weakened heart muscle
  - Recovery uncertain
- Sarcoidosis, Hypertrophic cardiomyopathy, Infiltrative, Myocarditis





# Valvular Heart Disease

## Heart Valve



- 5-10% of adults over 65, 47.5% women
- Women are underrepresented in clinical trials
- Smaller heart cavities
- Hormonal differences
- Diagnostic delays
- Worse outcomes following surgery

<https://www.heartandstroke.ca/heart-disease/conditions/valvular-heart-disease>

# Arrhythmias

- Irregular heart beat
- Risk increases in pregnancy
- Higher likelihood in women
  - Atrial fibrillation - 60% of those over 75 are women
  - Supraventricular tachycardia - menstrual cycle
  - Longer QT interval - Estrogen-related
  - Sick sinus syndrome, postural orthostatic tachycardia syndrome
- Outcomes
  - More symptoms, higher rate of recurrence
  - Less likely to undergo cardioversion, ablation



# Vascular Arterial Disease

## Thoracic Aortic Aneurysm

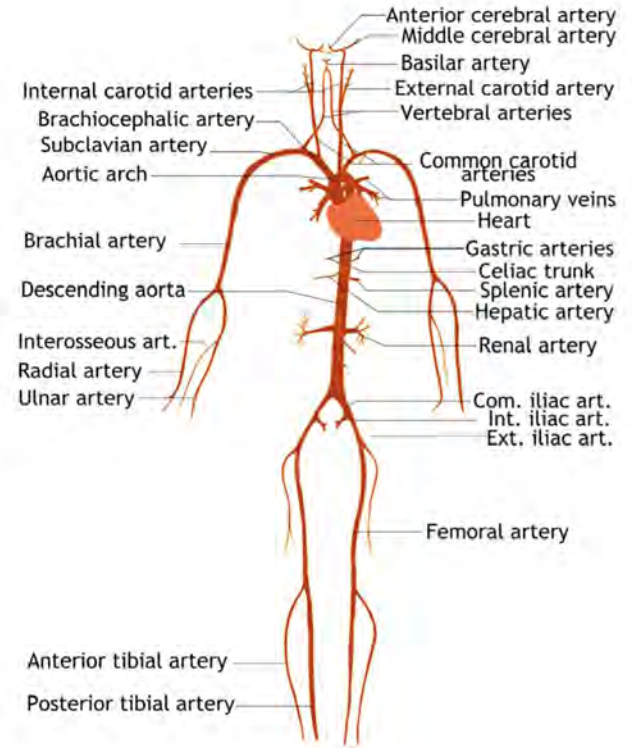
- Lower prevalence
- Faster growth
- Higher mortality and stroke following surgery

## Abdominal Aortic Aneurysm

- Faster growth and higher risk of rupture
- Hormonal, molecular, hemodynamic differences
- Higher elasticity, stiffness, lower strength
- Sex specific cut-offs for surgery

## Peripheral Vascular Disease

- 3x higher risk following HTN disorders in pregnancy
- Greater functional impairment, depression
- Higher morbidity and mortality following surgery



doi: <https://doi.org/10.1371/journal.pcbi.1007259.g001>



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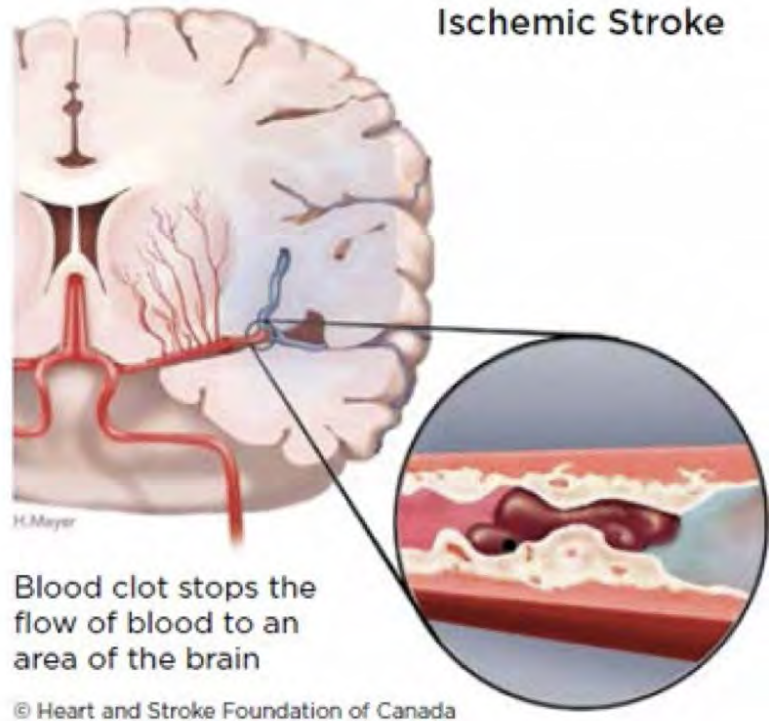
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# Stroke

**F**ace is it drooping?  
**A**rms can you raise both?  
**S**peech is it slurred or jumbled?  
**T**ime to call 9-1-1 right away.

Act **F A S T** because the quicker  
you act, the more of the person you save.

© Heart and Stroke Foundation of Canada, 2017



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# Stroke



- Women over 75 are disproportionately affected
- Higher risk of stroke related disability, reduced quality of life, increased levels of post-stroke depression, institutionalization
- Possible higher risk of stroke with atrial fibrillation
- Unique female-specific risk factors across the lifespan
- Higher risk of dementia



# In Summary

- CVD is the primary cause of premature death in women in Canada.
- Sex- and gender-unique differences exist in symptoms and pathophysiology of CVD in women.
- These differences must be considered when evaluating CVD manifestations, because they affect management and prognosis of cardiovascular conditions in women.





# Q&A



**WE WANT TO  
HEAR FROM YOU.**

Questions, Comments...



# THANK YOU!



## EVALUATION

Please complete the evaluation form after the webinar.

For more information visit

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**Table 1. Mechanisms and diagnosis of MINOCA**

Potential underlying mechanisms of MINOCA*	Diagnostic testing
Coronary plaque disruption (eg, plaque rupture, or ulceration, erosion, calcific nodules)	Coronary angiogram IVUS OCT
Epicardial coronary vasospasm	Coronary vasoreactivity testing (acetylcholine, ergonovine)
Coronary microvascular dysfunction	Coronary function testing (CFR, IMR) Myocardial PET
Spontaneous coronary artery dissection	Coronary angiogram IVUS OCT
Hypercoagulable disorders	Hypercoagulable work-up
Coronary emboli	TTE, TEE, bubble contrast
Paradoxical emboli	echocardiography
Takotsubo or other cardiomyopathy <sup>†</sup>	Cardiac MRI
Myocarditis <sup>†</sup>	TTE Cardiac MRI TTE