



UNIVERSITY OF OTTAWA
HEART INSTITUTE
INSTITUT DE CARDIOLOGIE
DE L'UNIVERSITÉ D'OTTAWA



@brainheartnexus



uOttawa

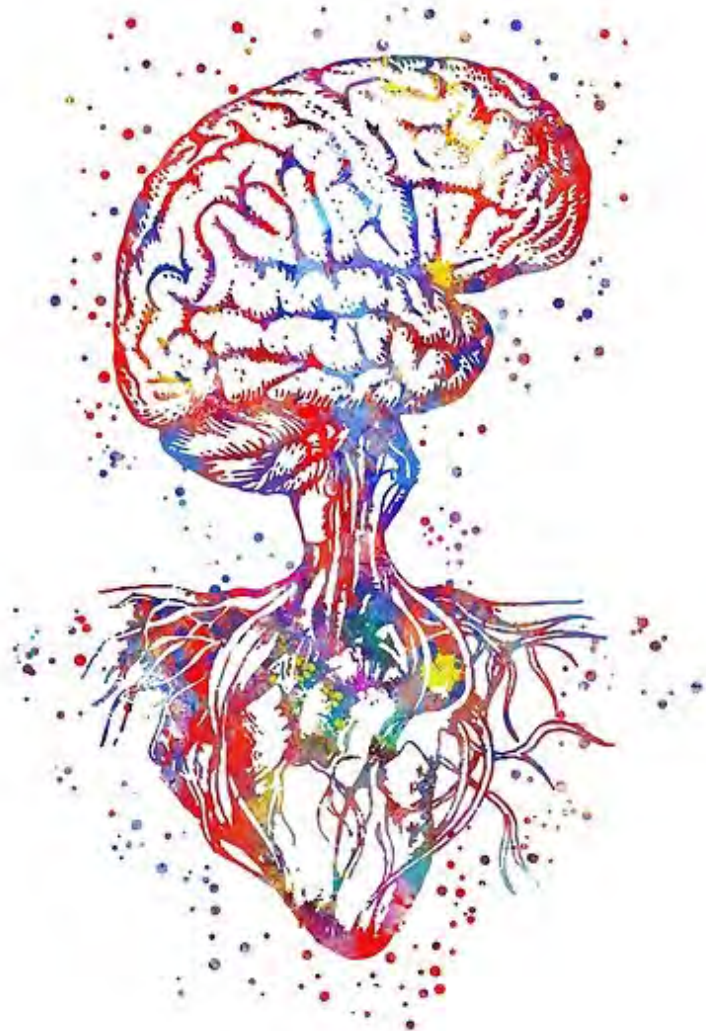
**Follow Your Heart.....But
Don't Forget Your Brain!**

The Heart-Brain Connection: What Have we Learned?

Jodi Edwards, PhD

Scientist and Director
Brain and Heart Nexus Research Program
Co-Director
UOHI Population Outcomes Research Unit
University of Ottawa Heart Institute
Assistant Professor
School of Epidemiology and Public Health
University of Ottawa

Heart-Brain Connection: Poll



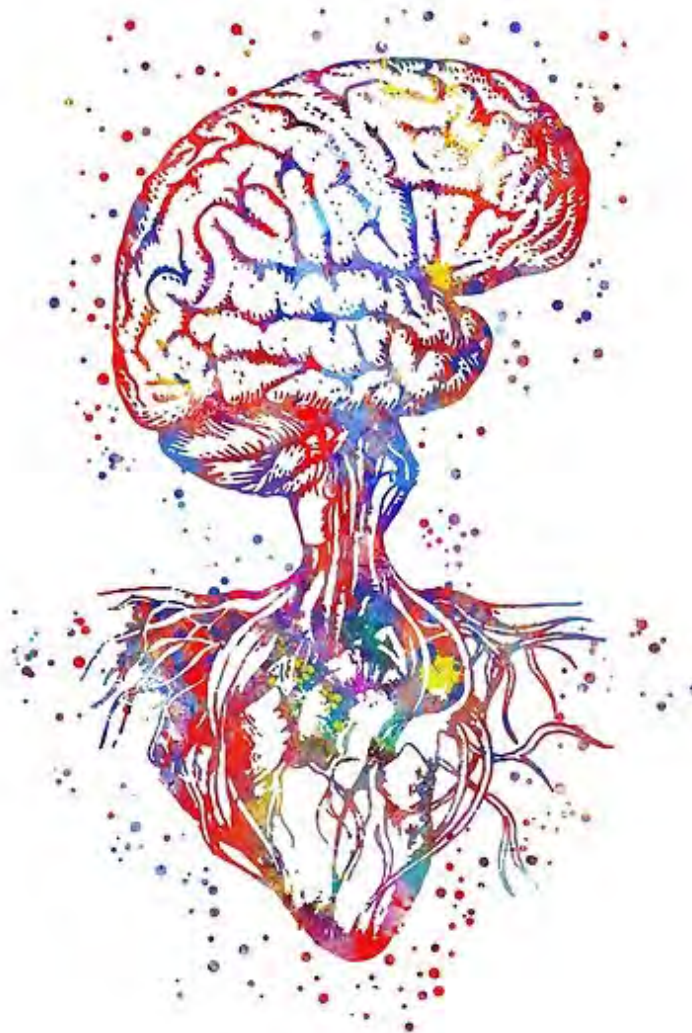
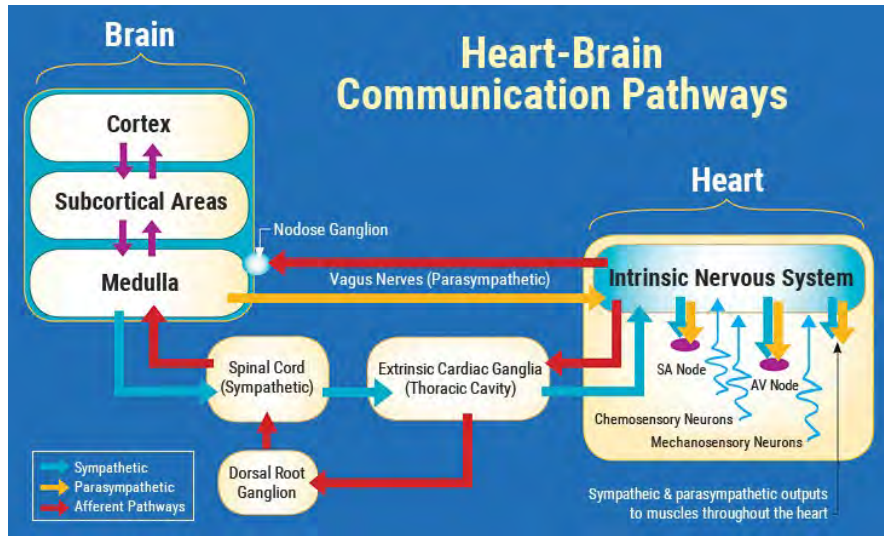
Q: Do you think heart diseases and brain diseases are connected?

A. Yes! They are peas in a pod

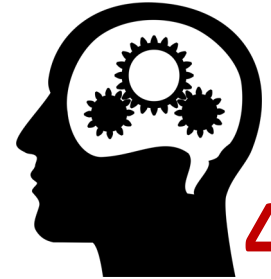
B. I am not sure

C. No. I follow my heart but listen to my brain and they rarely meet!

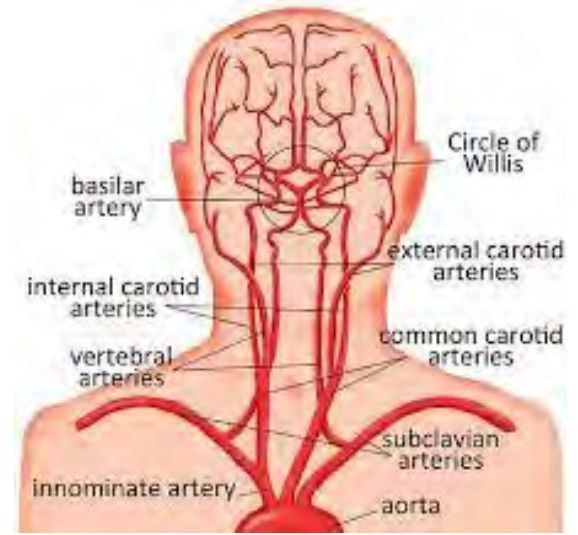
Heart-Brain Connection



5X



42%

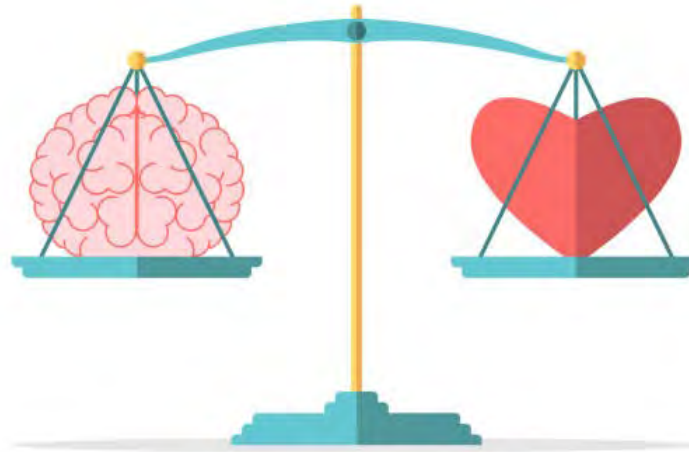
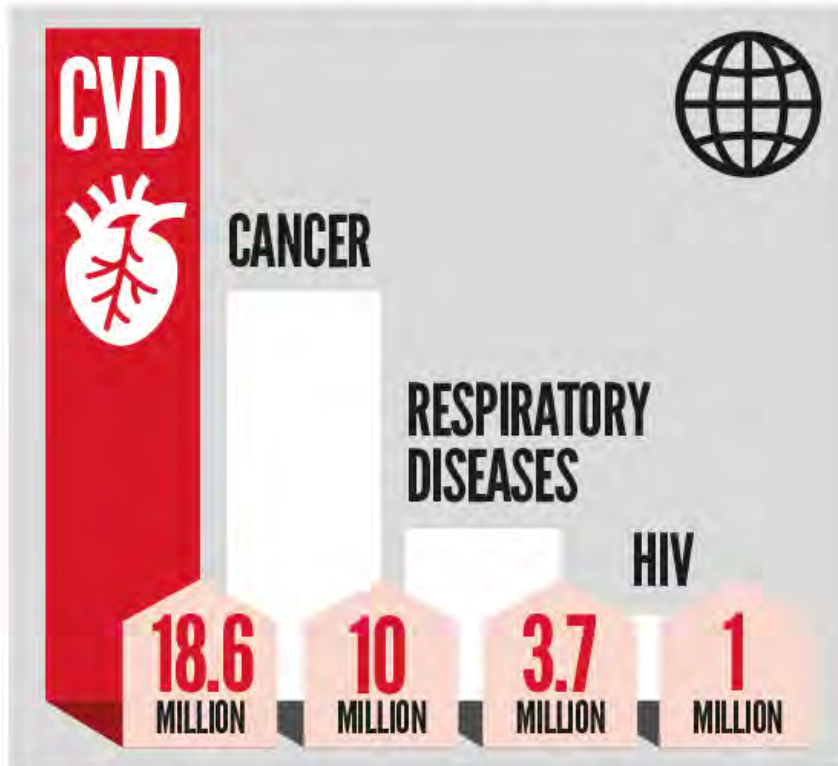


15-20%

Cardiovascular Health



GLOBAL CAUSES OF DEATH



2 FOR 1



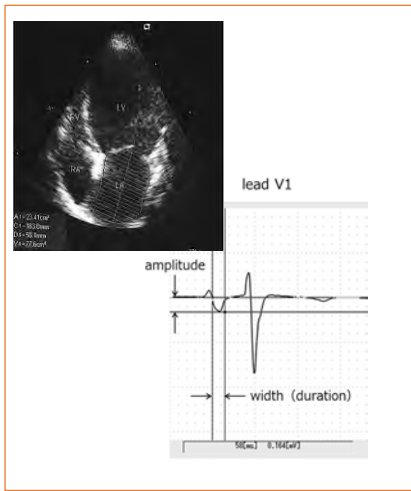
RISK FACTORS FOR CVD

- | | | | |
|---|----------------------|---|------------------------|
|  | High Blood Pressure |  | Unhealthy Diet |
|  | High Cholesterol |  | Diabetes |
|  | Overweight & Obesity |  | Tobacco |
|  | Air Pollution |  | Kidney Disease |
|  | Physical Inactivity |  | Harmful use of alcohol |

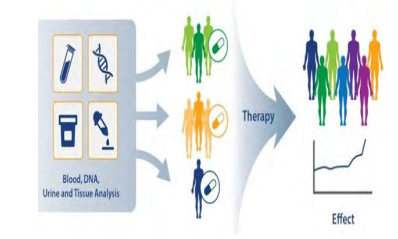
Brain and Heart Nexus Research Program



Risk Markers



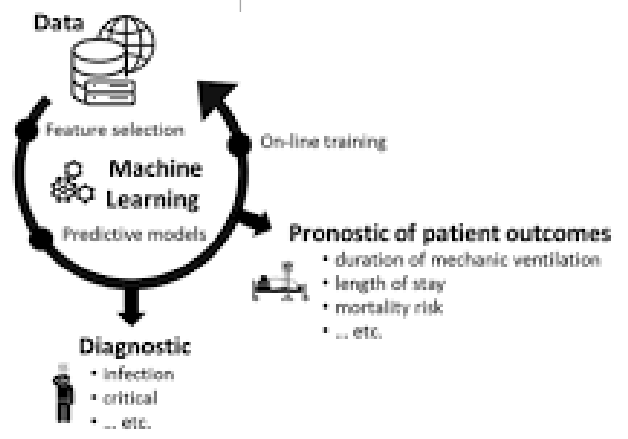
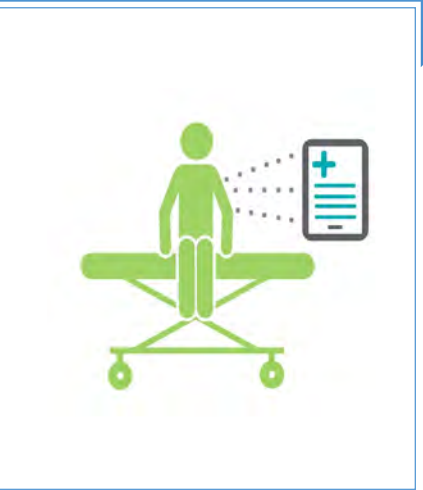
High-Risk Phenotypes



Clinical Prediction



Outcomes

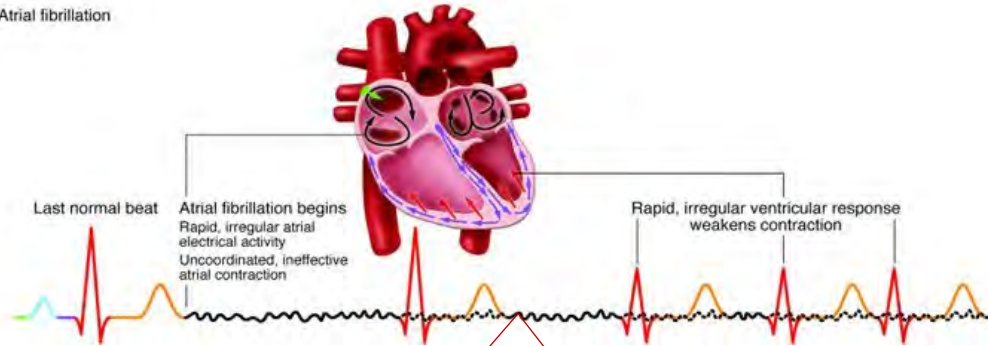


Decision support systems for effective management of medical resource

Atrial Fibrillation (AF) – Irregular Heartbeat



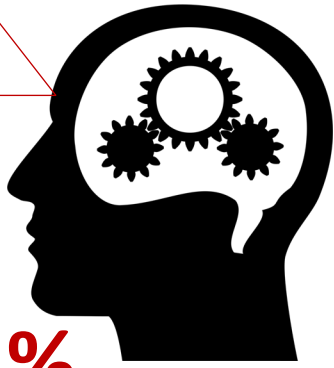
B Atrial fibrillation



1 in 4 persons over the age of 55 years have atrial fibrillation

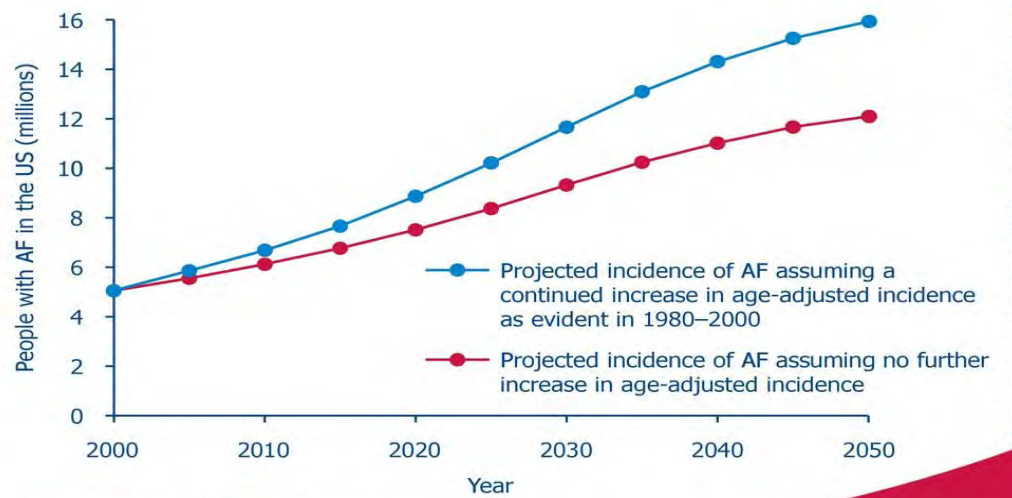


5X



42%

Prevalence of AF predicted to more than double by 2050



Miyasaka Y et al. Circulation 2006;114:119–25

Figure reproduced with permission: ©2009, American College of Cardiology, Inc

Chugh SS *et al.* Circulation 2014;129:837–47.
 Miyasaka Y et al. Circulation 2006;114:119-25
 Santangeli Heart Rhythm. 2012 Nov;9(11):1761-8

Atrial Fibrillation (AF)



Cerebral MRI findings in AF

- Clinical stroke and/or TIA
- Silent cerebral ischaemia

Cerebral microhaemorrhage

Global cerebral and hippocampal volume loss

White matter hyperintensities

The heart-brain connection

Cerebral thromboembolism

Cerebral hypoperfusion

AF-related cardiovascular changes

Prothrombotic state

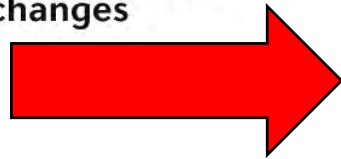
Pro-inflammatory state

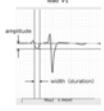
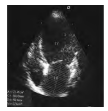
↓ Heart rate
↓ Cardiac output

LV systolic dysfunction

AF

- Shared risk factors
- Hypertension
- Diabetes mellitus
- Heart failure
- Chronic kidney disease
- Excessive alcohol consumption





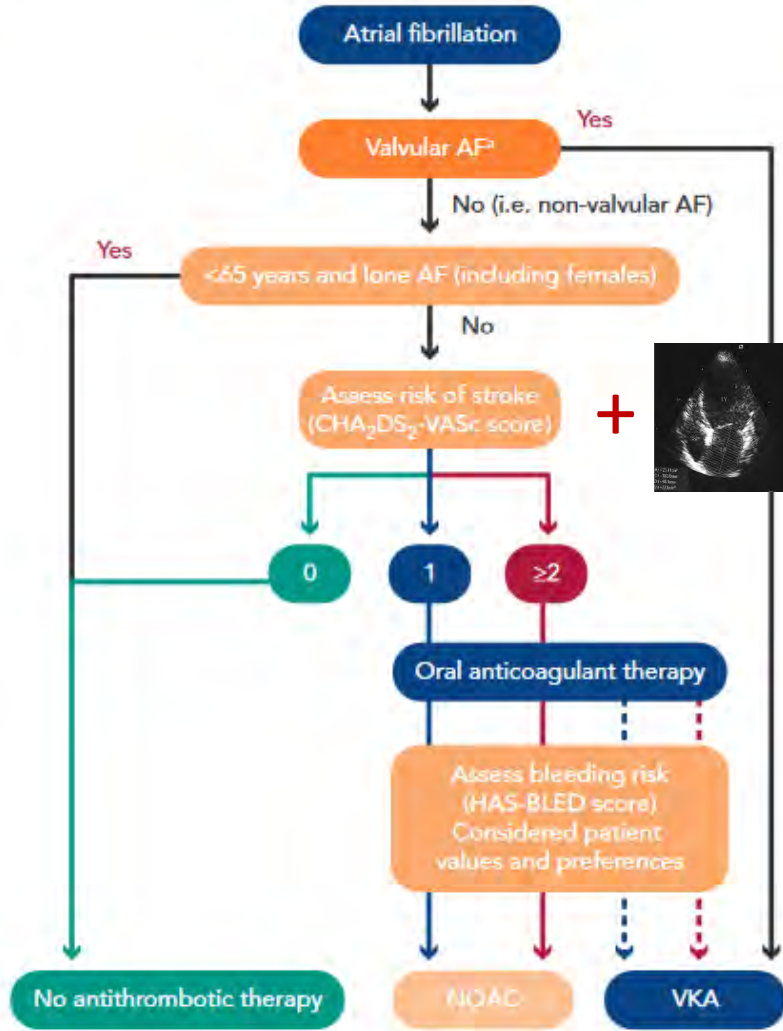
Risk Markers



Clinical Prediction



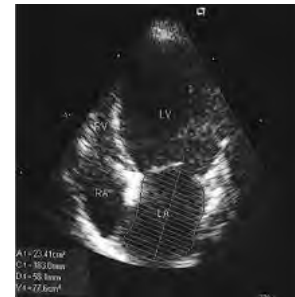
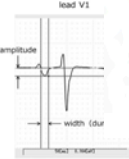
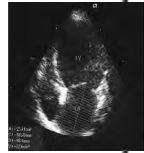
Figure 1: Choice of Anticoagulant for Atrial Fibrillation



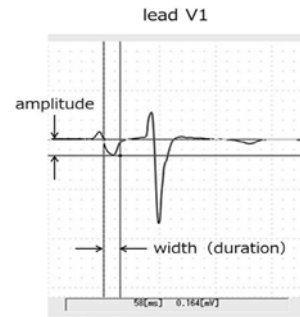
STROKE

Atrial Cardiopathy in the Absence of Atrial Fibrillation Increases Risk of Ischemic Stroke, Incident Atrial Fibrillation, and Mortality and Improves Stroke Risk Prediction

Jodi D. Edwards, PhD; Jeff S. Healey, MD, MSc; Jiming Fang, PhD; Kathy Yip, MD; David J. Gladstone, MD, PhD



Left atrial enlargement



Excessive atrial ectopic beats

Simple, right?

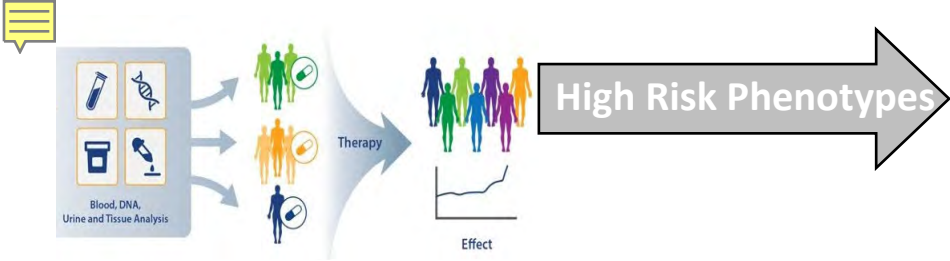


MULTIMORBIDITY

When **someone** has **two** or **more** long-term health conditions.

The diagram features a central white silhouette of a human figure. Seven circular icons are connected to the figure by lines, representing different health conditions: a brain (top right), a green pill bottle (top right), a heart (middle right), a syringe (bottom right), a joint (bottom left), lungs (middle left), and a red pill (top left).

33% of Canadians have 2+ chronic conditions



CardiacDOC

Heart Failure Population

	General Population	Depression	Obstructive Sleep Apnea	Cognitive Impairment
Prevalence				
Mortality				
Secondary Events*				

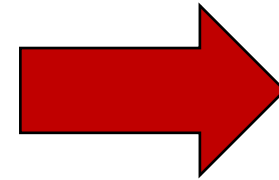


PROBLEM

DOC conditions are frequently **unscreened & undetected**

QUESTION

Can a simple rapid screening test identify DOC conditions and do DOC conditions predict adverse outcomes in HF patients

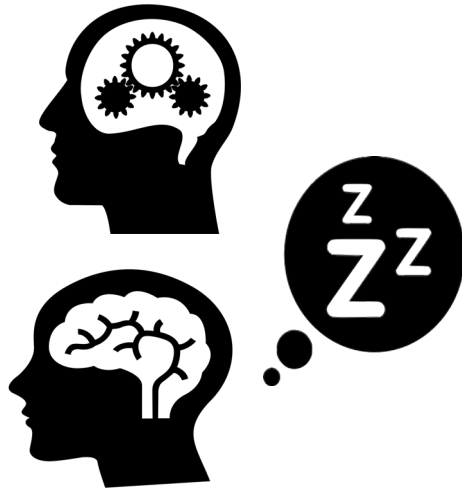


- Death
- Complications: falls, pneumonia, delirium, HF exacerbation

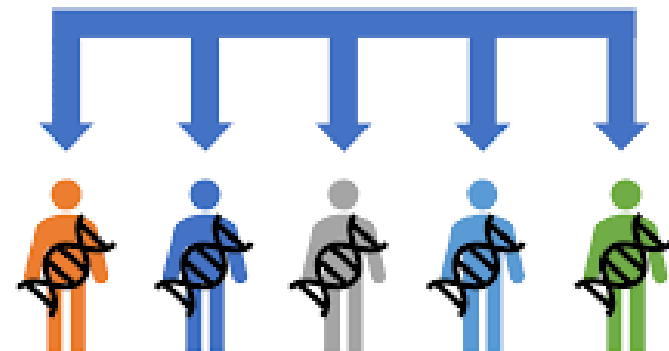
DOC SCREEN: Depression, Obstructive Sleep Apnea, Cognitive Impairment						
Name:		Date:				
Variables to refine risk assessment (www.docscreen.ca regression interpretation):						
Age:	Sex:	Weight:		Education:		
Height:				BMI:		
Memory (Registration) ¹		TRAIN	EGG	HAT	CHAIR	BLUE
Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 minutes.						No points
1 st trial						
2 nd trial						
D DOC Mood¹		Not at all (0)		Several days (1)	More than half the days (2)	Nearly every day (3)
"Over the last 2 weeks, how often have you been bothered by any of the following problems?"						Score (D)
Little interest or pleasure doing things						/6
Feeling down, depressed or hopeless						
O DOC Apnea²		Yes (1)		No (0)		
Do you snore loudly (louder than talking, heard through a door, or bother other people)?						
Do you often feel tired, fatigued or sleepy during the daytime?						
Has anyone observed you stop breathing during your sleep?						
Do you have, or are you being treated for high blood pressure?						
C Draw a Clock (Ten past Eleven)³						Score (C)
						/3
C ABSTRACTION "What is the similarity between: (e.g. banana – orange = fruit)"⁴						Score (C)
An eye and an ear? []		A trumpet and a piano? []				/2
C Memory (Delayed Recall)⁵		TRAIN	EGG	HAT	CHAIR	BLUE
What were those 5 words?						Score (C)
WITHOUT CUE						/5
Category Cue						
Multiple Choice Cue						

INTERPRETATION	High-risk	Intermediate-risk	Low-risk	DOC SCREEN SCORES	
D (DOC Mood) ¹	4-6	1-3	0	D (DOC Mood) ¹	/6
O (DOC Apnea) ²	4	1-3	0	O (DOC Apnea) ²	/4
C (DOC Cog) ³	0-5	6-9	10	C (DOC Cog) ³	/10

INTERPRETATION For regression interpretation, please visit www.docscreen.ca



Personalized Medicine



Treat patients **according to their characteristics**

Sex Matters!!



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

Epidemiology, Diagnosis, and Management of Cardiovascular Disease in Women



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.

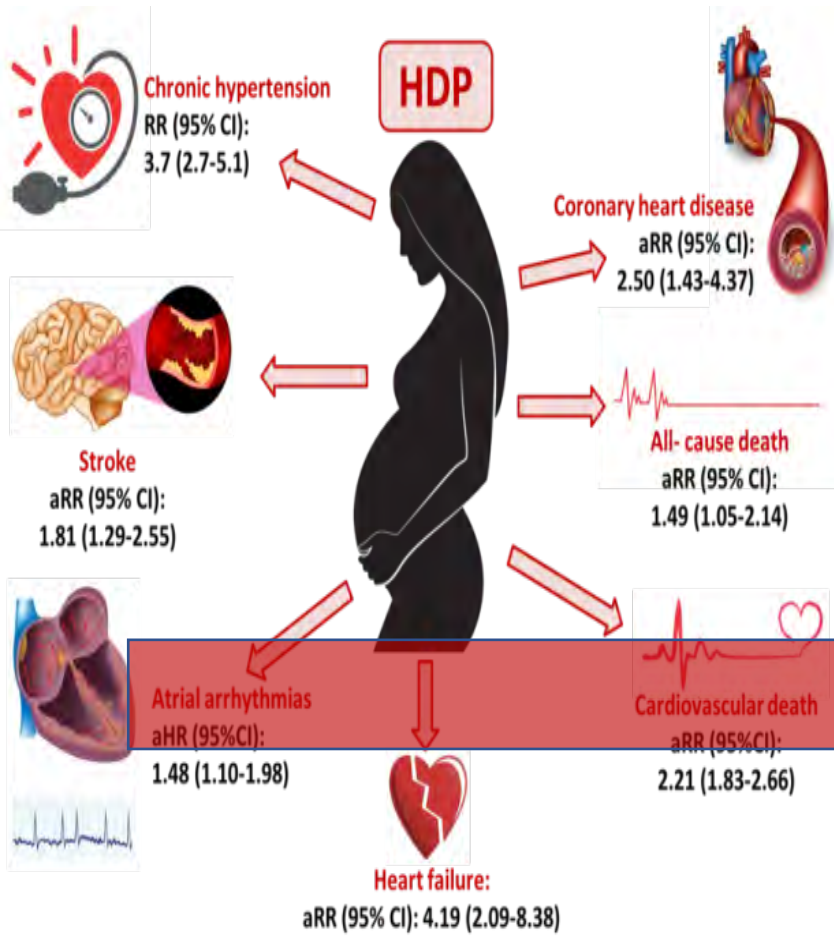
Women have sex-specific risk factors and *WORSE* outcomes



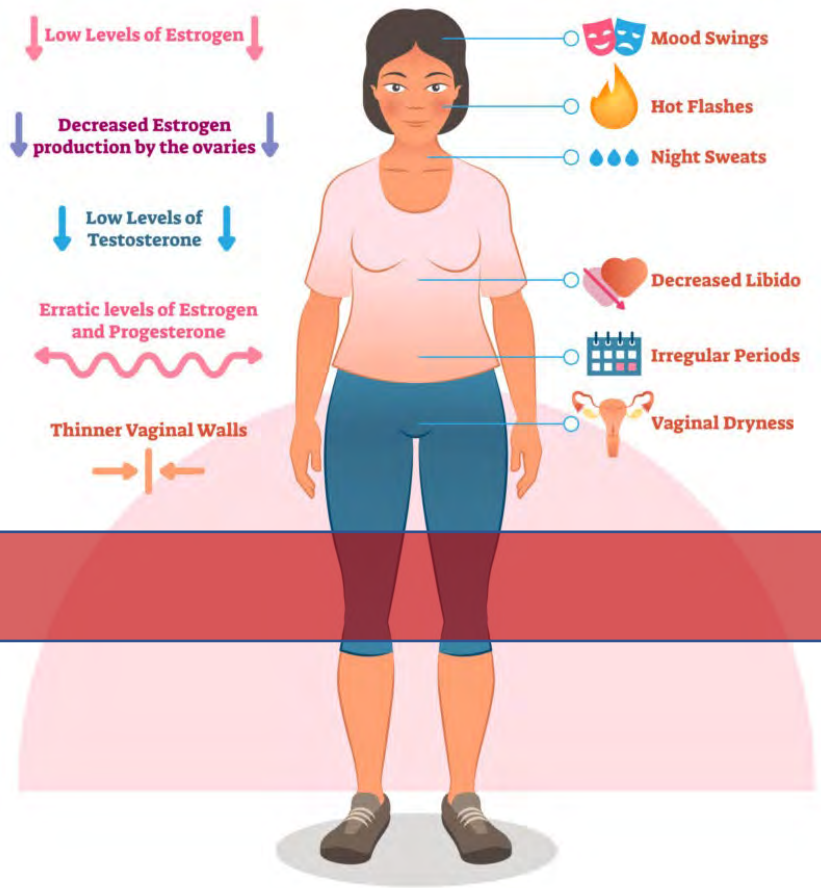
NATIONAL ALLIANCE
NATIONALE

CWHHA.CA

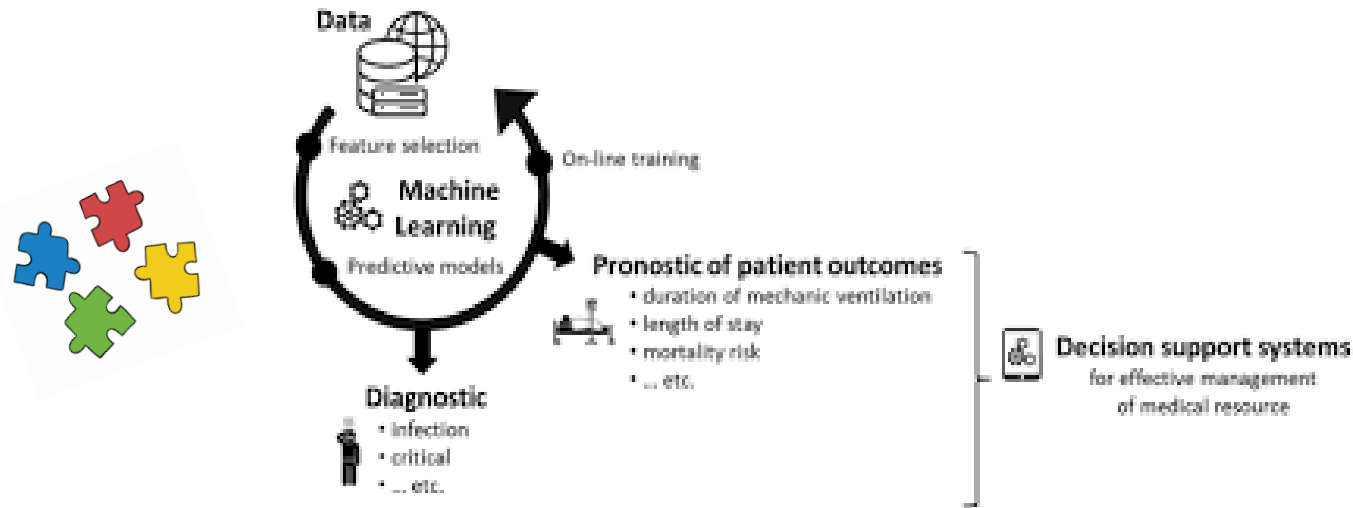
Sex-Specific Risks



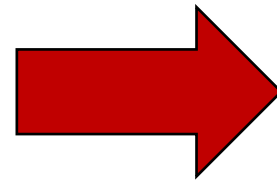
What Do I Need to Know About Menopause?



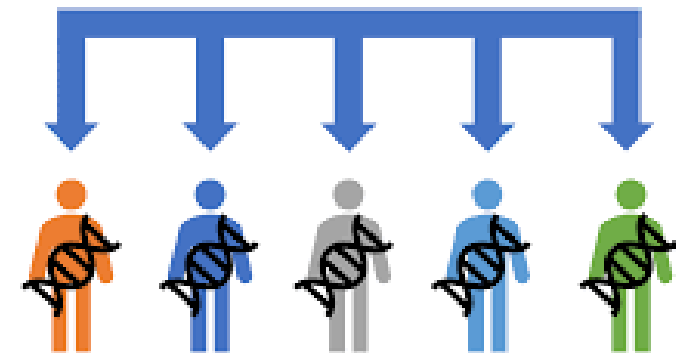
Heart Brain Connection



- Who to screen? When?
- Who to treat?
- Why type of treatment?



Personalized Medicine

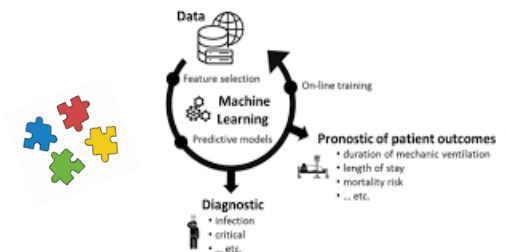
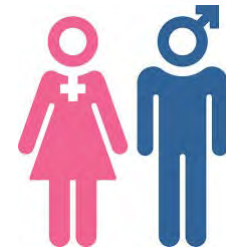
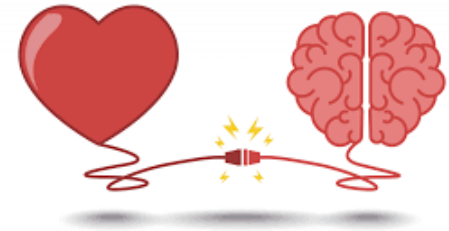


Treat patients according to their characteristics

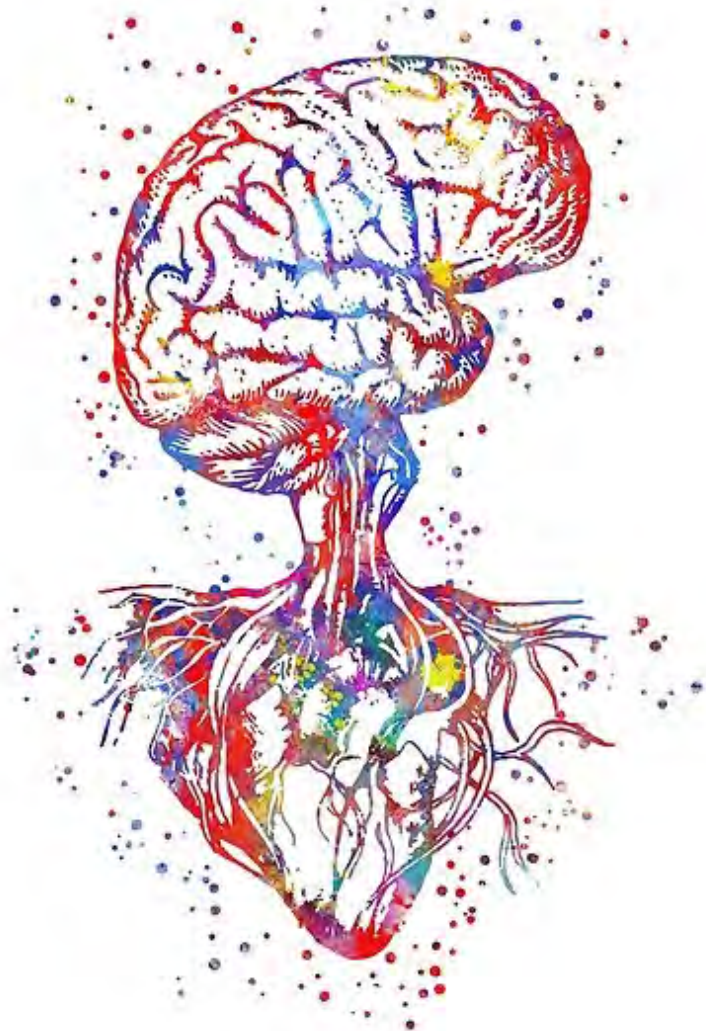
Key Messages



1. The heart and brain are more connected than previously thought
2. Overlapping risks BUT also overlapping benefits with prevention
3. Sex-specific risk factors matter!
4. We are now using data to better understand heart-brain relationships and develop personalized tools to detect and treat both heart and brain diseases



Heart-Brain Connection: Poll



Q: Do you think heart diseases and brain diseases are connected?

A. Yes! They are peas in a pod

B. I am not sure

C. No. I follow my heart but listen to my brain and they rarely meet!

Thank You and Questions

