

# Sex- and Gender-based Medicine

'Y' 'X' Makes a Difference

Lauren A. Walter MD, FACEP

Associate Professor of Emergency Medicine

University of Alabama at Birmingham

# No Financial Disclosures



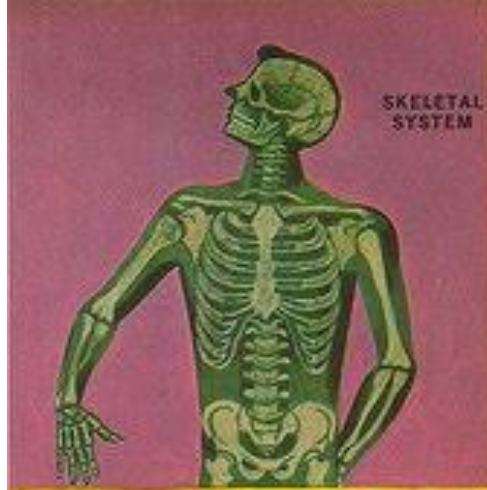
How often do you consider a patient's sex and/or gender in your assessment and management?

- A. Always
- B. Sometimes
- C. Occasionally
- D. Rarely
- E. Never

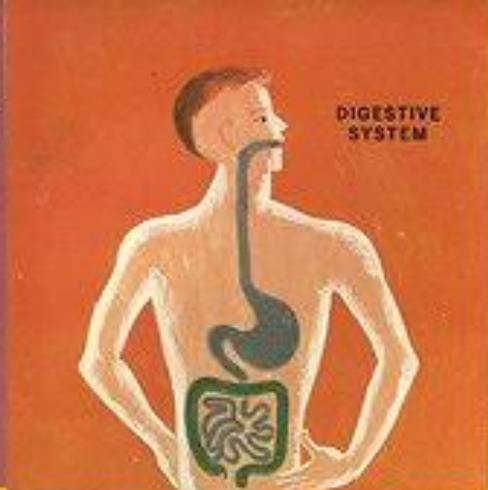
Every female cell is different from every male cell—different chromosomes, different mitochondrial properties, different mosaicism. Men and women are intrinsically different. It is a surprise when they are similar!

—*Michael D. Lockshin*, Professor of Medicine and Obstetrics-Gynecology at the Weill-Cornell University Medical College

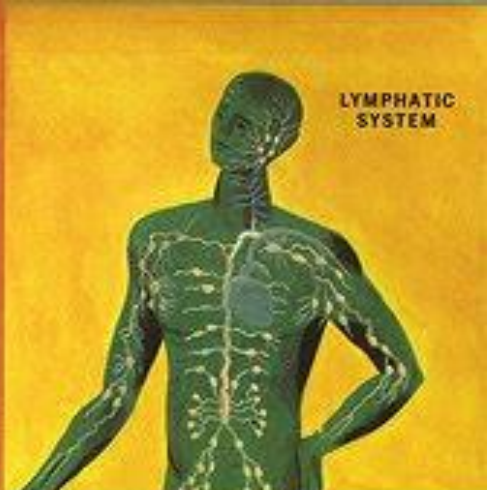




SKELETAL SYSTEM



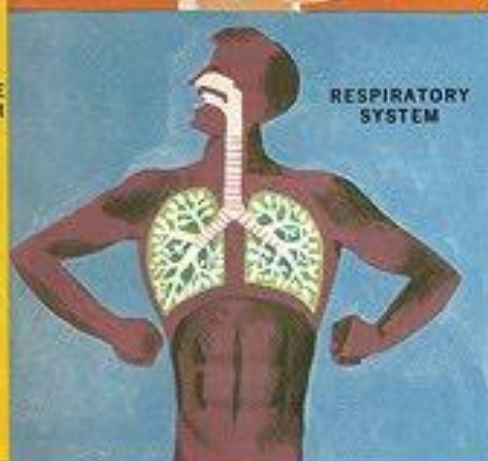
DIGESTIVE SYSTEM



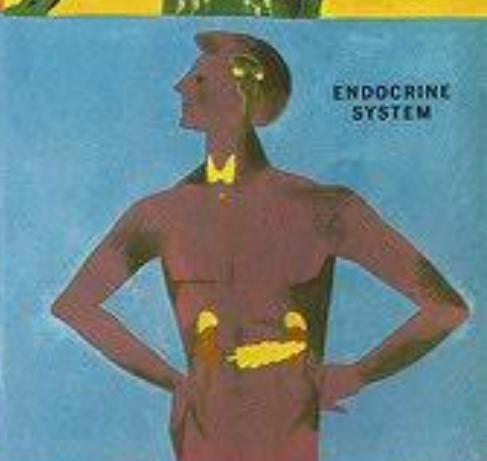
LYMPHATIC SYSTEM



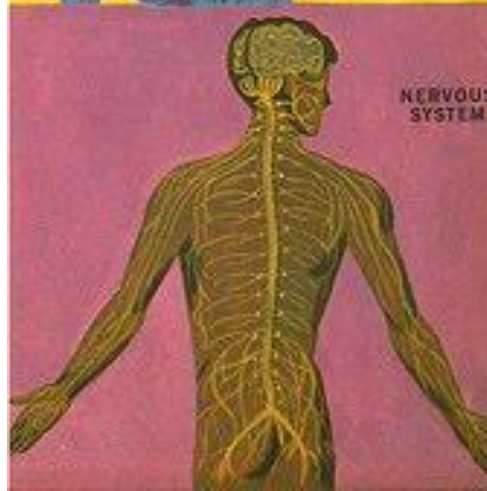
MUSCLE SYSTEM



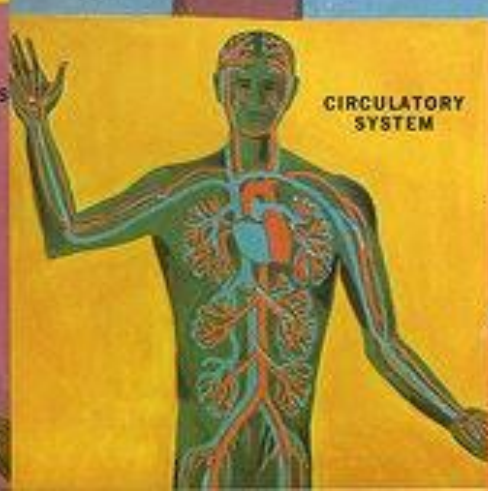
RESPIRATORY SYSTEM



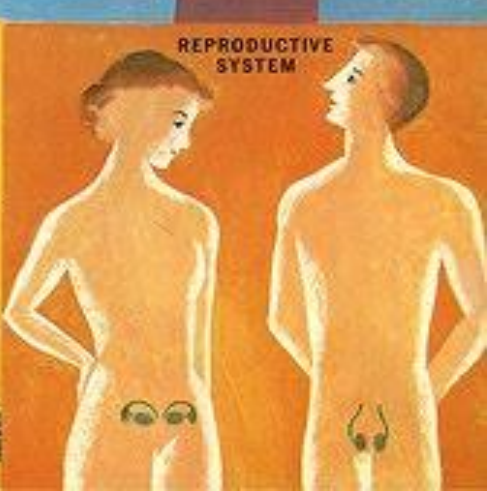
ENDOCRINE SYSTEM



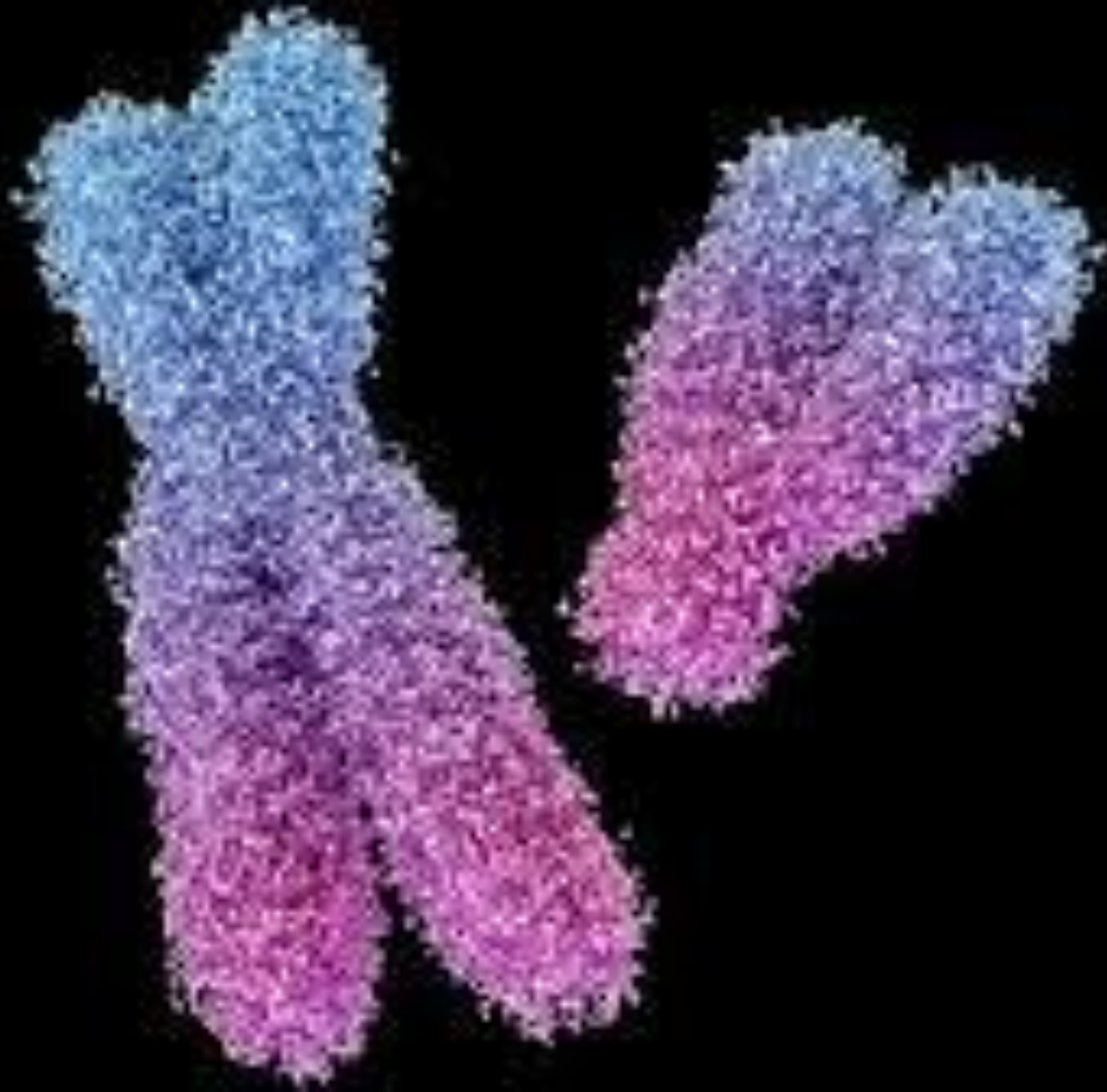
NERVOUS SYSTEM

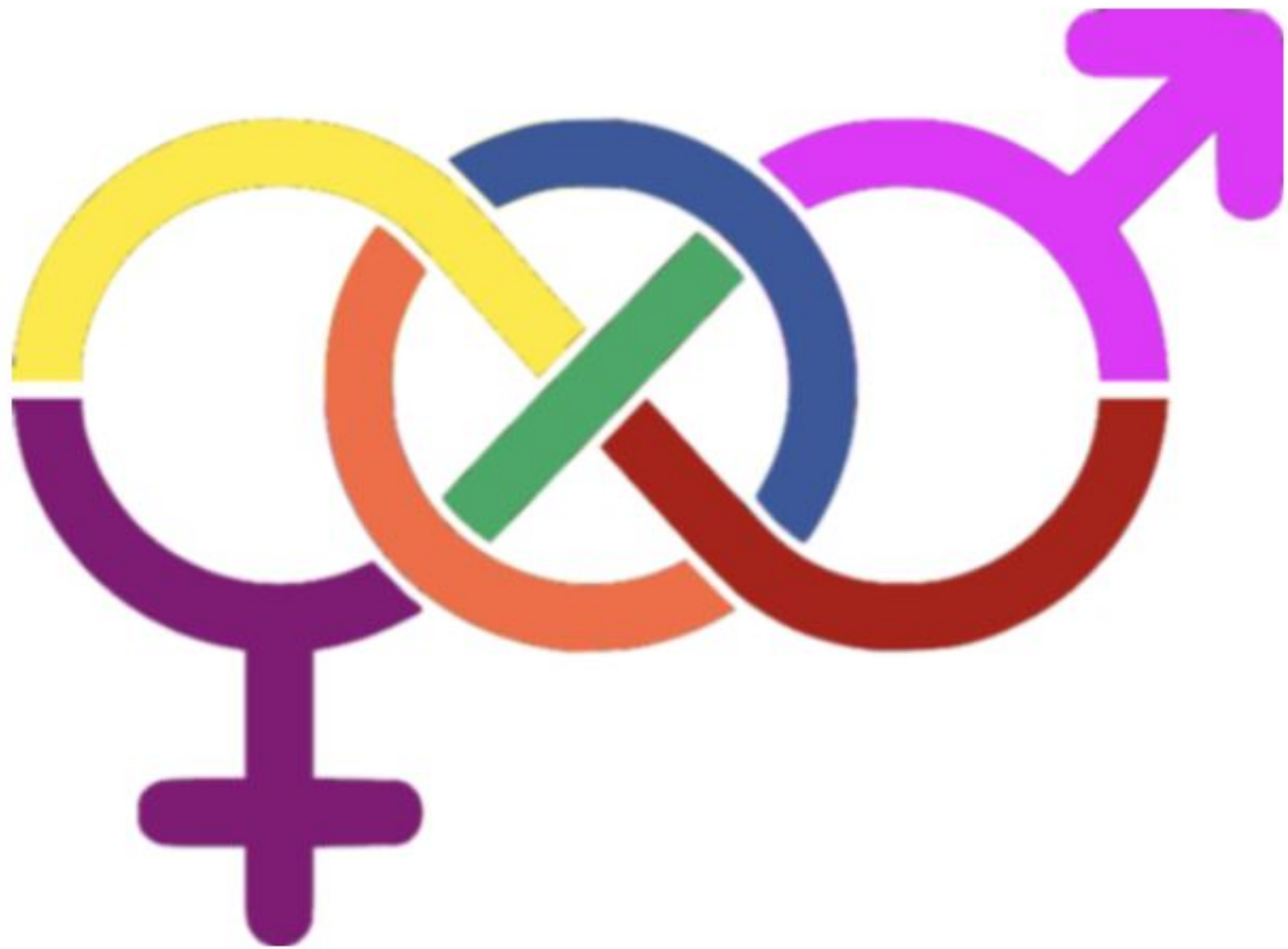


CIRCULATORY SYSTEM



REPRODUCTIVE SYSTEM

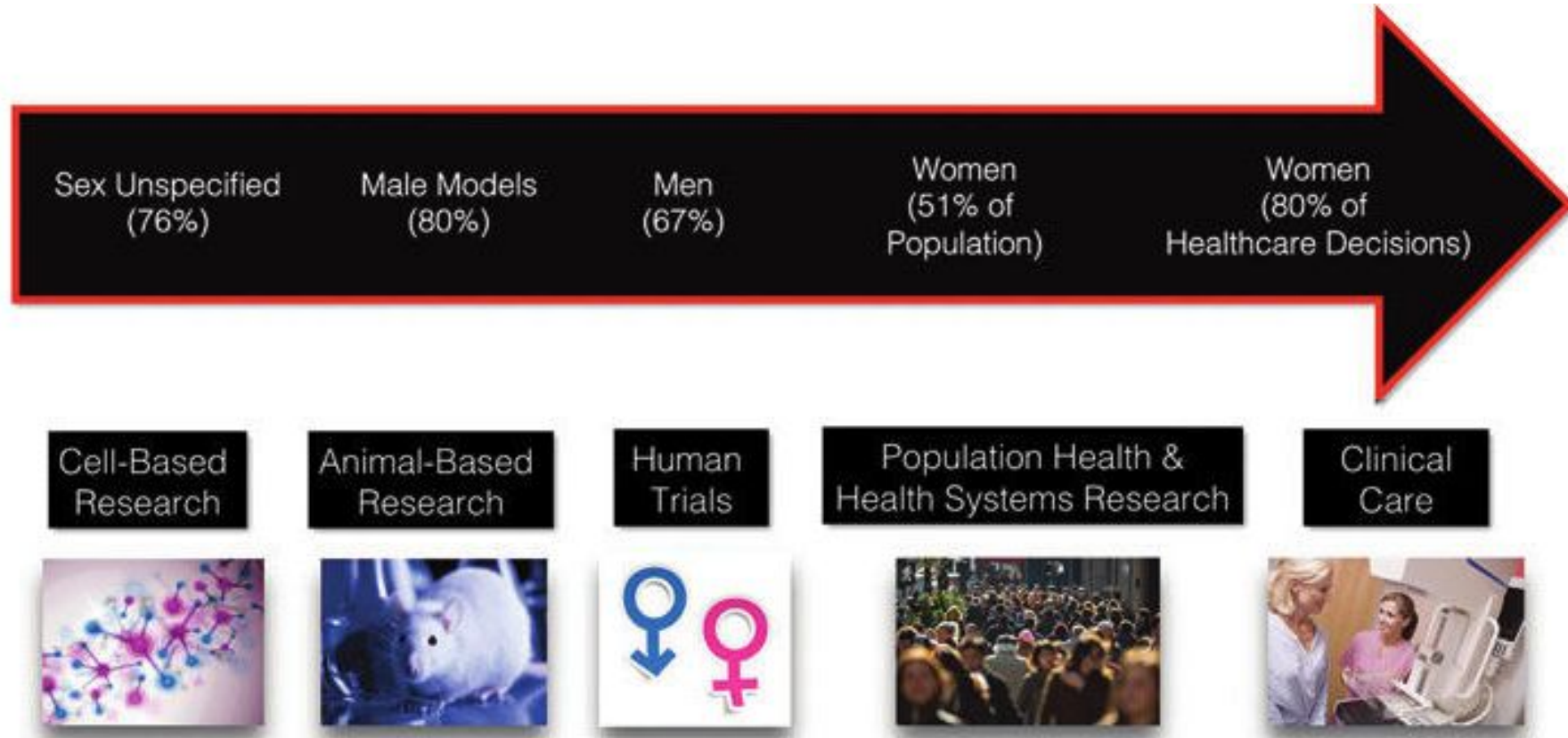








# Historical Research Perspective





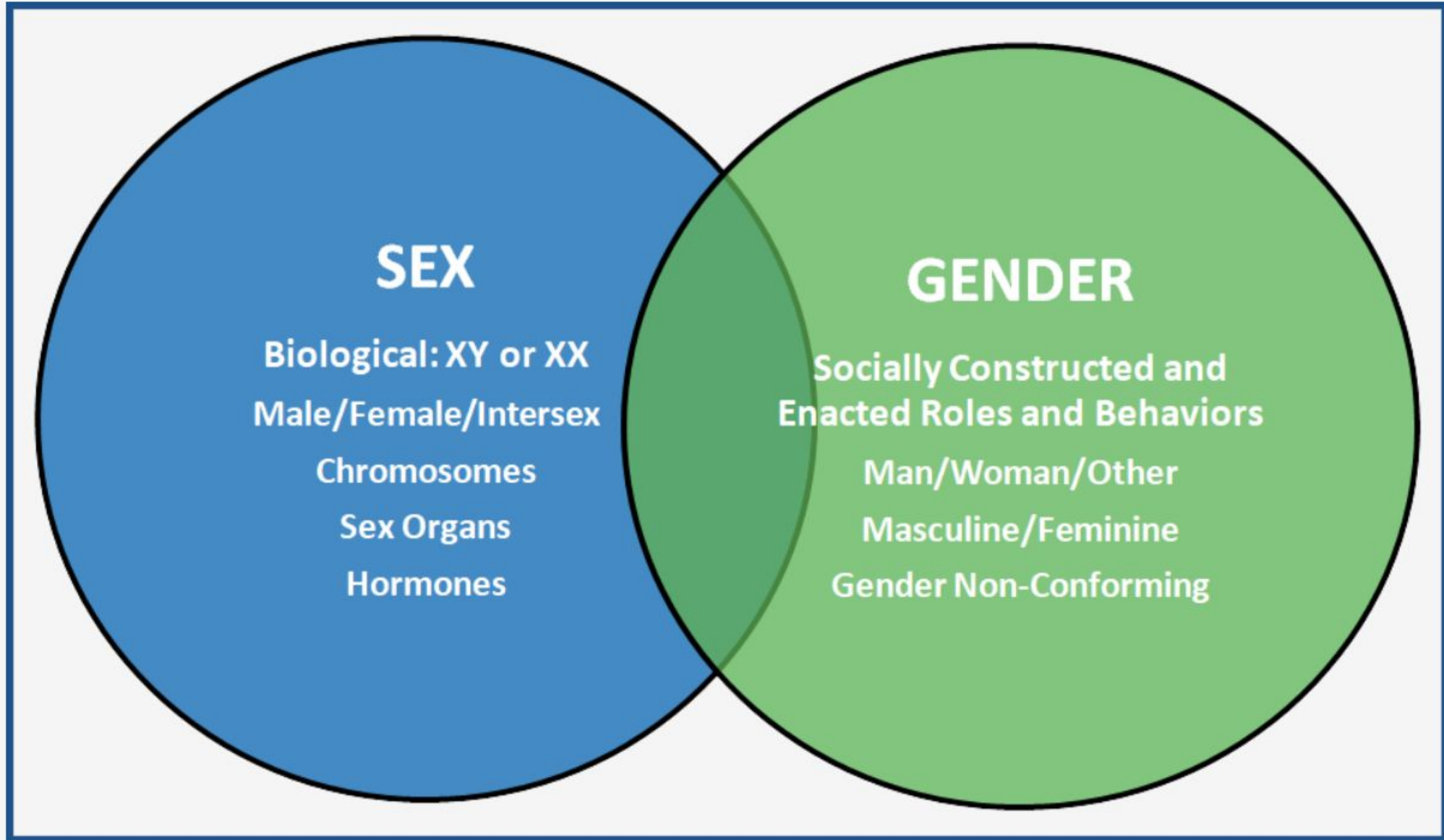
**Consideration of Sex as  
a Biological Variable in  
NIH Funded Research**

January 26<sup>th</sup>, 2016

# Sex and Gender in Medicine

Everyday Clinical Examples

# Health Is Affected by Both Sex and Gender



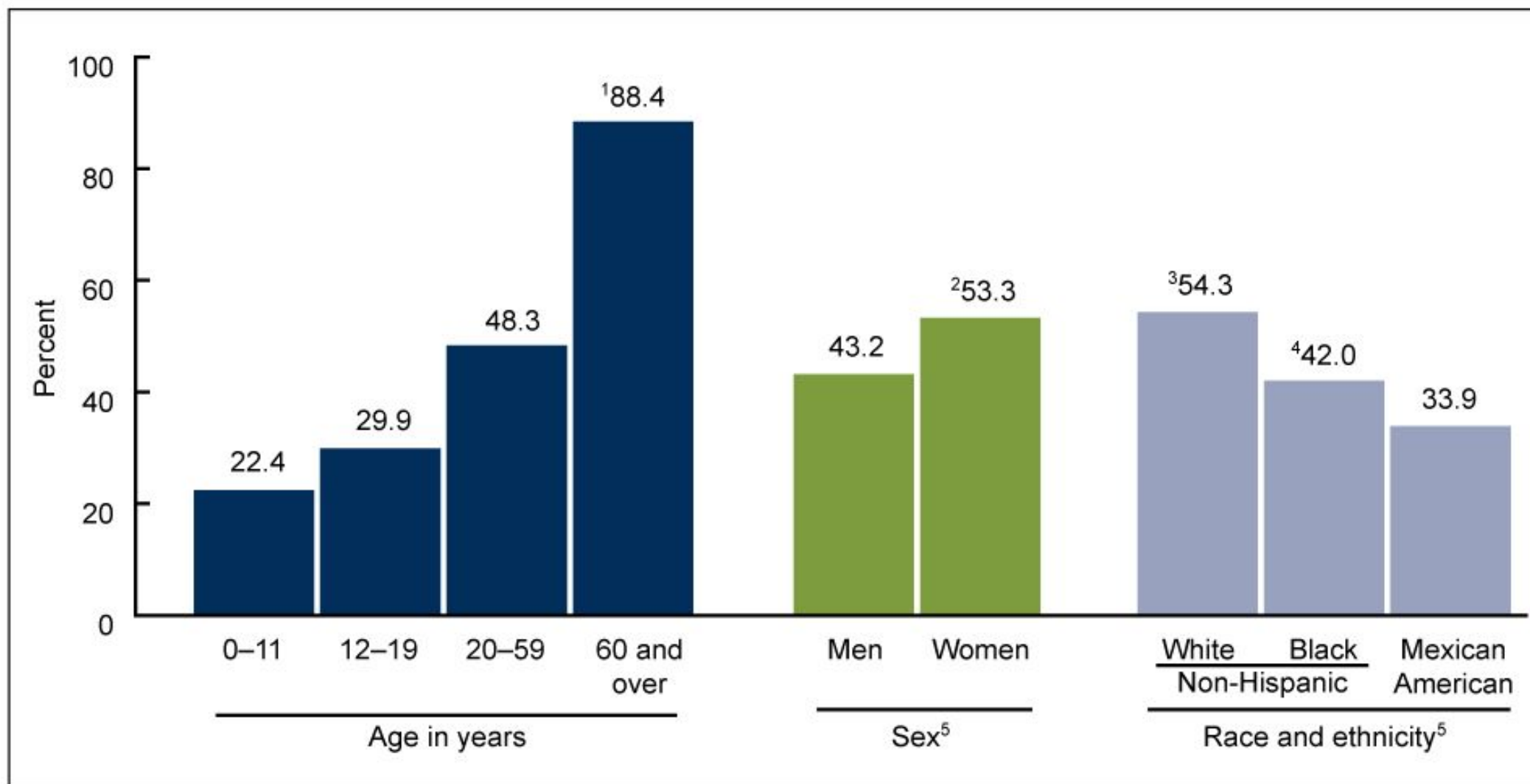
# Everyday Sex- and Gender-based Medicine

- Pharmacology
- Cardiology
- Neurology
- Musculoskeletal/Sports Medicine
- Infectious Disease

# Pharmacology (and Toxicology)

Sex- and Gender-based Medicine

Figure 3. Percentage of use of at least one prescription drug, by age, sex, and race and ethnicity: United States, 2007–2008



<sup>1</sup>Significant linear trend over age.

<sup>2</sup>Significantly different from men.

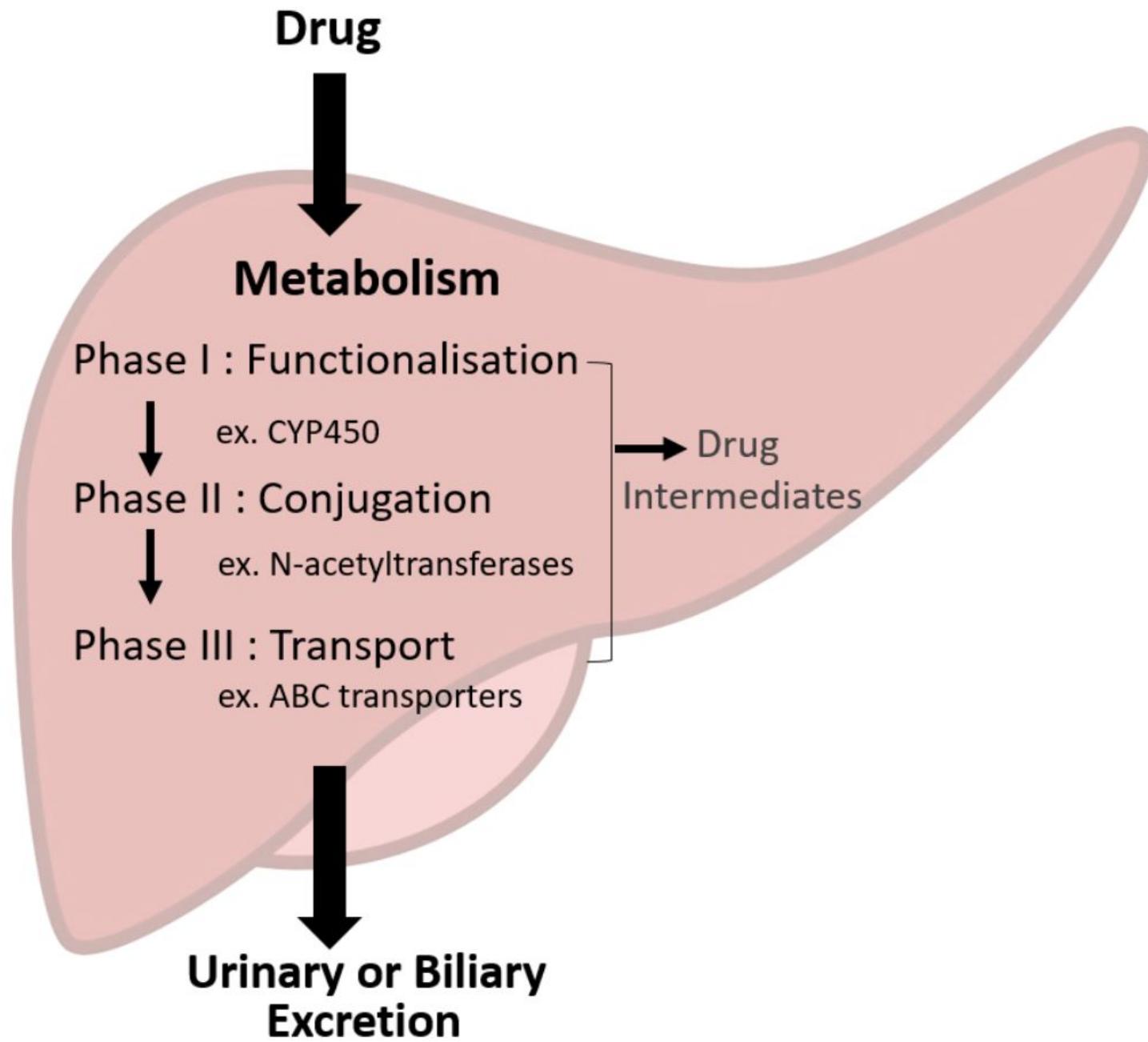
<sup>3</sup>Significantly different from Non-Hispanic black and Mexican-American persons.

<sup>4</sup>Significantly different from Mexican-American persons.

<sup>5</sup>Age adjusted by direct method to the year 2000 projected U.S. population.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey.





# Zolpidem (Ambien)

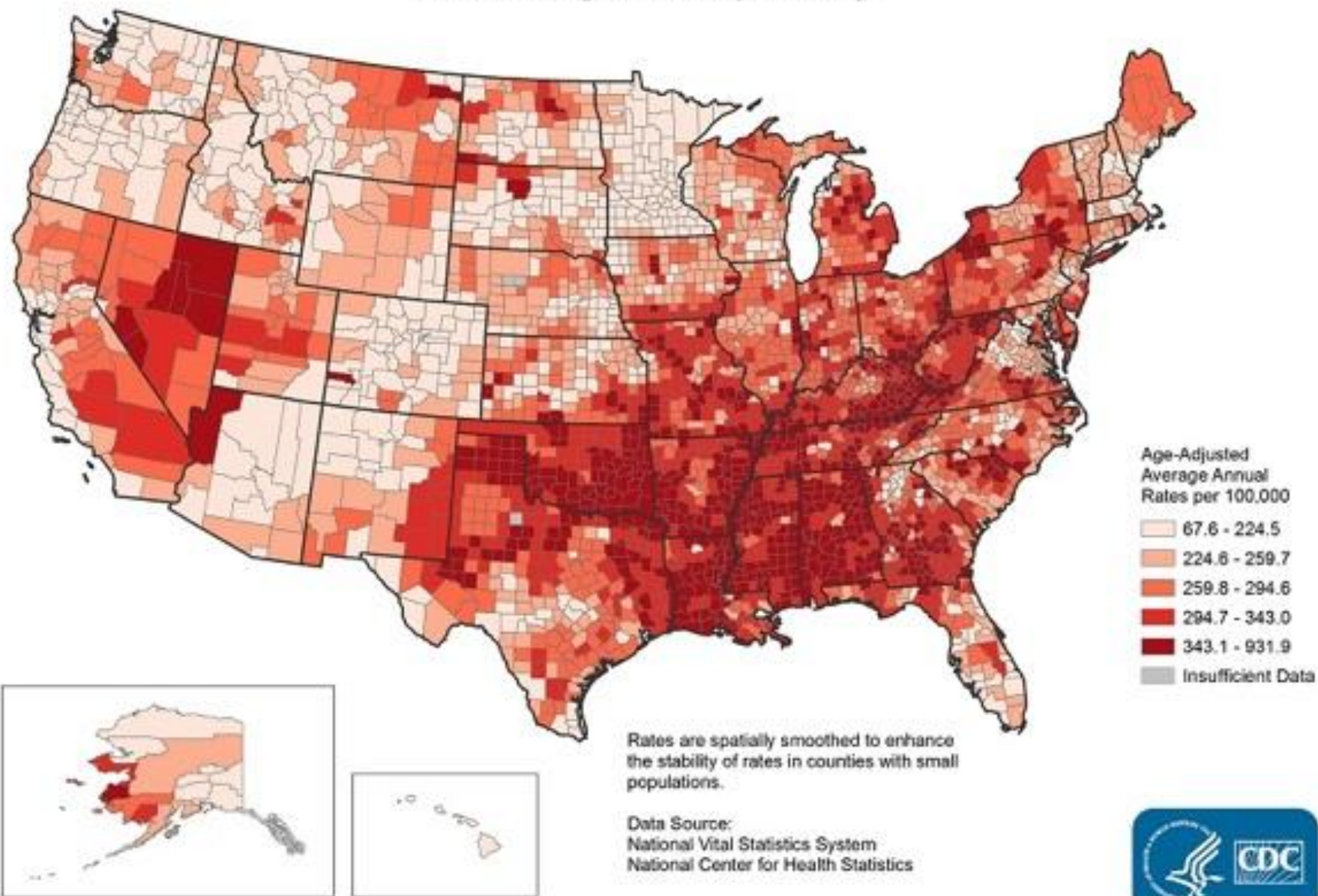




# Cardiology

Sex- and Gender-based Medicine

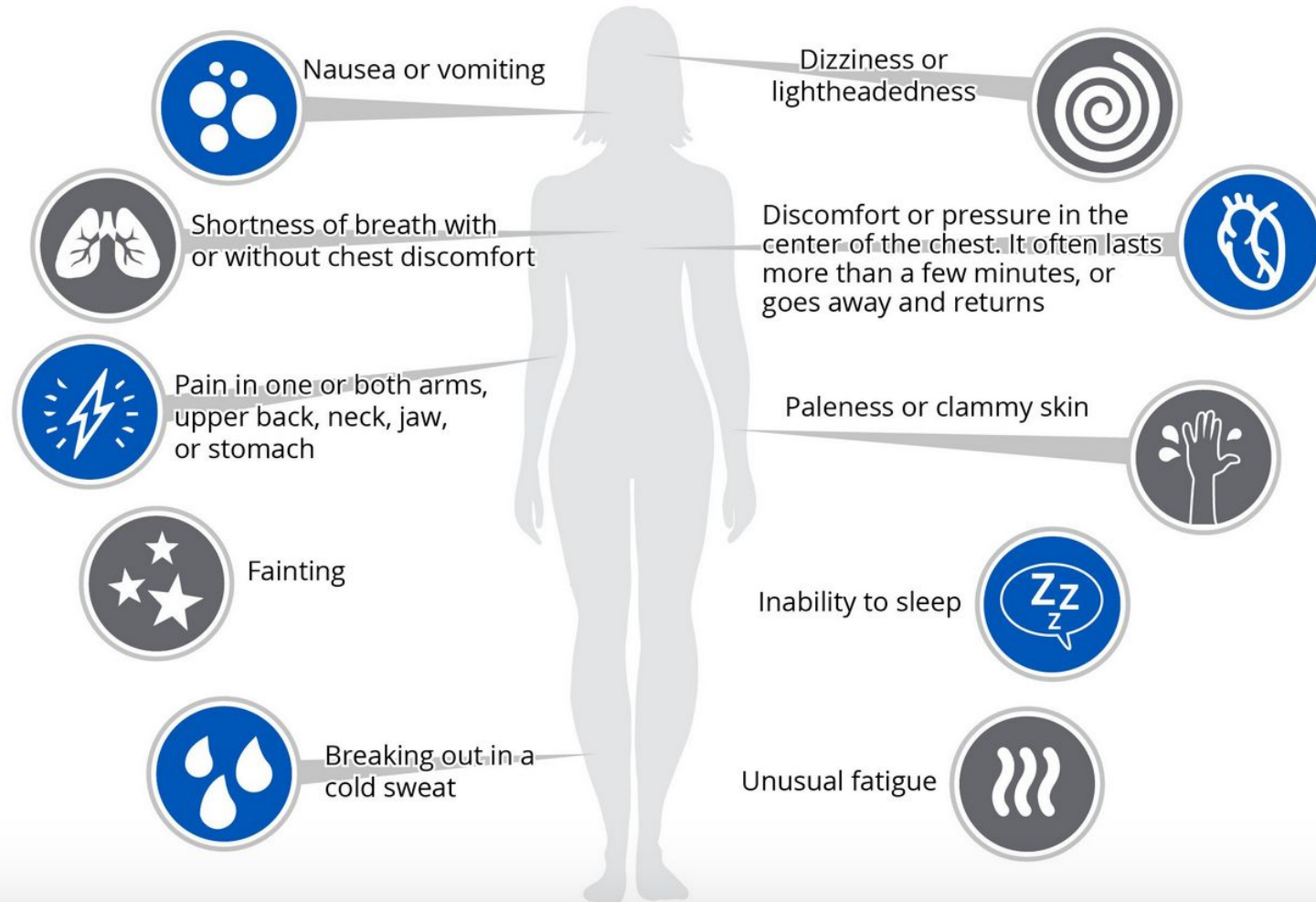
## Heart Disease Death Rates, 2011-2013 Women, Ages 35+, by County



# SIGNS OF A HEART ATTACK

## Symptoms Every Woman Should Know and Pay Attention to

Women and men may differ in their experience of heart attack symptoms, as women are more likely to have unusual or “atypical” signs of a heart attack. Some of these may come and go before a heart attack occurs.



# Sex-specific Risk Factors

- Diabetes and smoking affect women's CAD risk more than men's.
- Hypertension and dyslipidemia increase risk in men to a greater extent than in women.
- \*Nontraditional risk factors such as depression and autoimmune conditions present with greater frequency in women as compared to men and contribute to cardiovascular disease incidence.

# Gender-specific Risk Factors

- The female gender is more likely to delay presentation in the setting of a heart attack.
- Medical providers are also less likely to recognize a heart attack in women, leading to a further delay in diagnosis and worse outcomes.



# Why does the presentation of heart disease differ SO much between men and women?

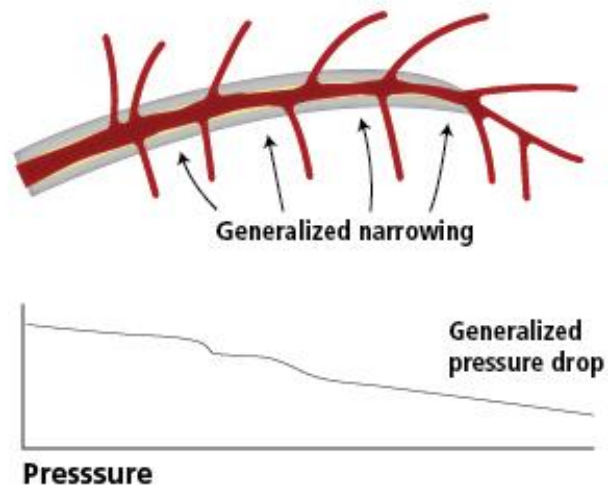
- Different pathology
  - Women more likely to have non-obstructive CAD and small vessel/micro-vascular disease than men = non-diagnostic or 'normal' cardiac testing.

## Coronary Angiograms for Patients with Chest Pain

Women are more likely to have minor or no obstruction

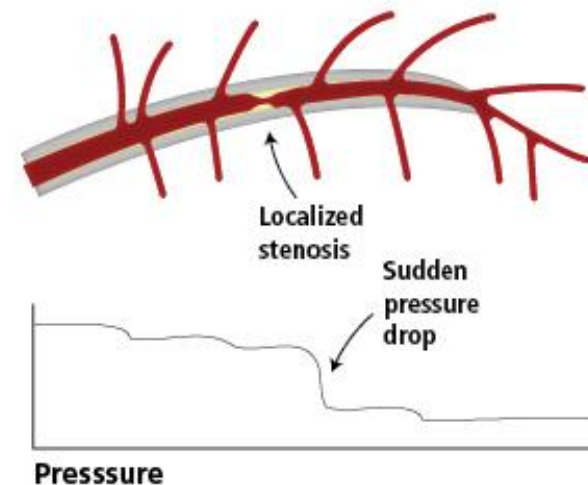
### Diffuse atherosclerosis

Most often seen in younger women with IHD



### Obstructive atherosclerosis

Most often seen in men and older women



# Study suggests women less likely to get CPR from bystanders



# Neurology

Sex- and Gender-based Medicine

# Ischemic Brain Injury





## Sex-specific stroke risk factors in women:

- Migraine with aura
  - 3x more common in women
- Pregnancy (can persist after delivery)
- Oral contraceptives/birth control/hormone replacement therapy



# Sex differences in stroke: hormonal effects?

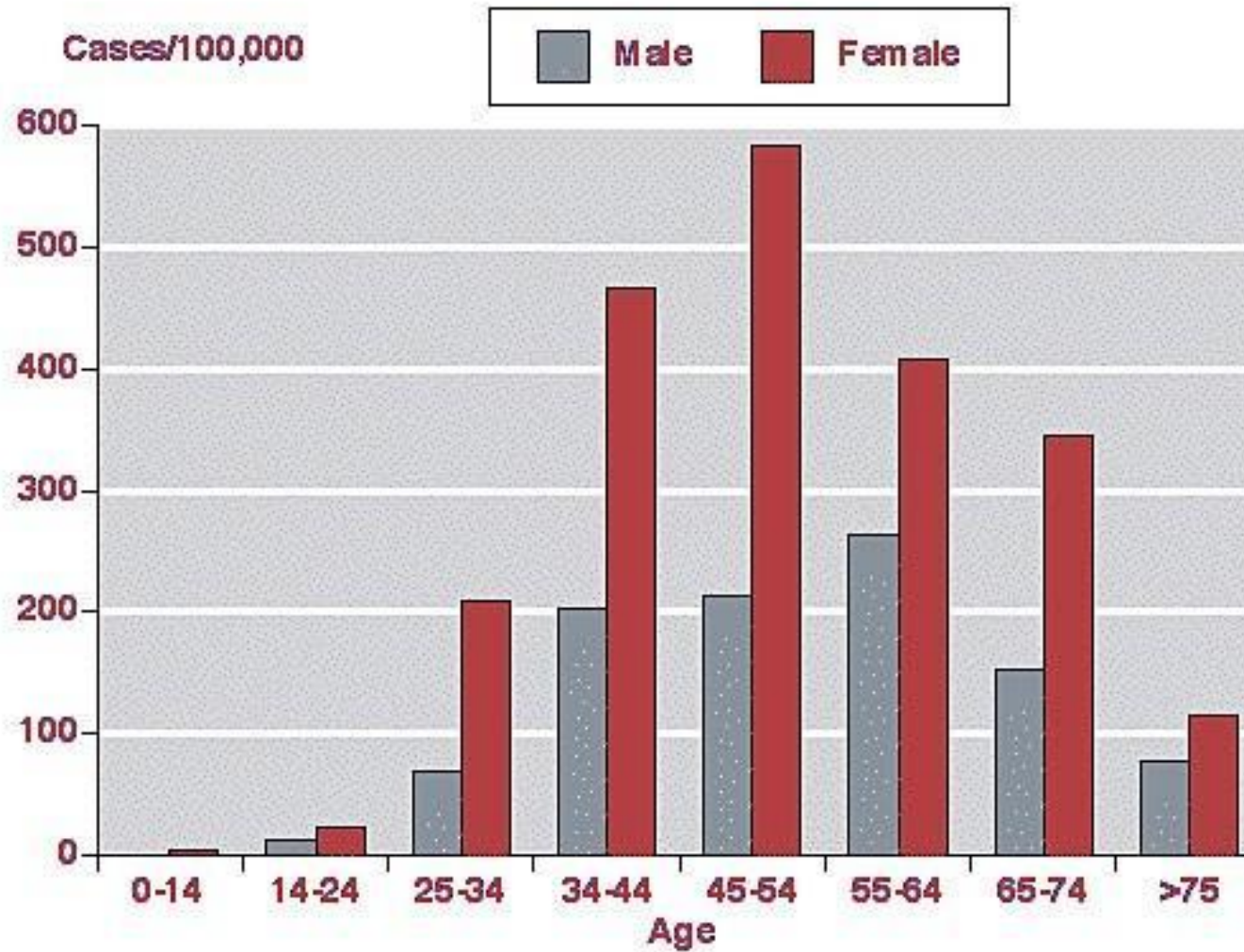




# Subarachnoid Hemorrhage

- Incidence of both SAH and unruptured intracranial aneurysms (UIA) is higher in women
  - 2-3x greater in women >50 as compared to men
  - Women who smoke are more likely to be affected than men who smoke.

# Multiple Sclerosis





# Men Experience MS Differently Than Women Do

Lisa Emrich / @LisaEmrich, Patient Expert





X chromosome may have a direct role in autoimmunity  
[[Selmi, 2008](#); [Smith-Bouvier \*et al.\* 2008](#)].



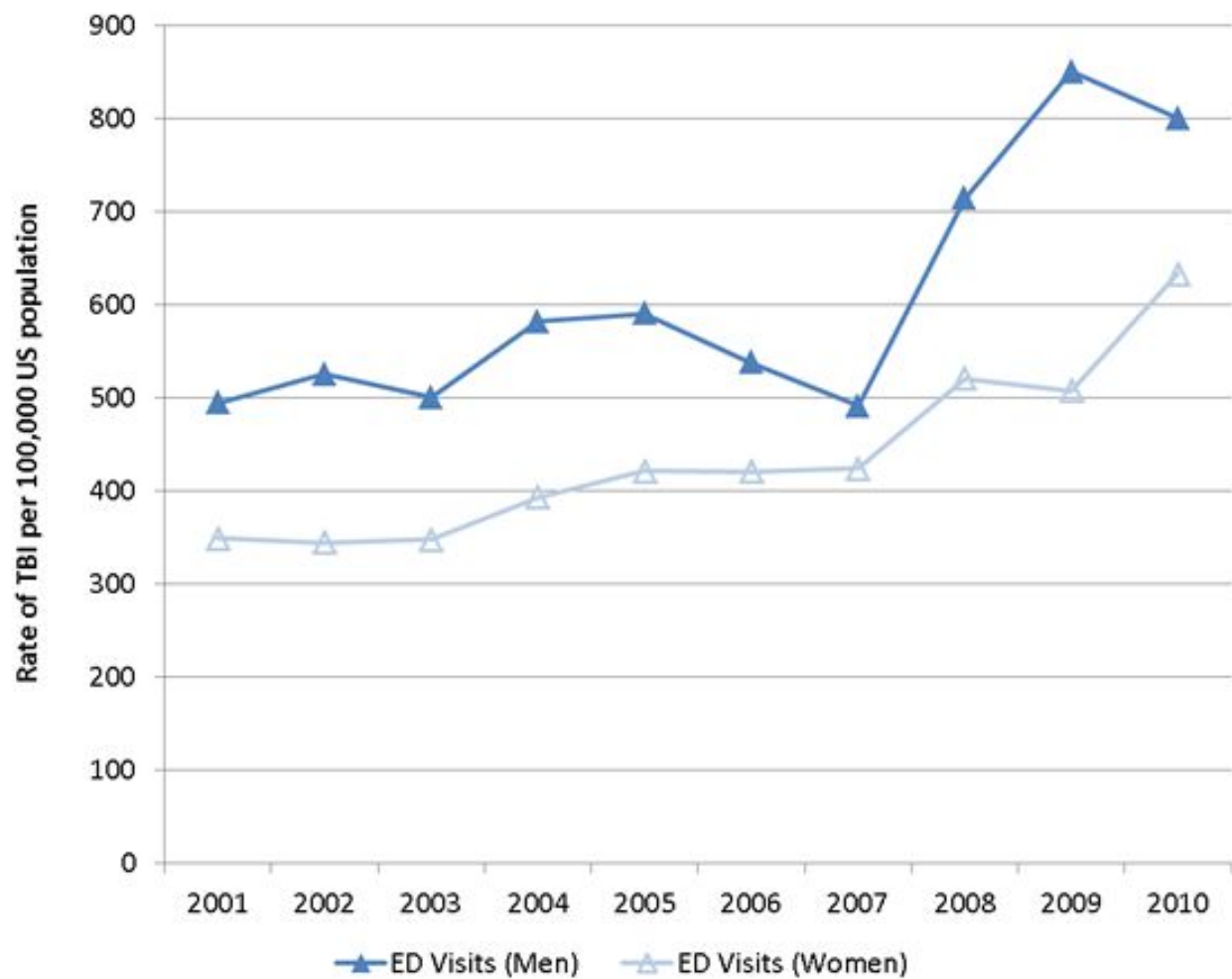
# MSK/Sports Medicine

Sex- and Gender-based Medicine

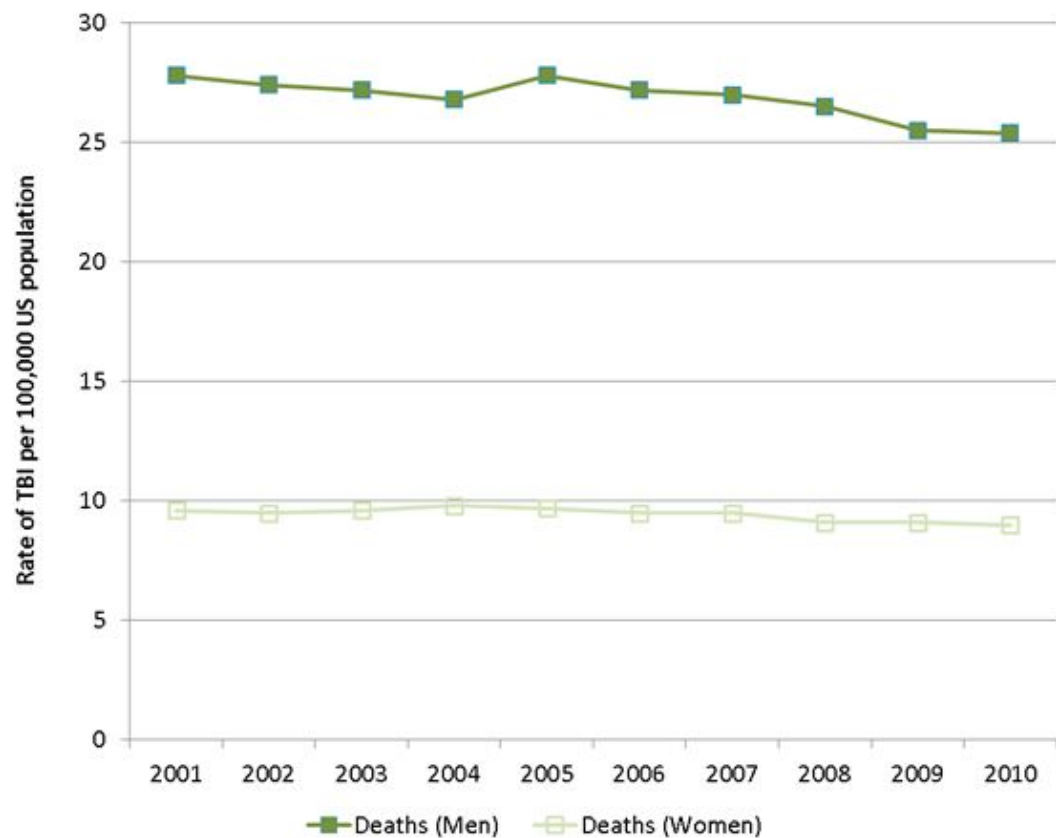


# Traumatic **BRAIN INJURY**

Rates of TBI-related Emergency Department Visits by Sex — United States, 2001–2010



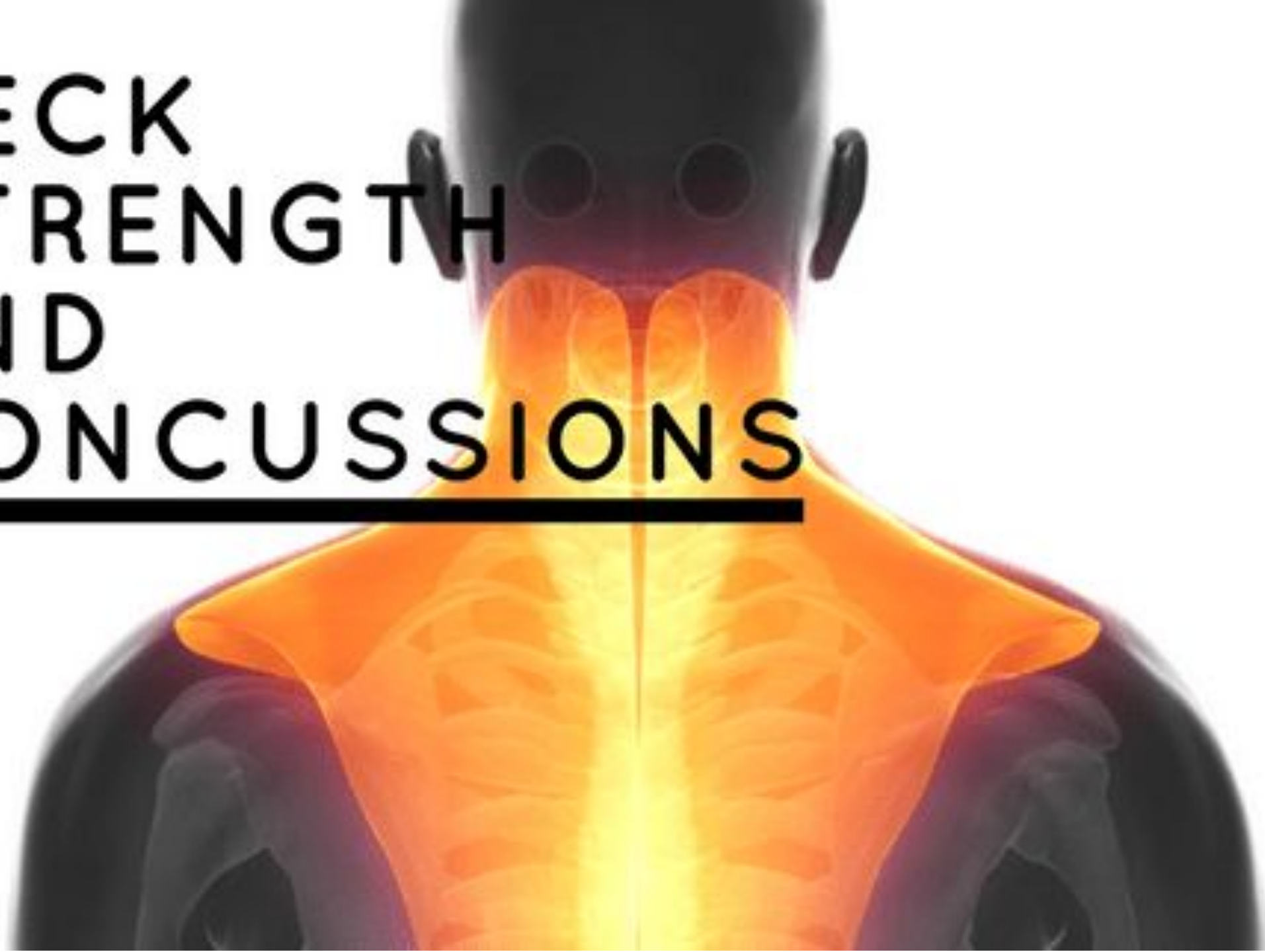
Rates of TBI-related Deaths by Sex — United States, 2001–2010







# NECK STRENGTH AND CONCUSSIONS







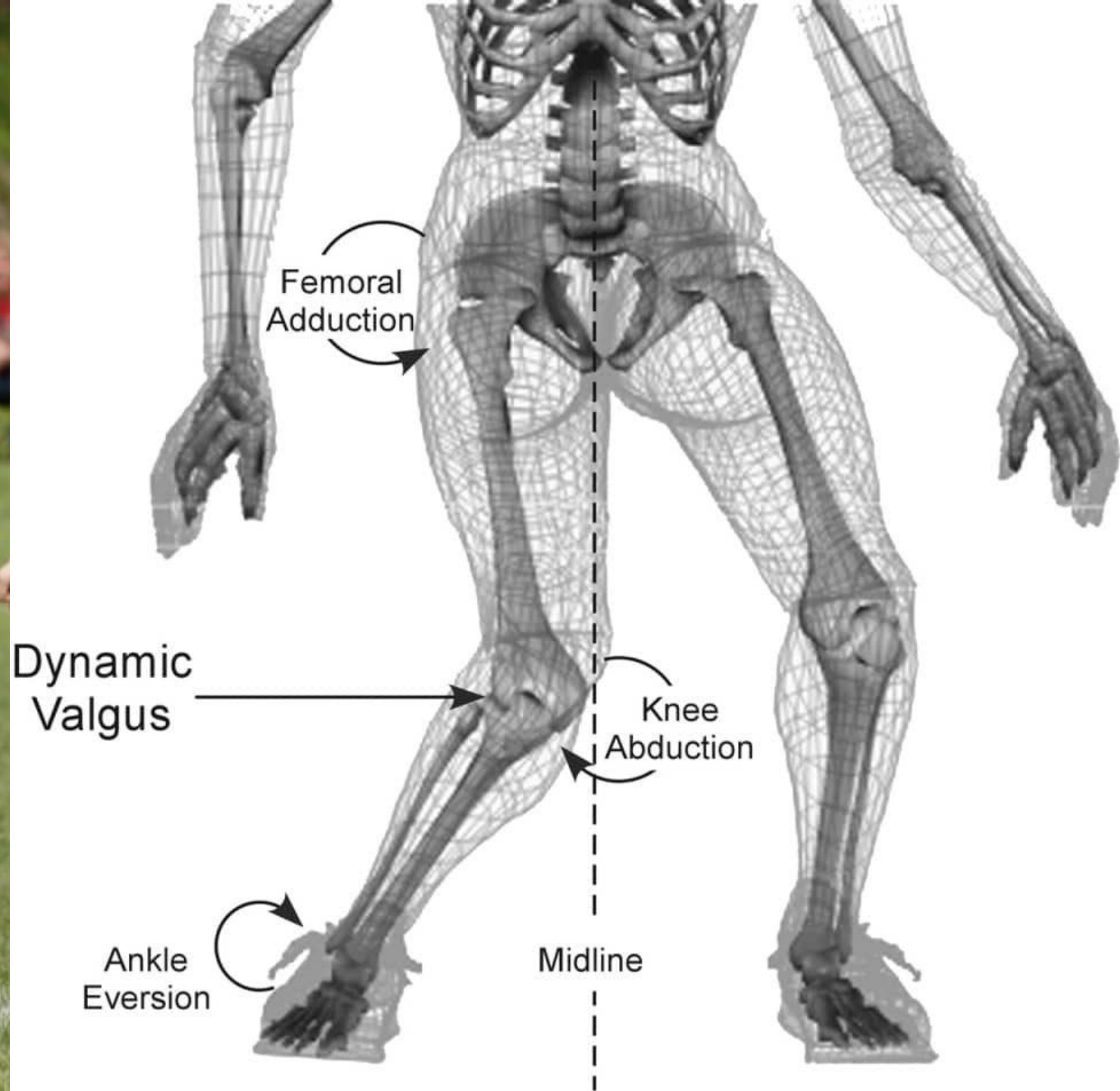
A word cloud centered around the text "POST CONCUSSION SYNDROME". The words are arranged in a circular pattern around the central text. The colors of the words are primarily blue and orange. The central text is in a large, red, serif font. The surrounding words are in various sizes and orientations, including vertical and horizontal text.

POST CONCUSSION SYNDROME

Words included in the cloud: deficits, chronic, permanent, evidence, people, stress, complex, headaches, sensitivity, children, worsen, cognitive, insomnia, irritability, aging, brain, dizziness, disorder, symptoms, injury, fatigue, effect, emotional, risk, anxiety, players, memory loss, traumatic, persistent, doctor, related, therapy, sports, trauma, head, football.

# SEX DIFFERENCES IN SYMPTOMS, DISABILITY AND LIFE SATISFACTION THREE YEARS AFTER MILD TRAUMATIC BRAIN INJURY: A POPULATION- BASED COHORT STUDY

Styrke, J., Rehab Med, 2013.

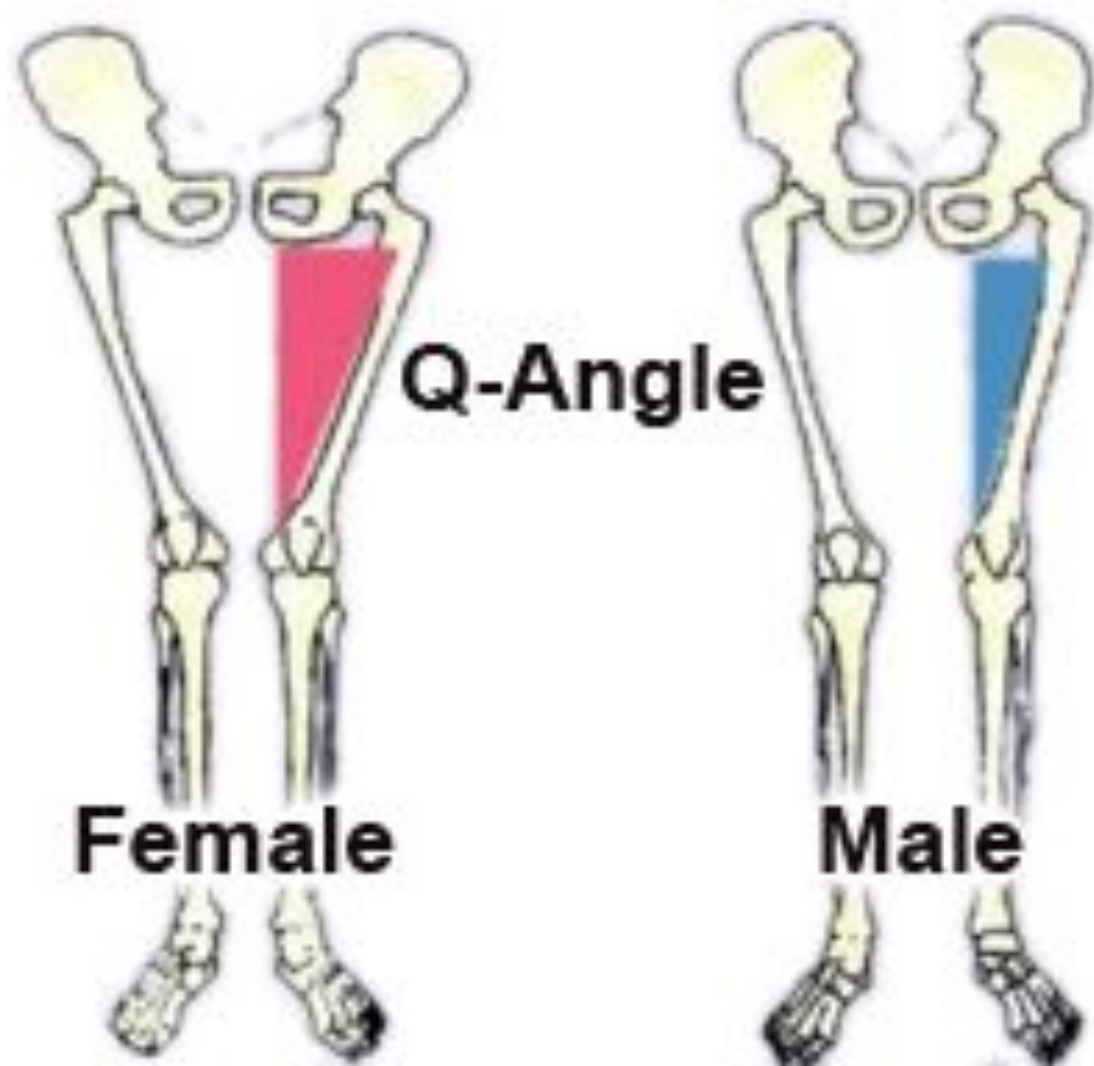
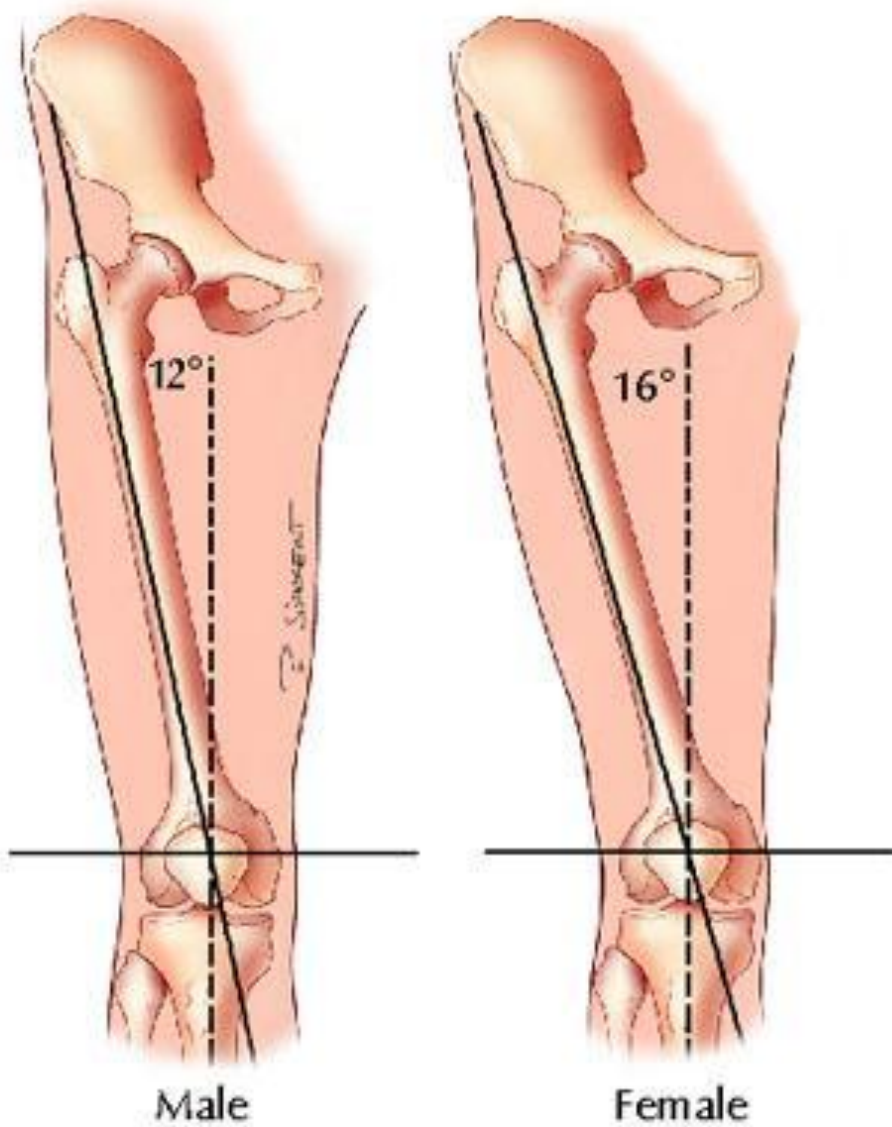


# Why?

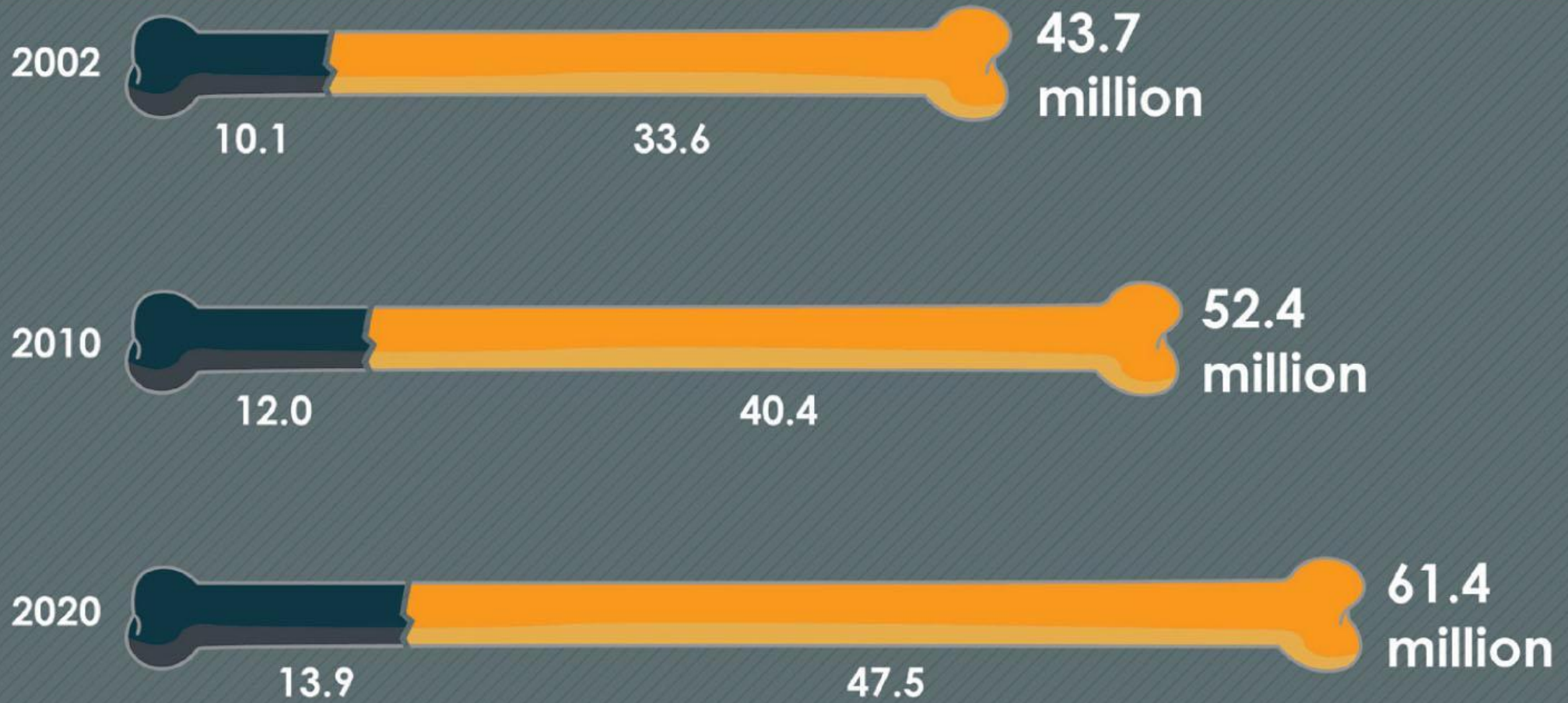
- Hormonal
  - Women's connective tissue tends to be more lax than men's □ estrogen
- Neuromuscular activation differences
  - Women more likely to exhibit hamstring strength that is less than quadriceps strength.
- Q-angle



# Comparison of male and female Q angles





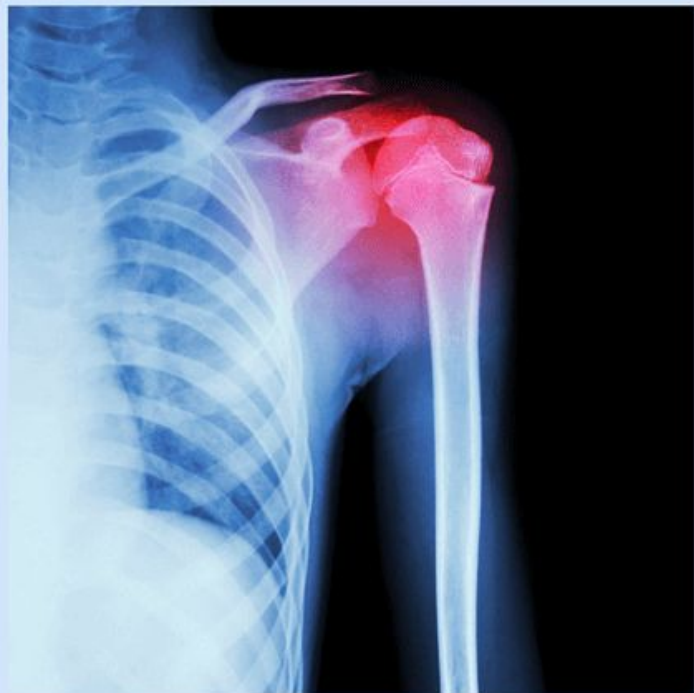


 **Osteoporosis**

 **Osteopenia**

**Number of Women and Men (in millions)**





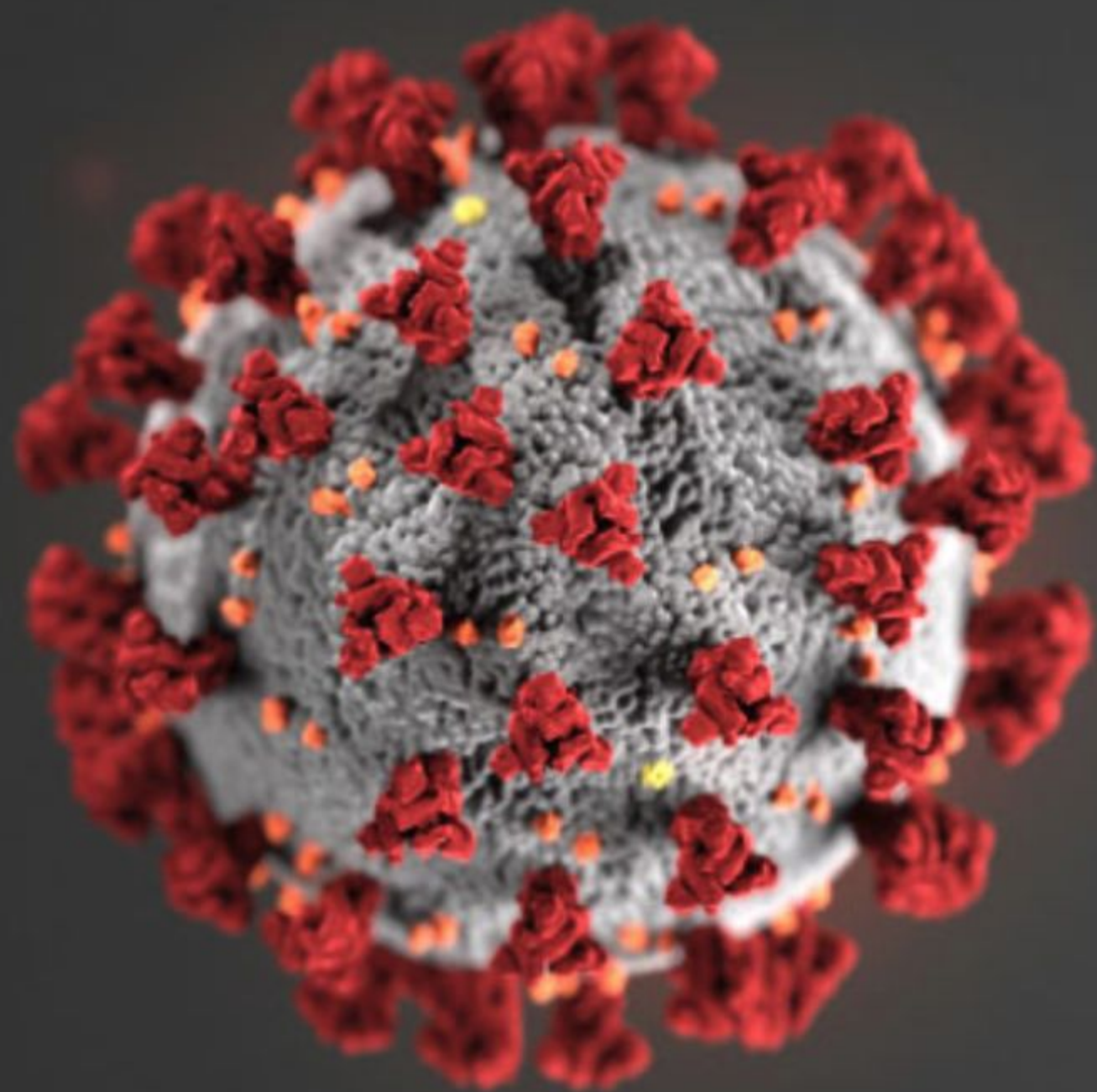
Elderly **men** with fragility fractures were virtually ignored (1, 2) even though it is known that men have a higher mortality rate than women in acute care after hip fracture .

1. **Juby AG, De Geus-Wenceslau CM** 2002 Evaluation of osteoporosis treatment in seniors after hip fracture. *Osteoporos Int* 13:205–210

2. **Kiebzak GM, Beinart GA, Perser K, Ambrose CG, Siff SJ, Heggeness MH** 2002 Undertreatment of osteoporosis in men with hip fracture. *Arch Intern Med* 162:2217–2222

# Infectious Disease

Sex- and Gender-based Medicine







[Live Science](#) > [Health](#)

# Is 'Man Flu' Real? Men Suffer More When Sick, Study Suggests

By Rachael Rettner, Senior Writer | December 11, 2017 06:30pm ET

f 0

🐦 0

F

🍷

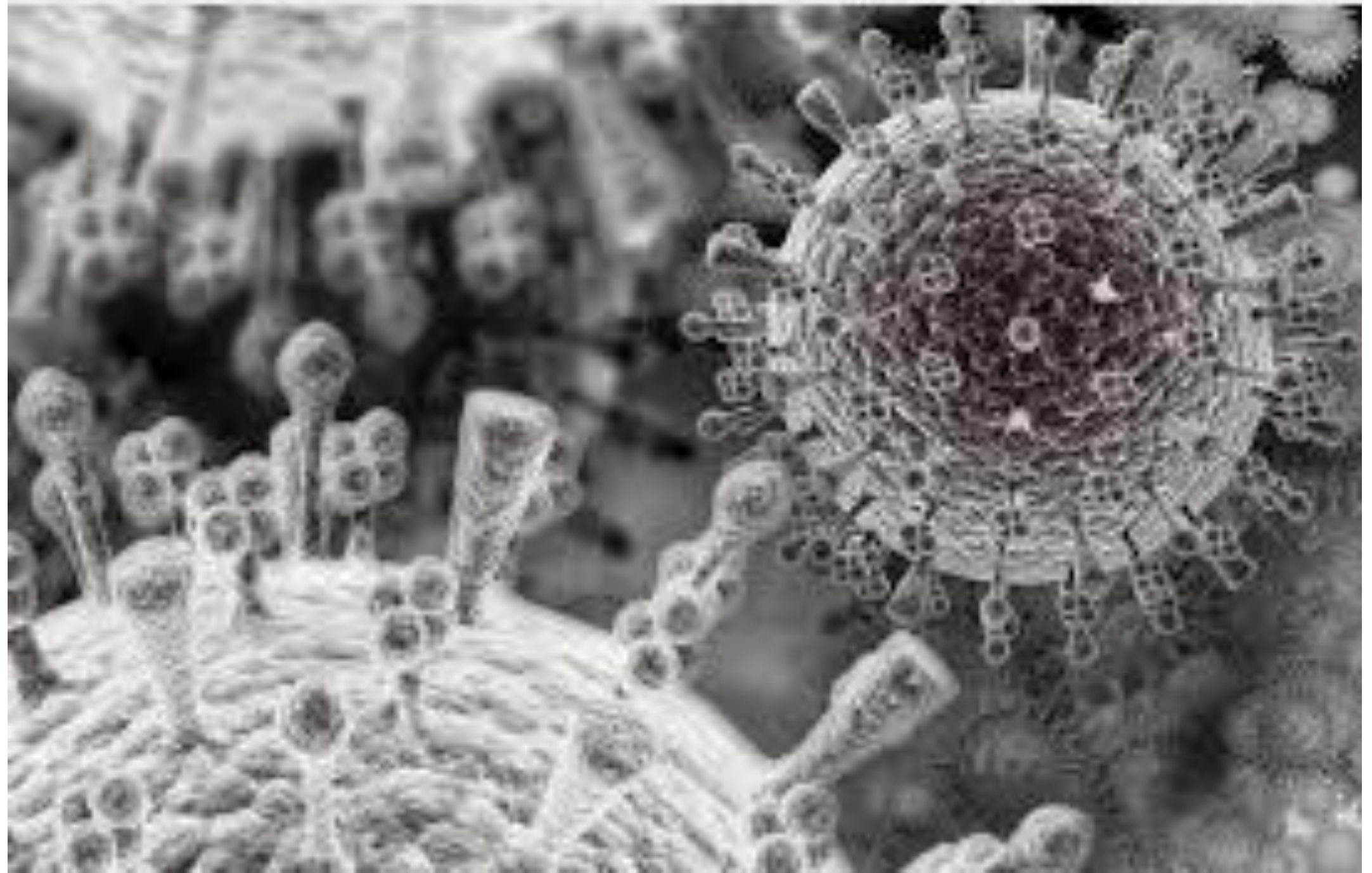
🍷

MORE ▾

Health without the hype:  
Subscribe now to stay in the know.

Subscribe to  
LiveScience >





The infographic features a dark red background with a pattern of red blood cells. In the center, the word "Sepsis" is written in a large, white, sans-serif font. Below it, the phrase "the Equal Opportunity" is written in a smaller white font, followed by the word "Killer" in a very large, bold, white font. Five white-bordered callout boxes with rounded corners are connected to the central text by thin white lines. Each box contains a statistic or fact about sepsis. The top-left box shows a map of the United States with the number "258,000" and the text "Americans die from Sepsis each year". The top-right box contains a globe icon, the text "5+ million", and "children worldwide – die from Sepsis each year". The middle-right box shows six human icons and the text "1.6 million cases of Sepsis in the U.S. every year". The bottom-right box contains the text "55% of Americans have ever heard of the word 'SEPSIS'". The bottom-left box contains the text "Sepsis is the third leading cause of death in the U.S. after heart disease and cancer".

**258,000**

Americans die from **Sepsis** each year



**5+ million**

children worldwide – die from Sepsis each year

# Sepsis

the Equal Opportunity

# Killer



**1.6 million**

cases of **Sepsis** in the U.S. every year

Sepsis is the **third leading** cause of death **in the U.S.**

after heart disease and cancer

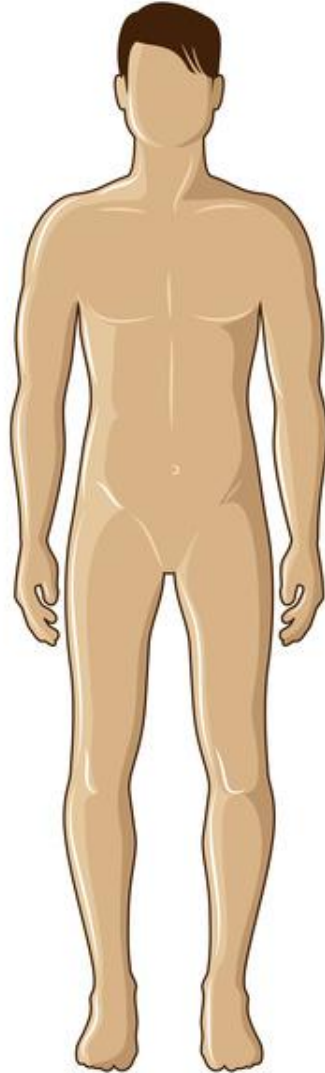
**55%** of Americans have ever heard of the word "SEPSIS"

# Summary

Sex- and Gender-based Medicine

# TRUTH

Cardiovascular  
Suicide  
Sudden Death  
Aneurysms  
Impulsivity  
Cardiomyopathy  
Autism  
Antisocial



Autoimmune  
Depression  
Arrhythmia  
Hip Fractures  
Cholecystitis  
Irritable Bowl  
Migraine  
Alzheimers



# Health Care Disparity







How often do you consider a patient's sex and/or gender in your assessment and management?

- A. Always
- B. Sometimes
- C. Occasionally
- D. Rarely
- E. Never

# Resources

- Sex and Gender Health Collaborative: <https://www.amwa-doc.org/sghc/>
- Sex and Gender Specific Health (Texas Tech): <https://www.sexandgenderhealth.org>
- The Foundation for Gender-Specific Medicine: <https://gendermed.org>
- Organization for the Study of Sex Differences: <https://www.ossdweb.org>