



# CARDIORESPIRATORY & CARDIOVASCULAR HEALTH IN OBESITY

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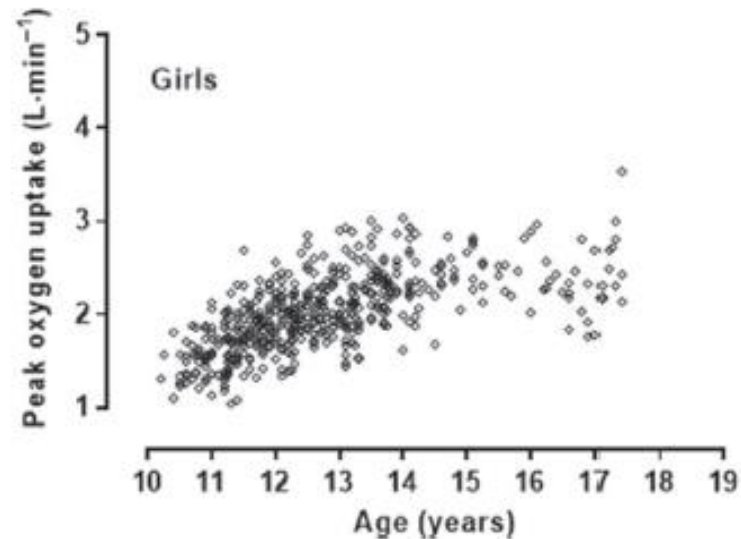
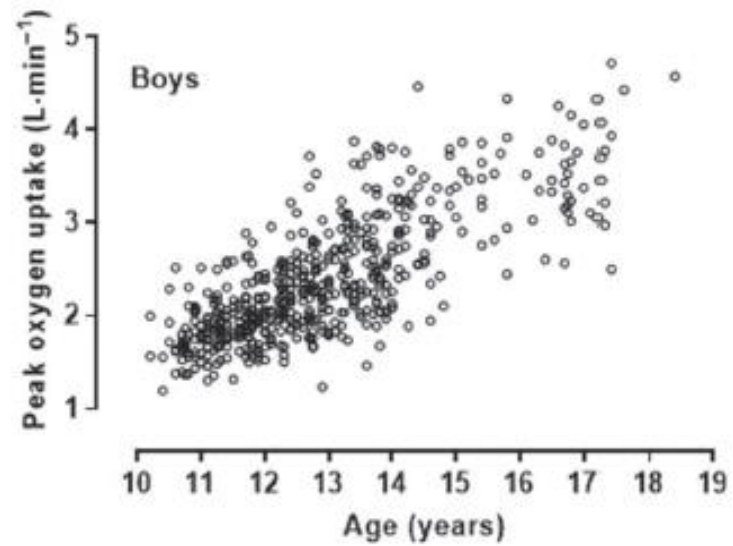
# OUTLINE

- Highlight key aspects of cardiorespiratory and cardiovascular health in obesity
- Overview effect of treatment on cardiorespiratory and cardiovascular health

# CARDIORESPIRATORY HEALTH

# VO2 MAX

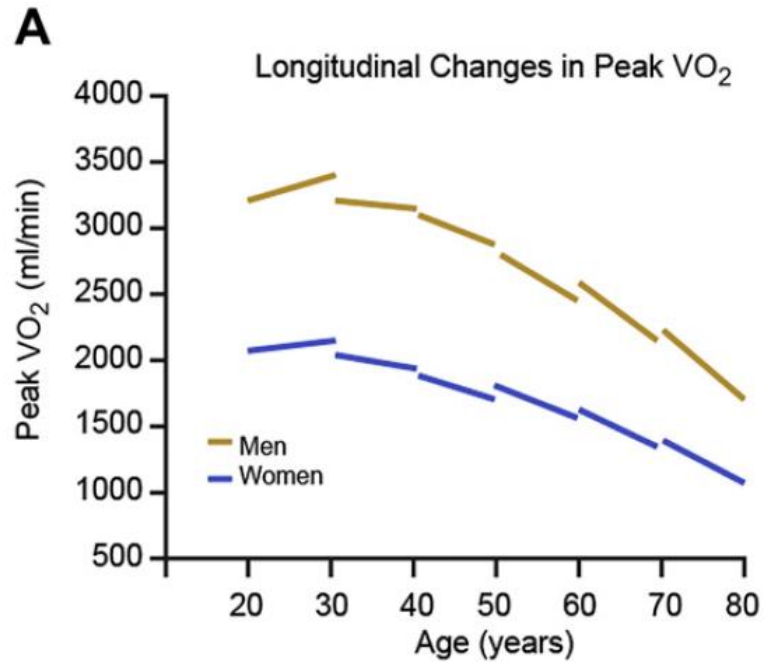
- As a best indicator of CardioRespritory Fitness (CRF)
- VO2 Max vs. VO2 peak
- Absolute vs. Relative



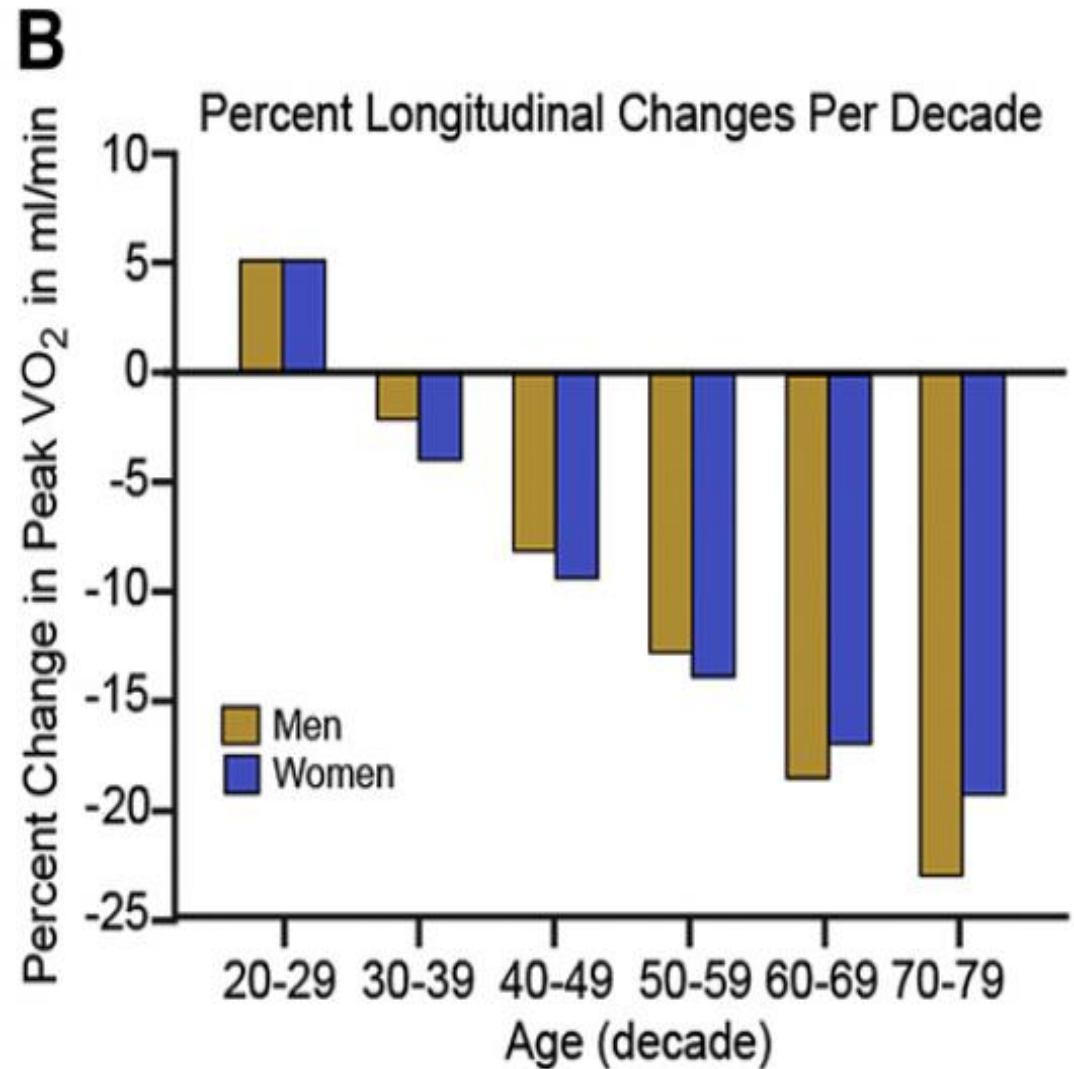
- Absolute VO<sub>2</sub>peak in L/min increase with body mass
- Males are consistently higher than females at same body weight
- ✓ Driven by higher lean body mass- active tissue

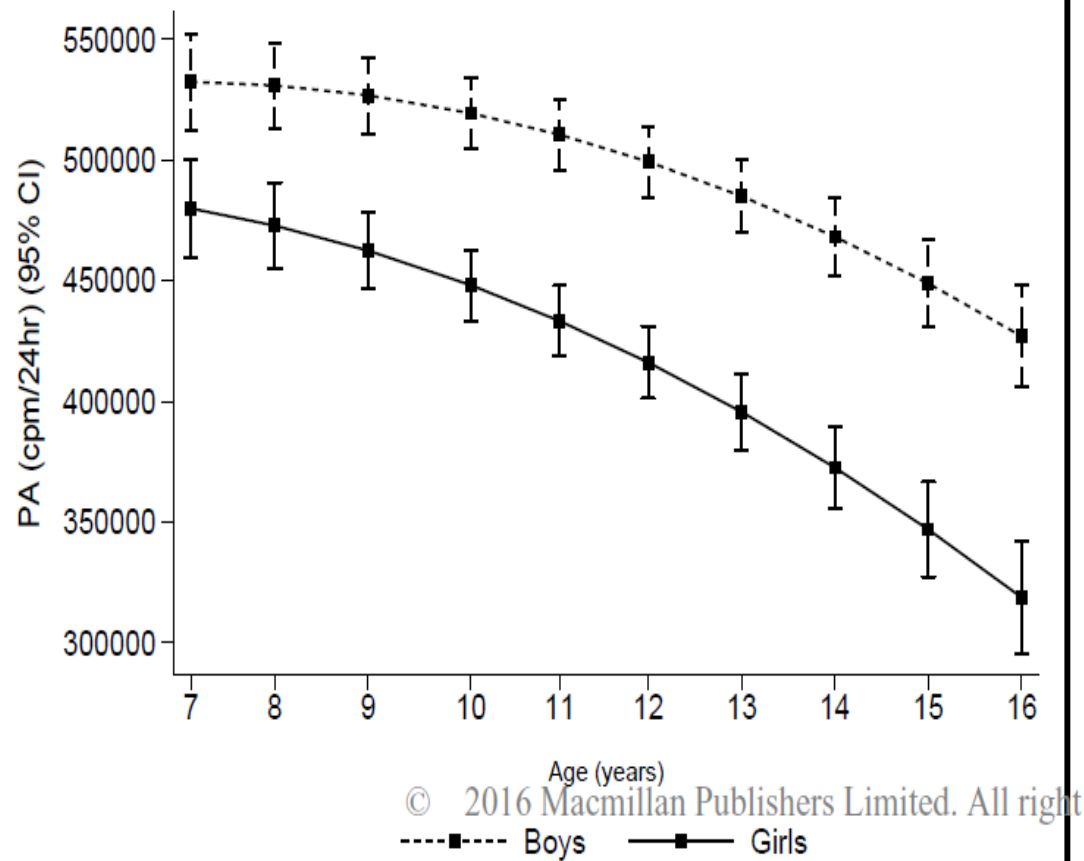
**Figure 1** — Peak oxygen uptake and age in 10- to 18-year-old boys and girls.

- Fitness – lifespan



- VO<sub>2</sub>peak “peaks” in late-adolescence, begins to decline around age 30 which is exacerbated by sex and obesity

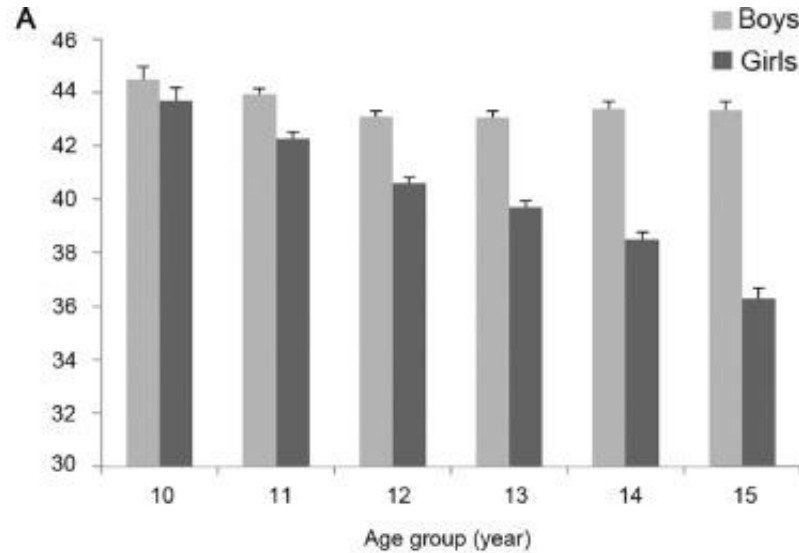




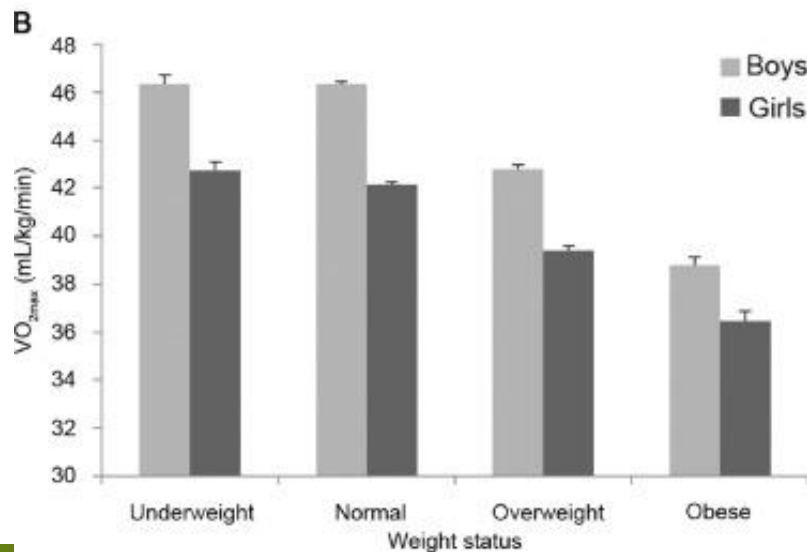
- **Activity – childhood**

- Well documented decline in PA during childhood might be a key contributor to reduced fitness independent of BMI

# OBESITY AND SEX COMPOUND DIFFERENCE



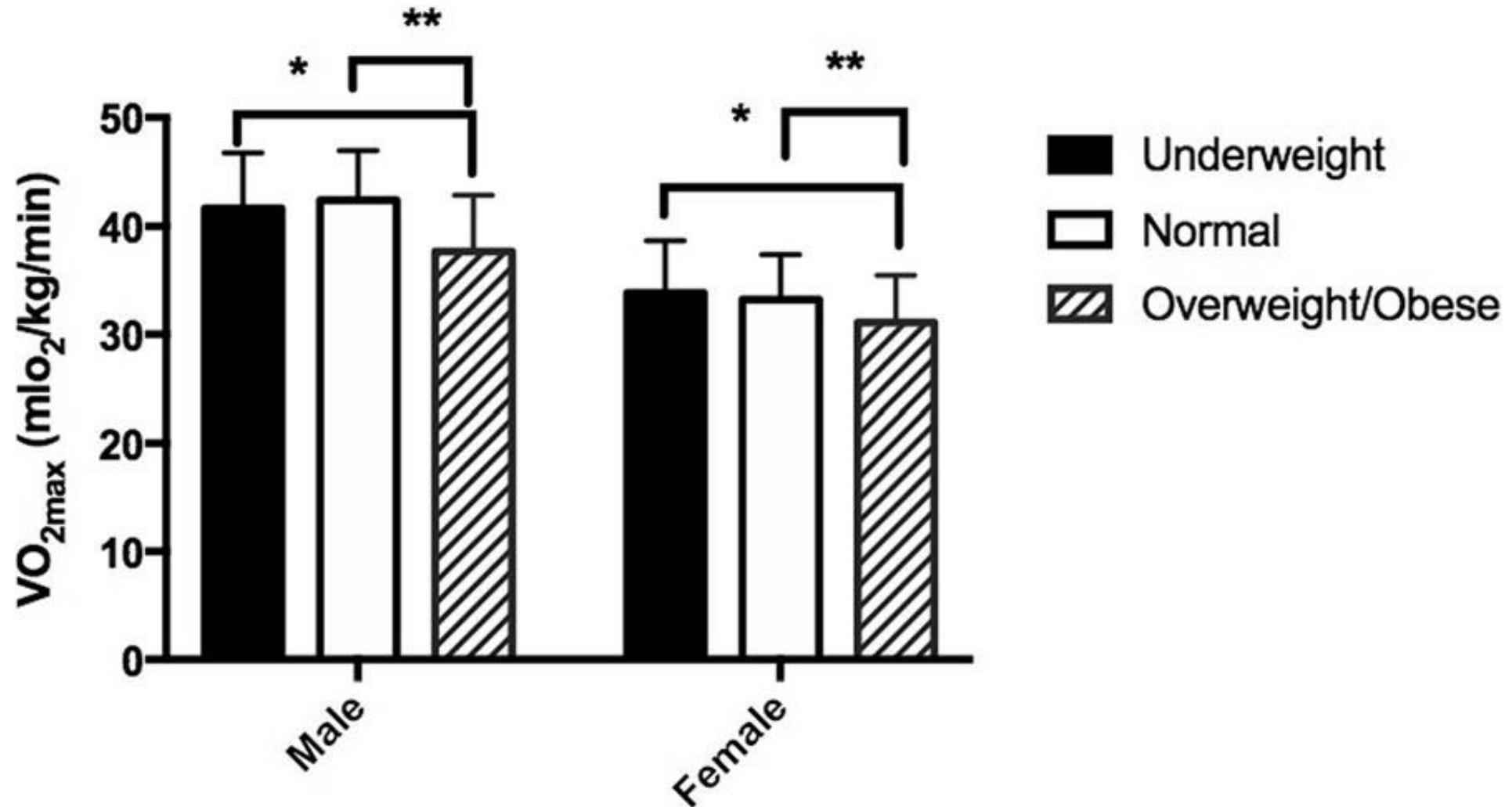
- Males maintain relative VO<sub>2</sub>peak during development
- Females decline



- Relative VO<sub>2</sub> peak (ml/kg/min)
- Youth with OW and OB have lower VO<sub>2</sub>peak



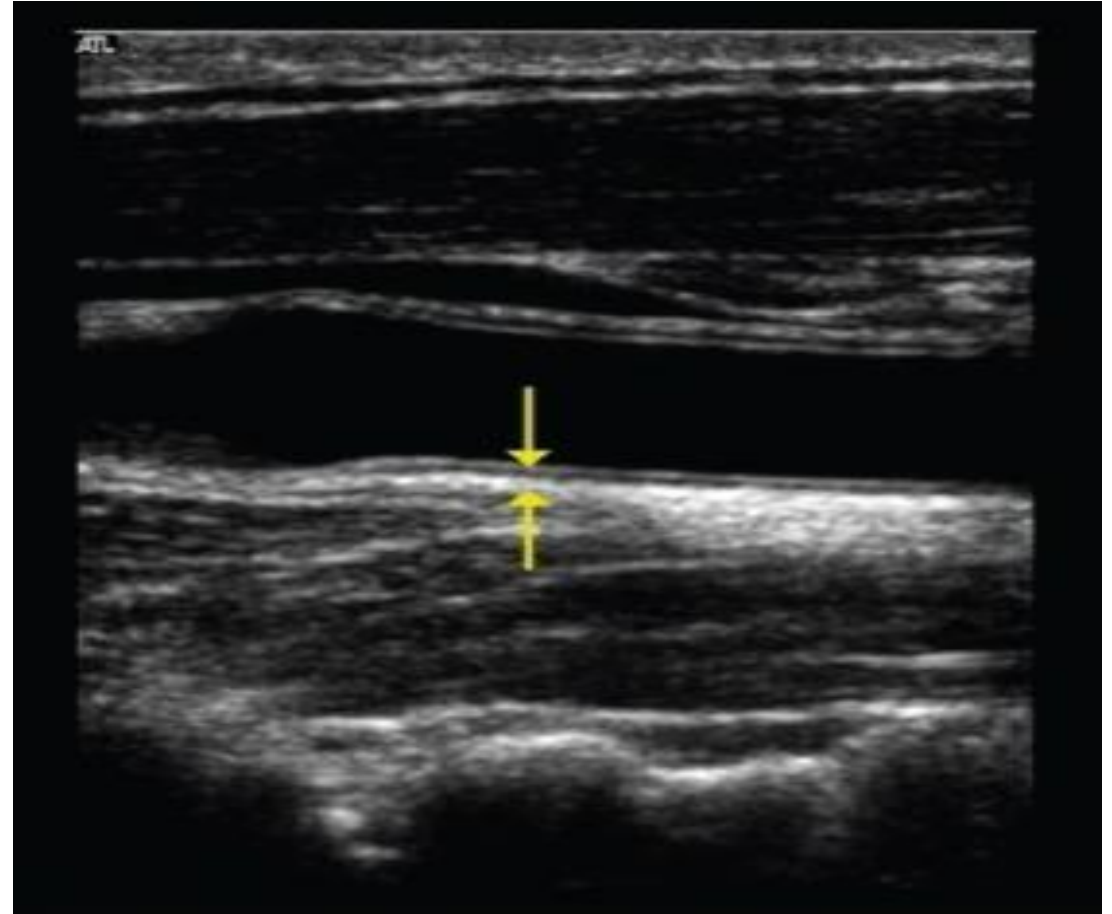
# OBESITY AND SEX COMPOUND DIFFERENCE



# CARDIOVASCULAR HEALTH

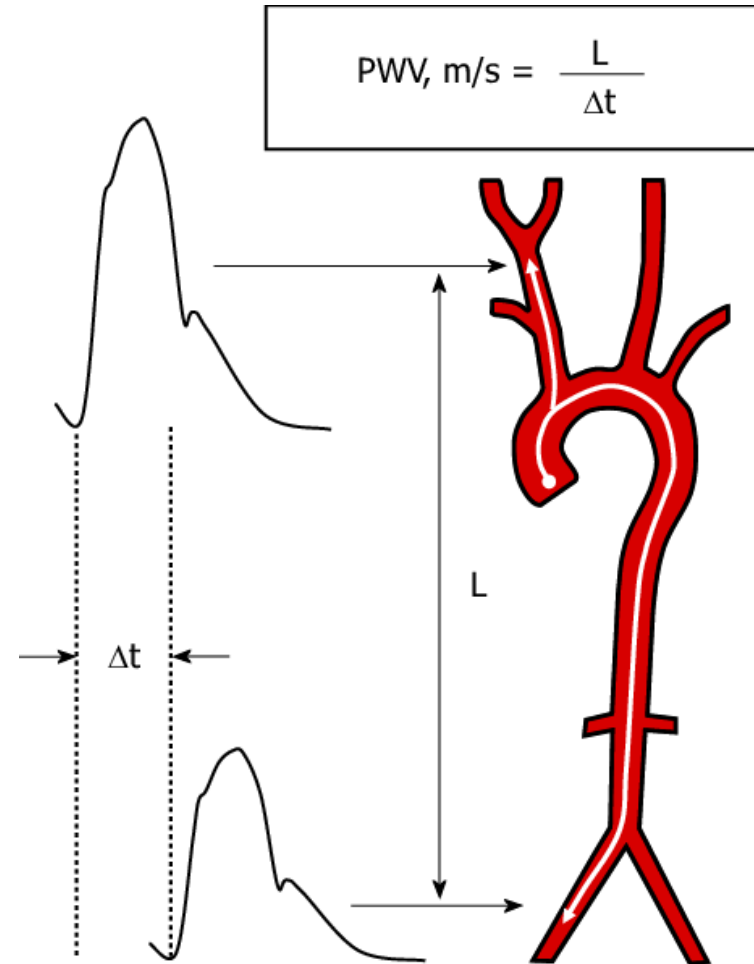
# CAROTID INTIMA MEDIA THICKNESS (CIMT)

- Most common measure of vessel thickening
- Can be measured in 3 sites:
  - ✓ Common, internal, bulb
- Associated with CV events

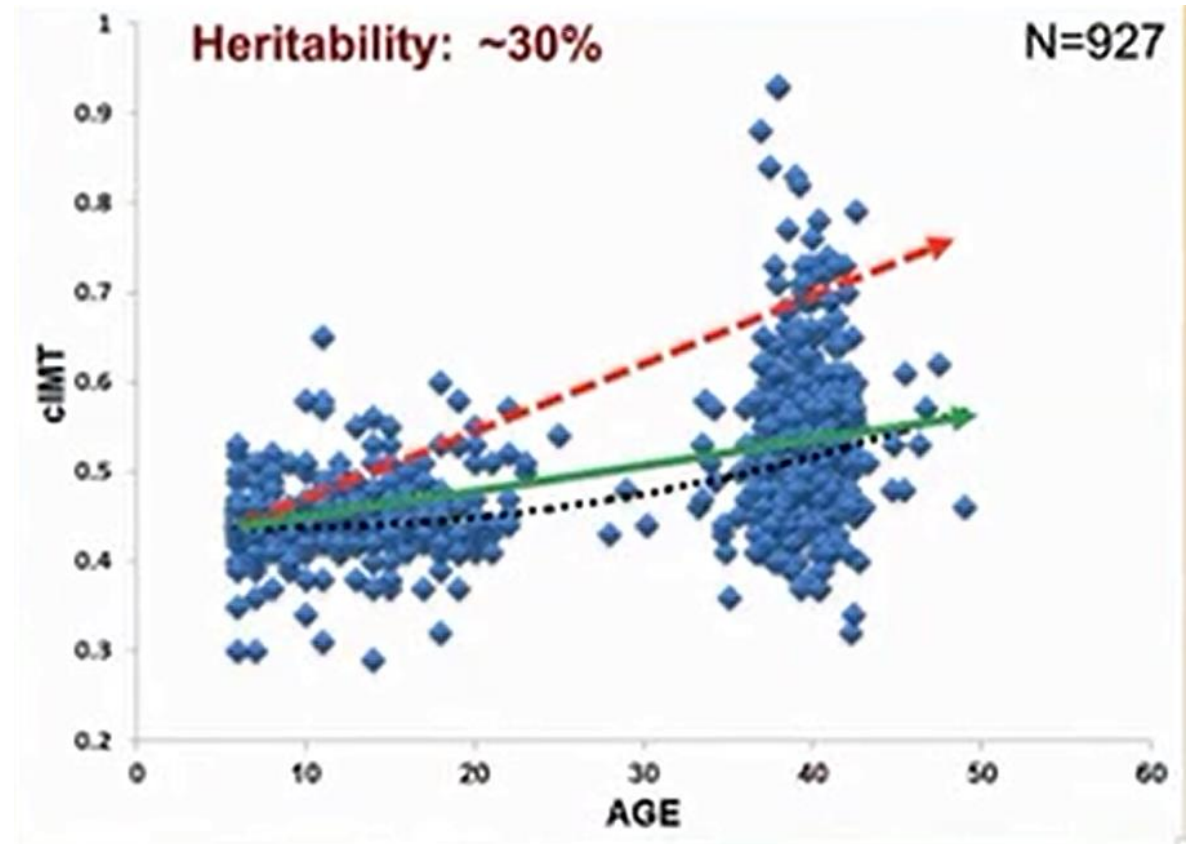
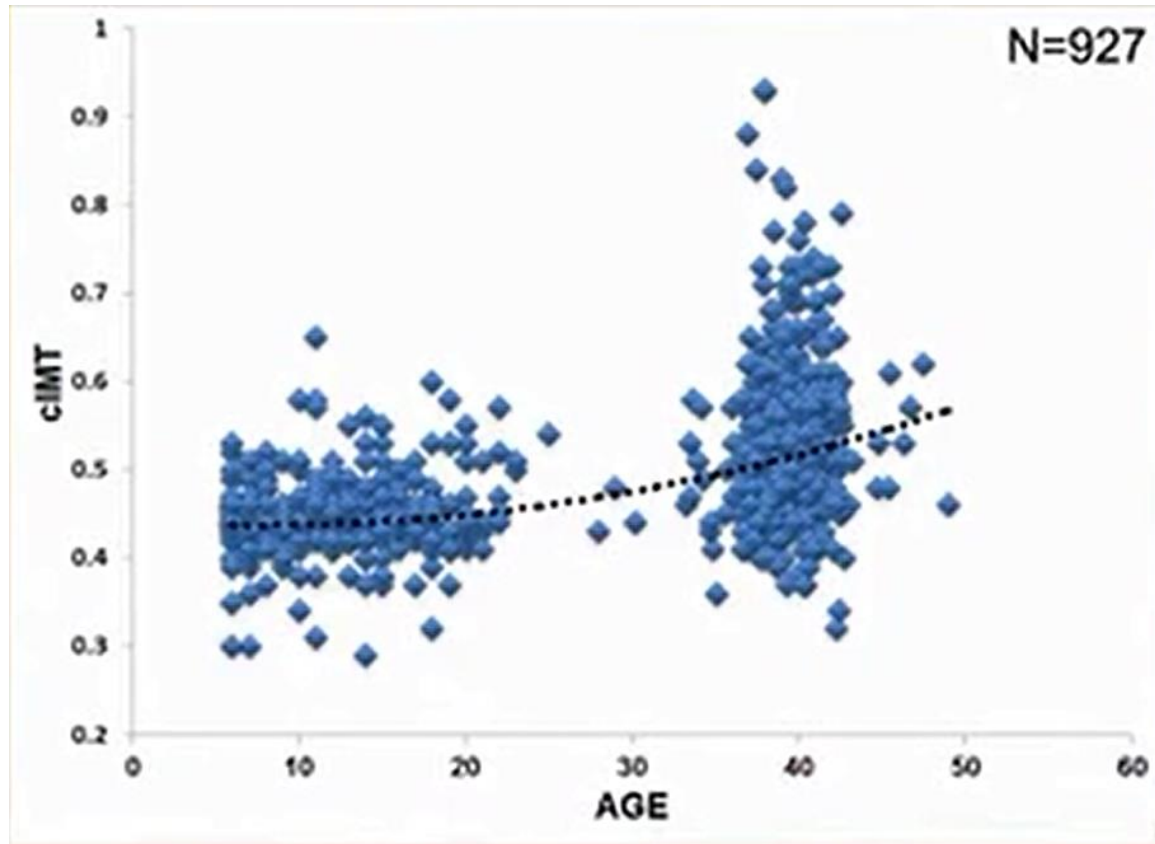


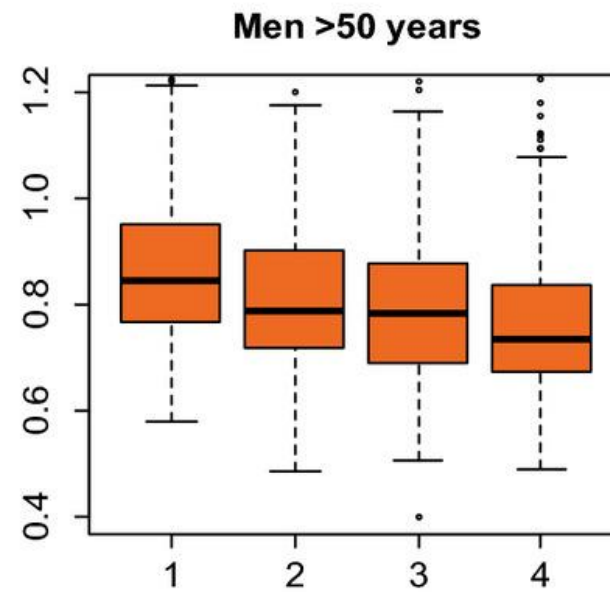
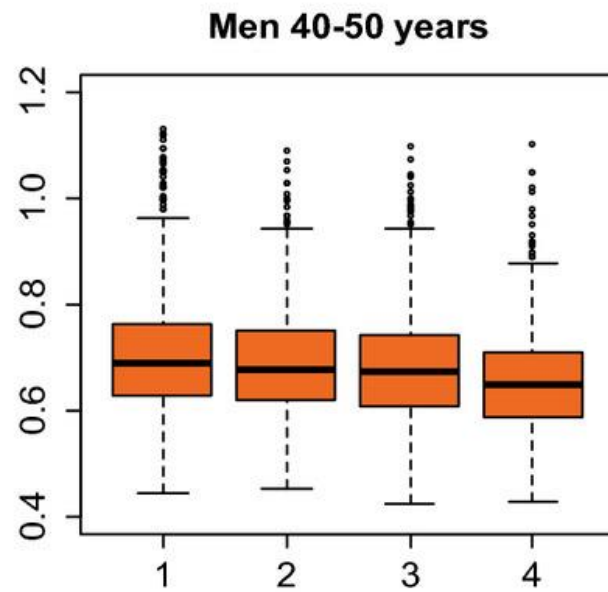
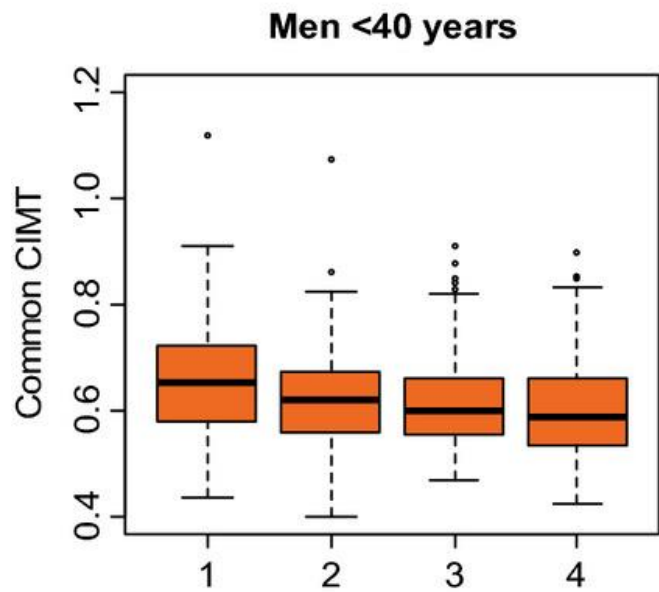
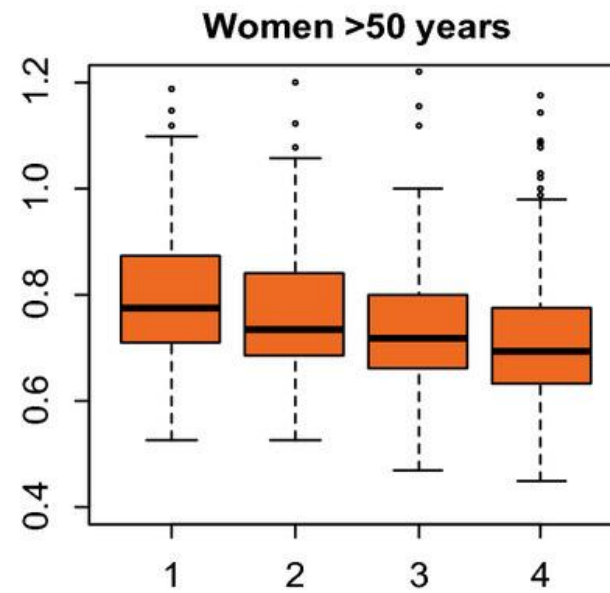
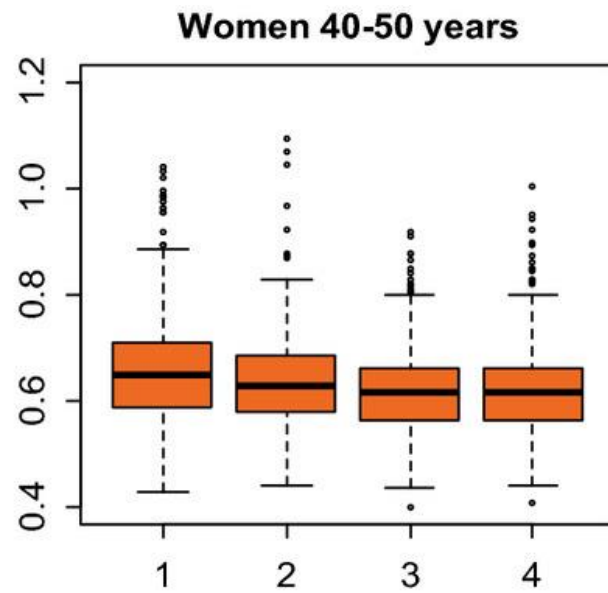
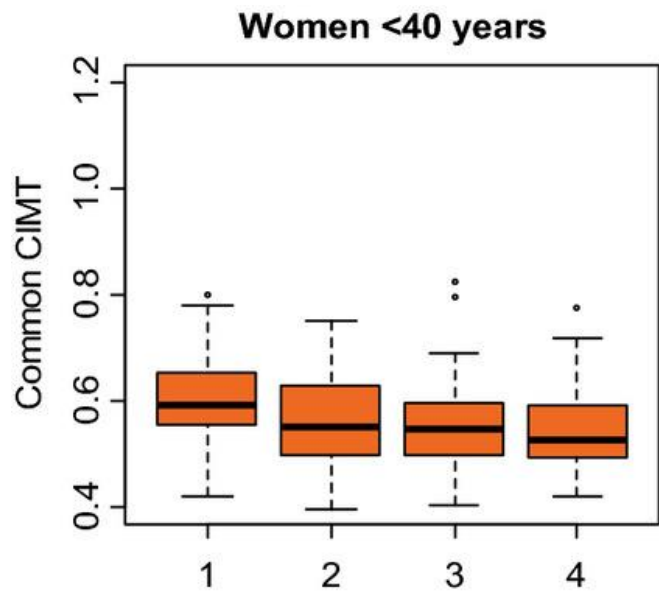
# PULSE WAVE VELOCITY (PWV)

- Reflects aortic wave length divided by transit time
- Faster PWV is a surrogate for greater arterial stiffness
- Associated with CV events in adults



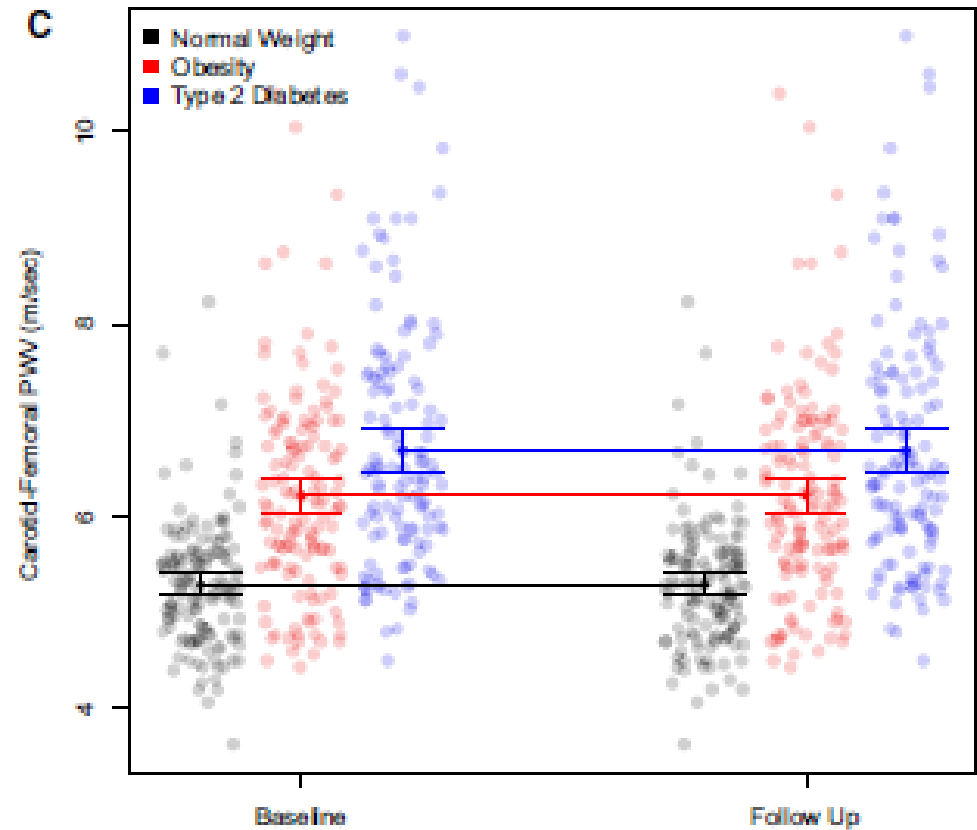
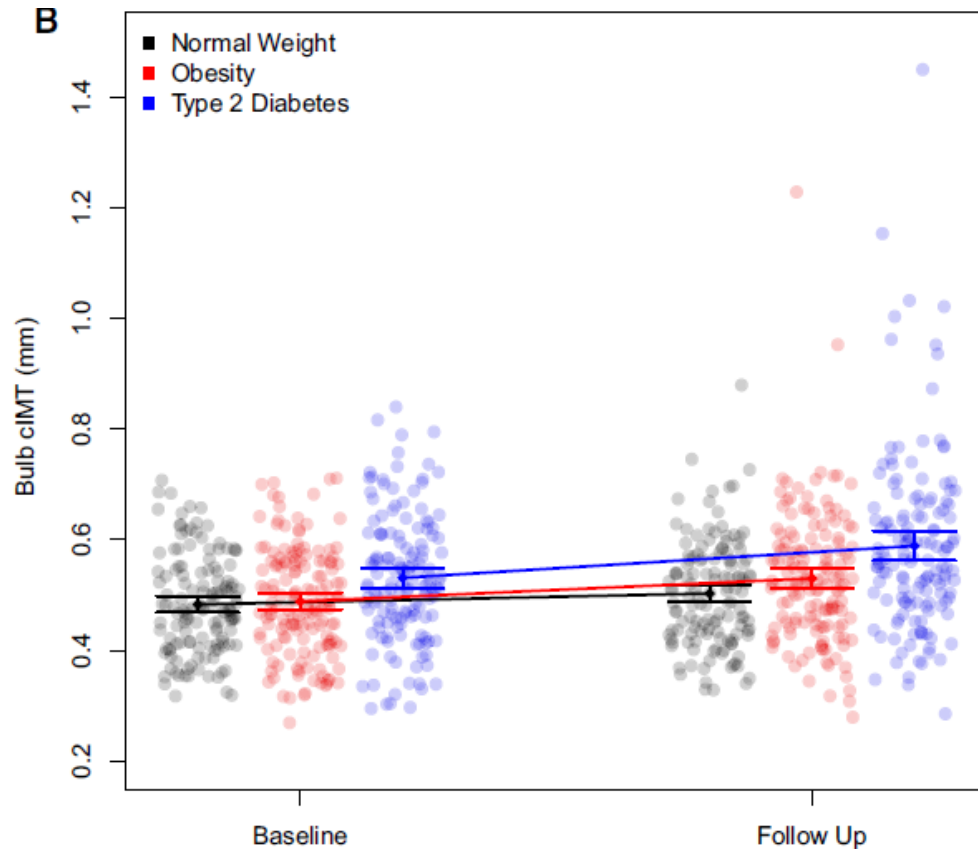
# WHAT IS THE TRAJECTORY?



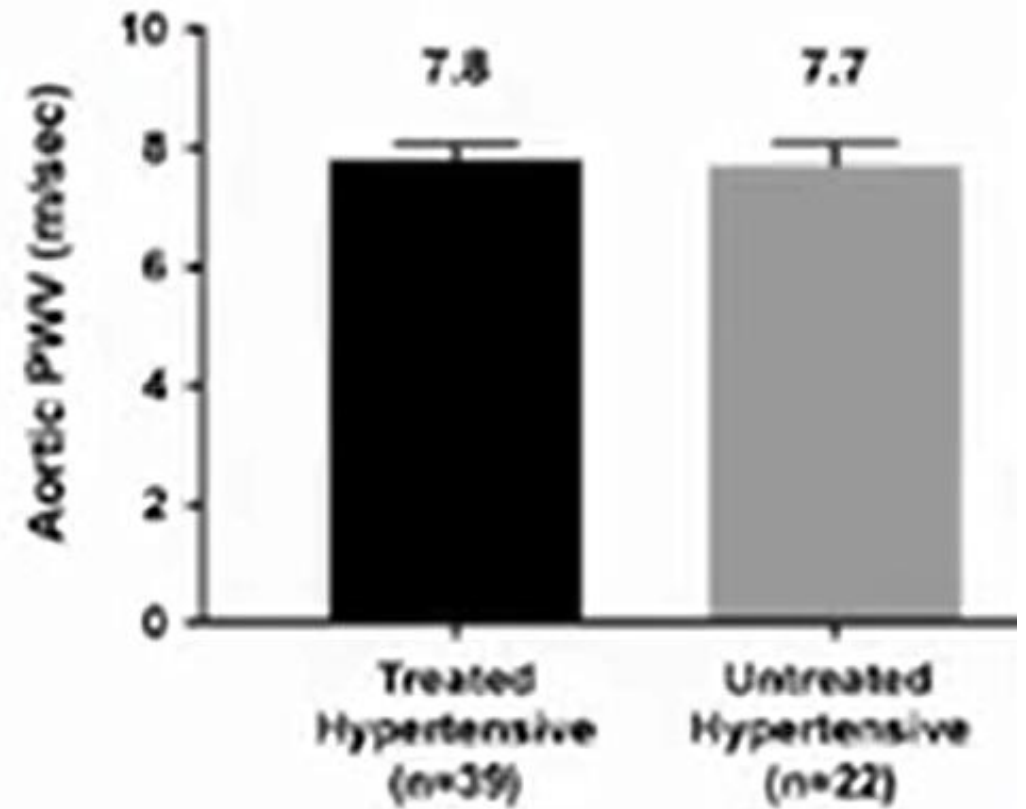
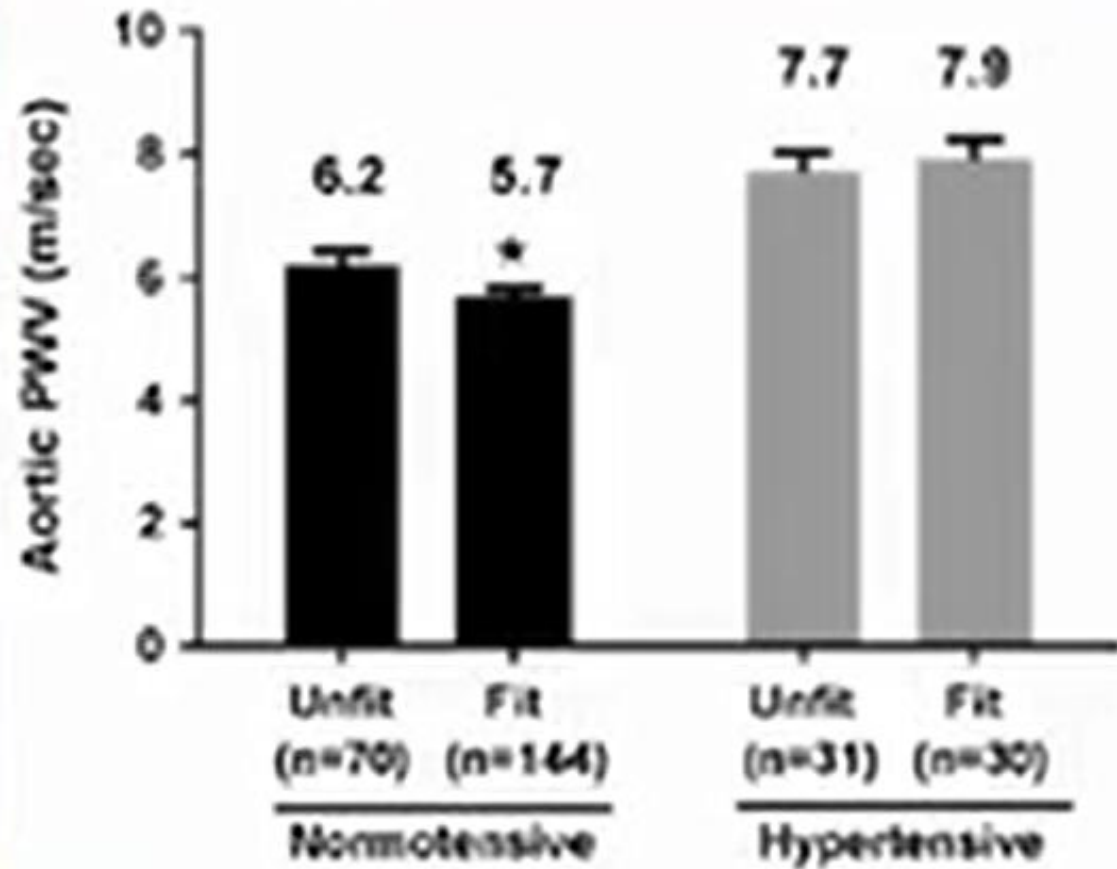


Relative VO2max

# LONGITUDINAL – VASCULAR STRUCTURE



In addition to obesity and T2D, elevated SBP was highly associated with advanced CV aging

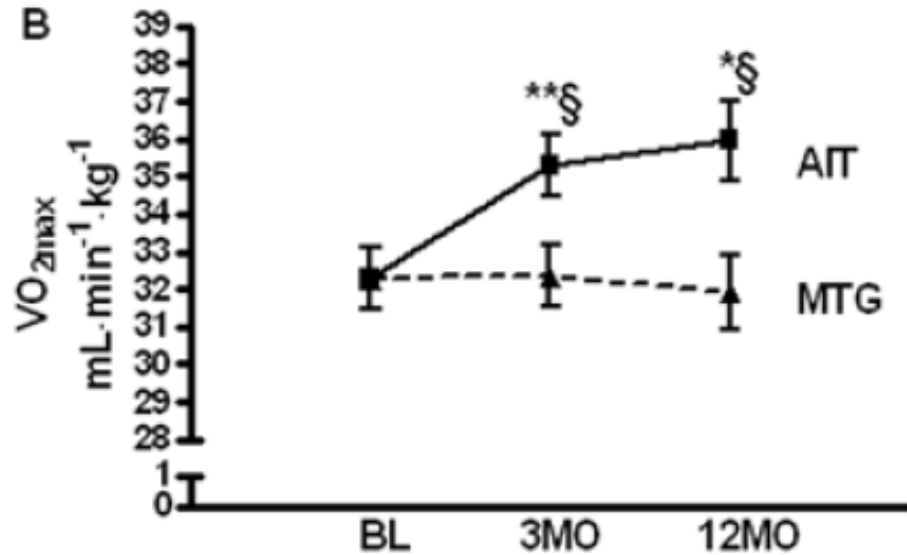


While fitness may be important, hypertension may have a greater on arterial stiffness, even with treatment

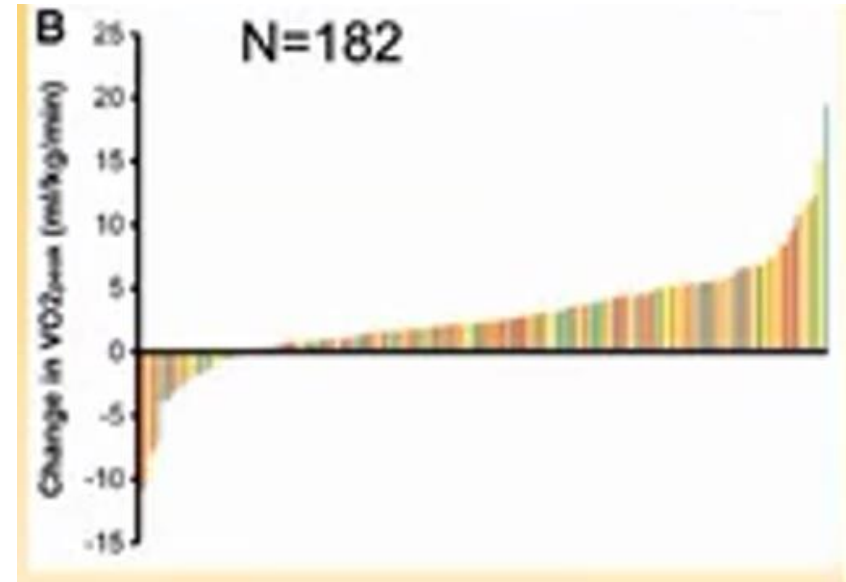


# EXERCISE TRAINING AS A POSSIBLE EFFECTIVE TREATMENT

# INTENSIVE EXERCISE IMPROVES VO<sub>2</sub>PEAK...



- Minimal weight loss needed for intensive exercise to improve VO<sub>2</sub>peak in youth with obesity
- AIT (Interval training)
- MTG (Multidisciplinary treatment)



- Significant heterogeneity
- Major predictors remain elusive
- Similar to what has been shown by the Heritage Family Study

# EFFECT OF EXERCISE ON ARTERIAL STIFFNESS

- Adults

- ✓ Controversy

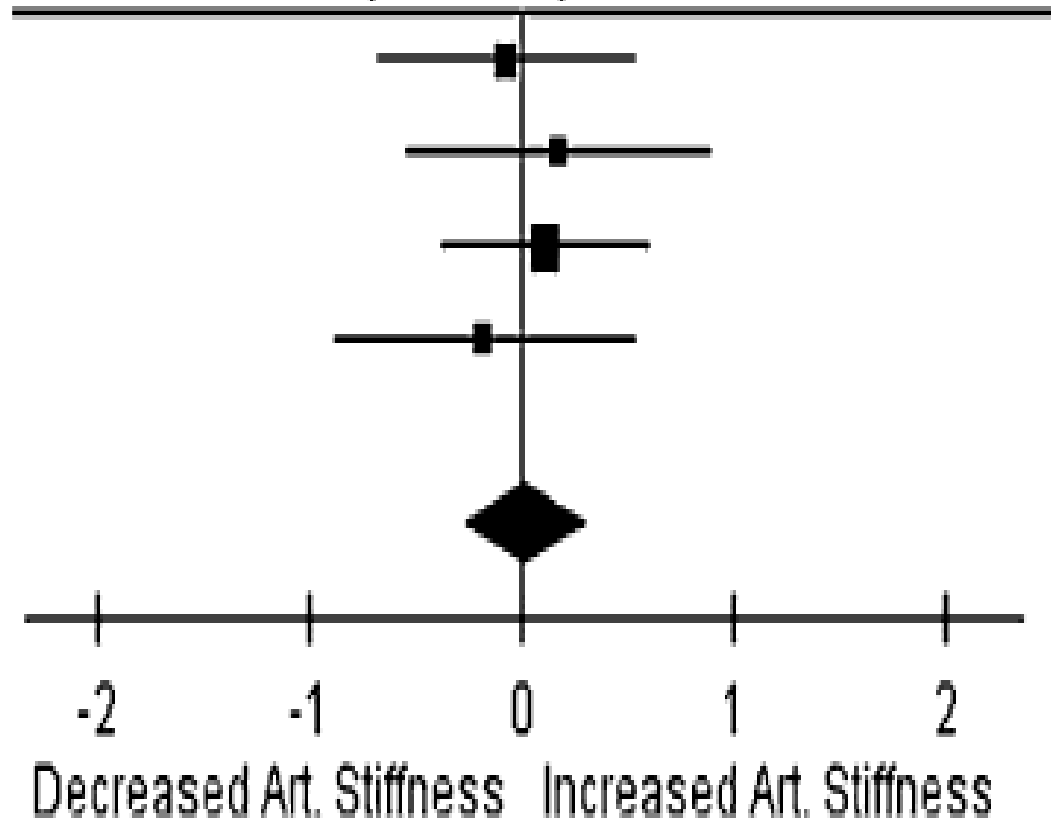
- ✓ in studies using low-intensity aerobic training and yielding a decrease in SBP, arterial stiffness may decrease.

- Youth

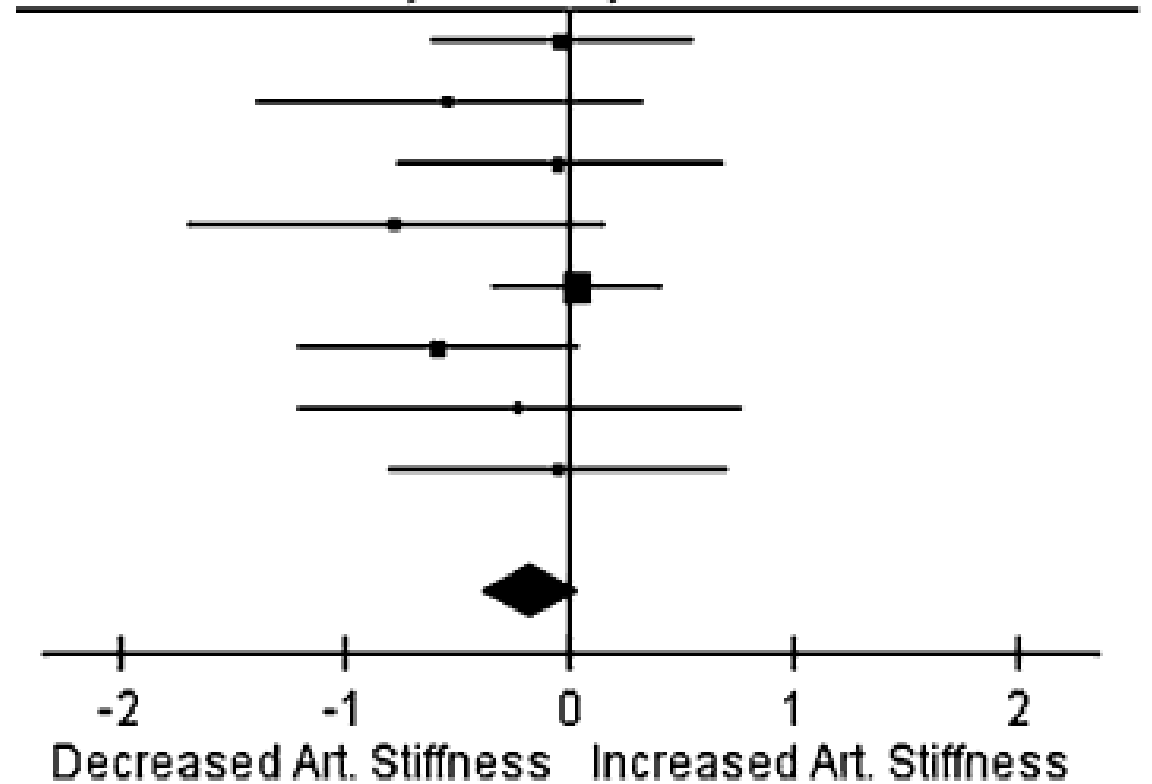
- ✓ Changes in arterial stiffness are mixed

- ✓ Need larger more rigorous studies to determine exercise prescription

**Std. Mean Difference  
IV, Random, 95% CI**

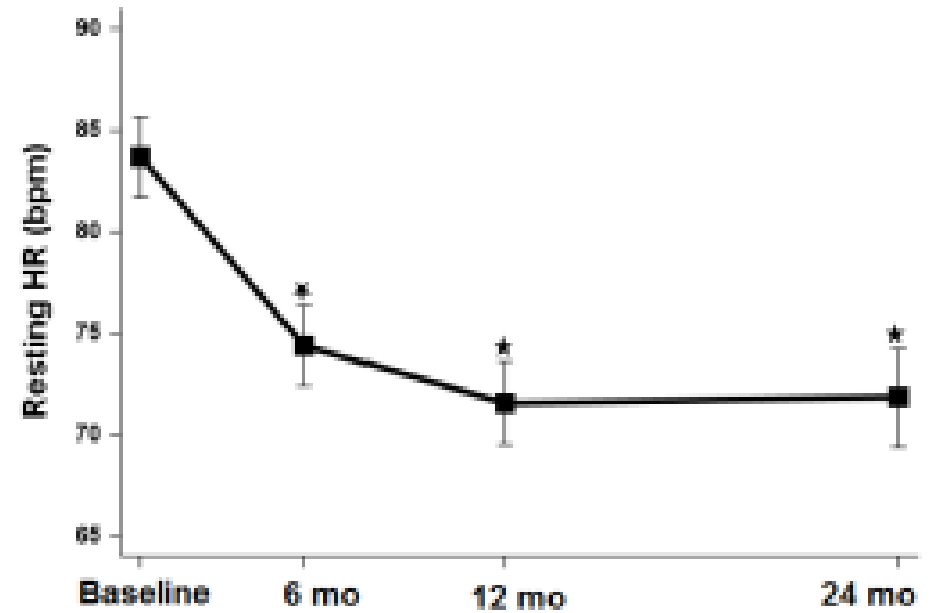
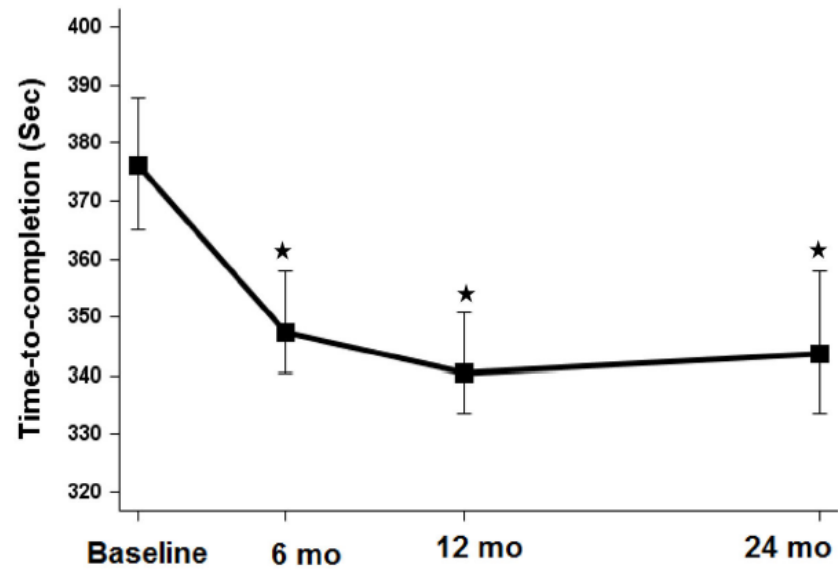


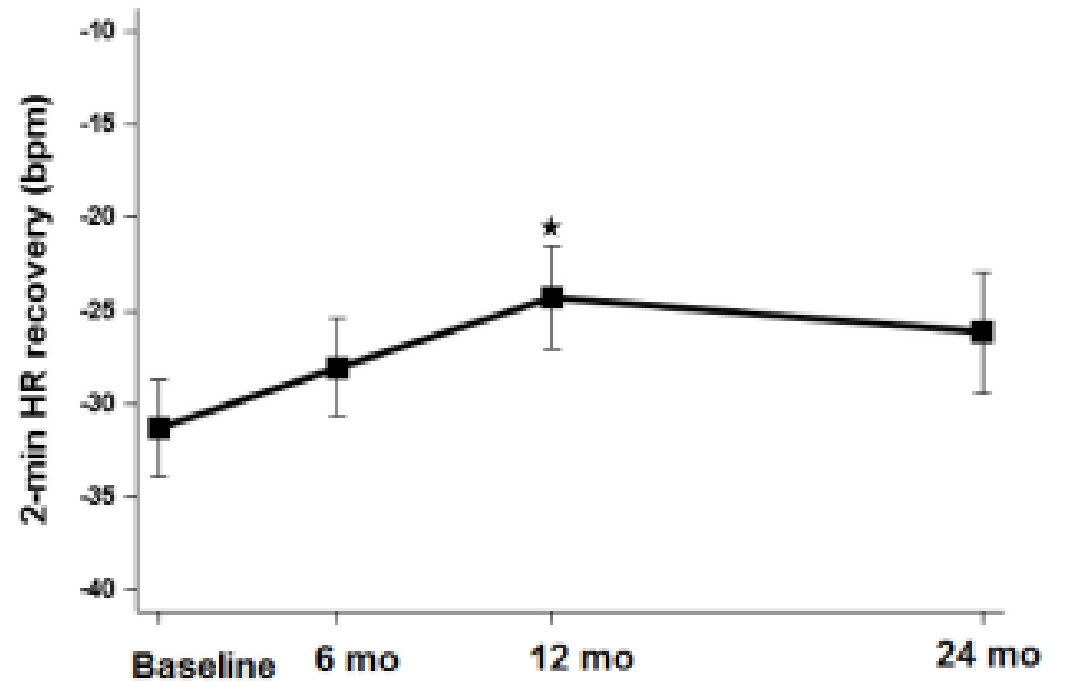
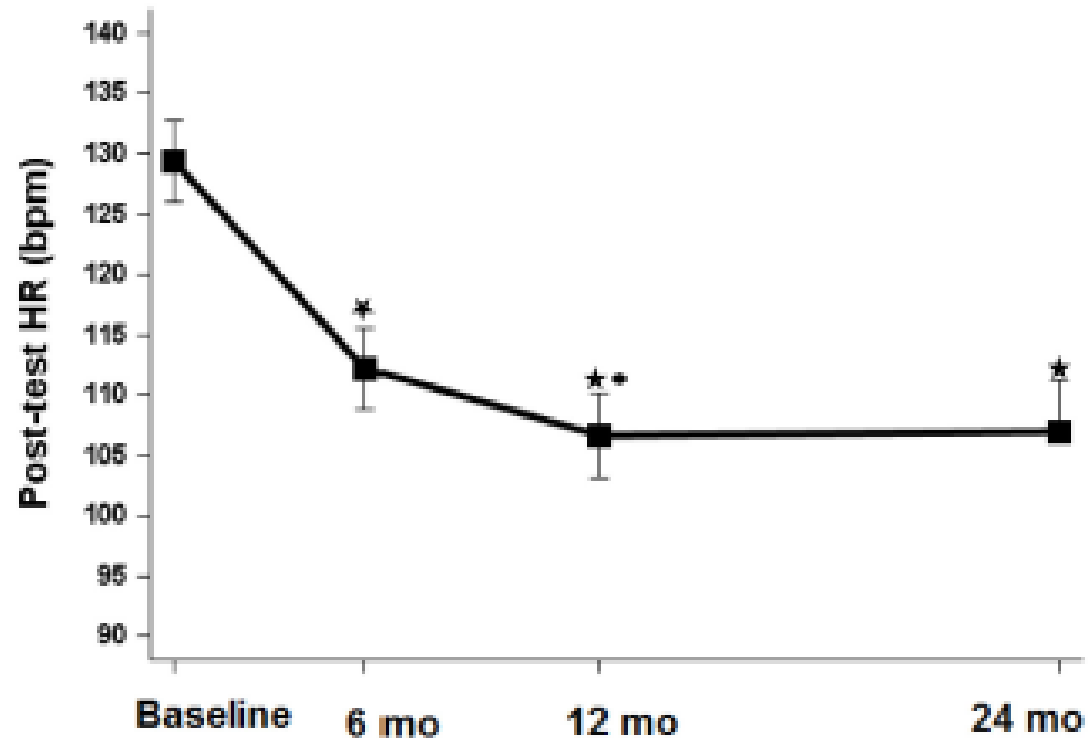
**Std. Mean Difference  
IV, Random, 95% CI**



# HEART RATE RESPONSE / FUNCTIONAL MOBILITY FOLLOWING BARIATRIC SURGERY

A





# IN SUMMARY

- people with obesity have lower relative cardiorespiratory fitness compared to normal-weight peers
- CV health impaired by obesity, insulin resistance, T2D, elevated blood pressure, and physical inactivity/fitness
- CV health can be improved with weight loss, or intensive exercise/intervention with minimal weight change

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THANK YOU!