

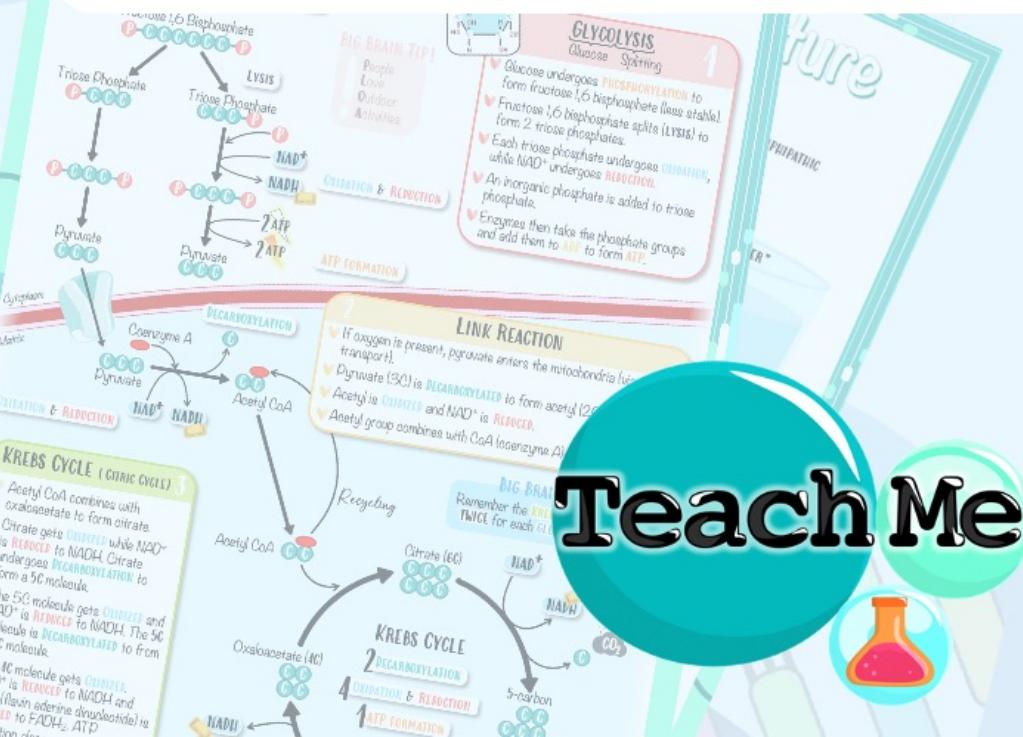
TeachMe

STUDY

NOTES

B3.2 TRANSPORT

Last update: 2024.07.21



Transport

I. ANIMALS

TWO body systems work together:

Respiratory System: Helps bring air into our body and into our blood stream.

Cardiovascular System: Helps us distribute the blood (containing nutrients and oxygen) to all the cells of our body.

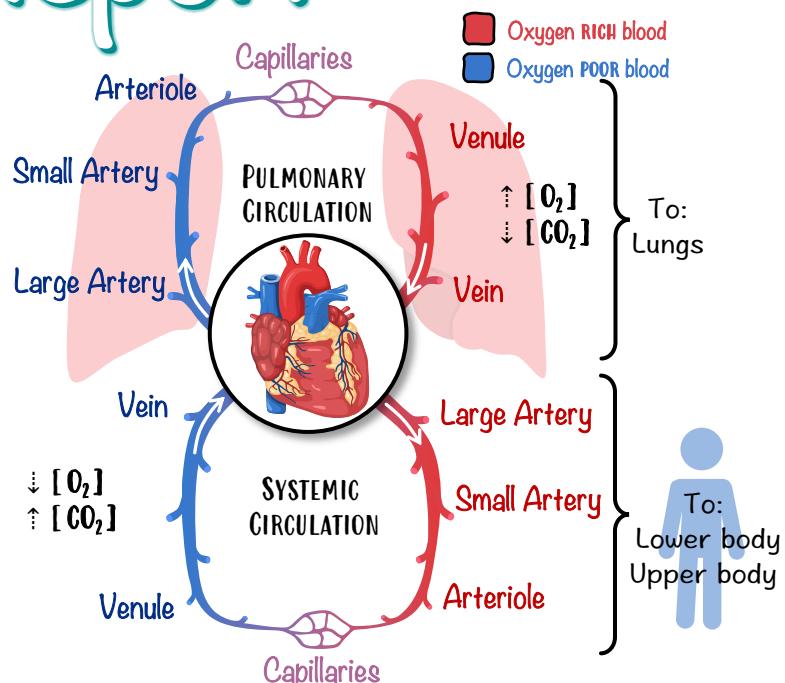
BIG BRAIN TIP!



Arteries - Away from heart
Veins - Towards the heart



The identification "artery" or "vein" is NOT based on the level of blood oxygenation in the blood so NOT color based.



THE BLOOD VESSEL SYSTEM

Take blood AWAY from heart towards capillary bed

Arteries

Site of nutrient exchange

Capillaries

CAPILLARY BED

ENDOTHELIUM (1 layer)

MUSCLE & Elastic layer (Thick)

ADVENTITIA (COLLAGEN)

Real image of vessels on page 5

Arteries

Capillaries

Veins

Take blood TOWARDS the heart away from capillary bed

VALVES

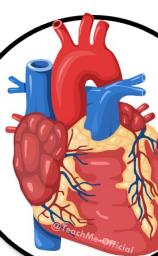
ENDOTHELIUM (1 layer)

MUSCLE & Elastic layer (Thin)

ADVENTITIA (COLLAGEN)

CAPILLARY BED

ENDOTHELIUM (1 layer)



Veins

VALVES

ENDOTHELIUM (1 layer)

MUSCLE & Elastic layer (Thin)

ADVENTITIA (COLLAGEN)

ARTERIES

Thicker (Withstand more pressure)

ENDOTHELIUM: Reduce Friction

MUSCLE (THICK): Contract* (strong)

MORE ELASTIC LAYERS: Stretch and recoil*

LUMEN (SMALL): Keep pressure and blood flow

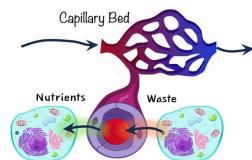
ADVENTITIA: Strength

*See "why are arteries elastic" on page 2

CAPILLARIES

Very thin, and permeable.

ENDOTHELIUM: Reduce Friction



LUMEN (VERY SMALL): Slow flow (exchange of waste for nutrients)

Fenestrated (intestine, & kidney)

Other - Highly branched (each cell is close)

VEINS

Thinner (Withstand less pressure)

ENDOTHELIUM: Reduce Friction

MUSCLE (THICK): Contract (weak)

LESS ELASTIC LAYERS: Stretch and recoil

LUMEN (LARGE): Large capacity

VALVES: Prevent backflow**

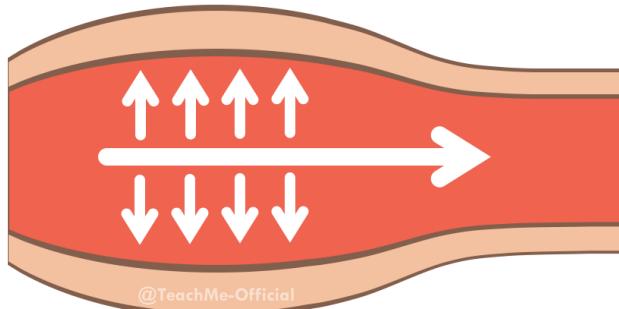
ADVENTITIA: Strength

**See "how do valves work" on page 2

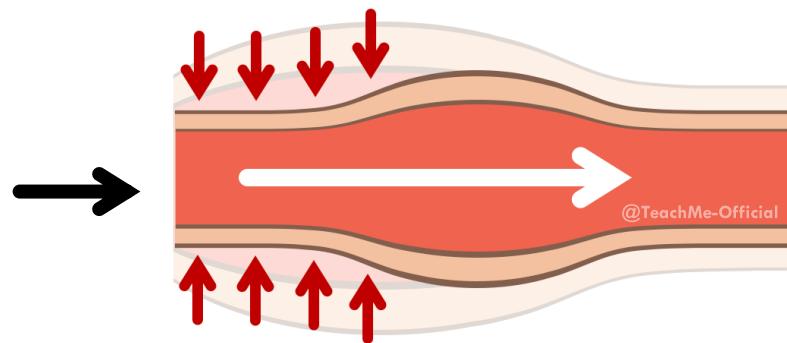


Transport

Why ARE ARTERIES ELASTIC?



Pressure stretches elastic fibres

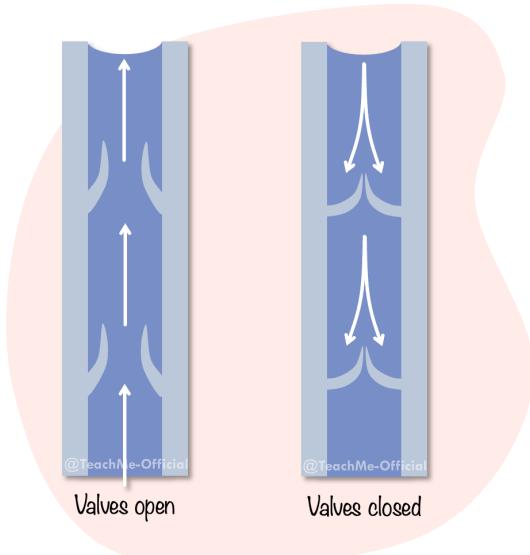


Recoil of elastic fibres

High pressure caused by each contraction of the heart pushes outwards on the elastic wall of the artery. In between contractions the stretched area **RECOILS** and helps maintain the high-pressure characteristics of arteries. It allows for:

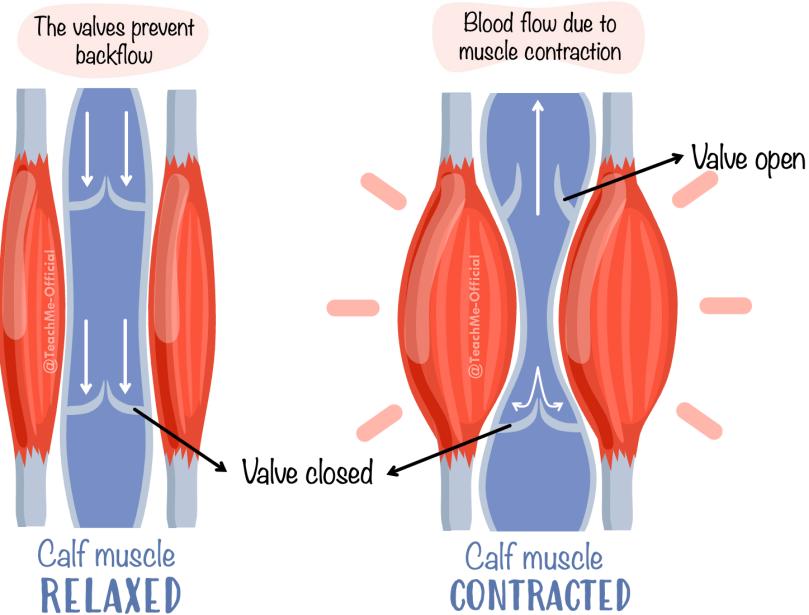
PULSATING & **CONTINUOUS FLOW**

How DO VALVES WORK?



In veins blood flow is so **SLOW**: valves ensure **UNIDIRECTIONAL** blood flow (no backflow) back to the heart. It is a one-way valve.

CALF MUSCLES ACT AS PUMP FOR DEEP LEG VEIN
THIN wall allows compression by muscles to help blood flow return to heart.



Summary

ARTERIES

CAPILLARIES

VEINS

Walls	Thick	Thin (1 cell)	Thin
Valves	None	None	Yes
Blood Pressure	High	Low	Low
Purpose	Carries blood AWAY from heart	Links arteries & veins Nutrient EXCHANGE	Carries blood back TOWARDS heart

Transport

MEASURING PULSE RATE...

(number of times your heart beats per minute)

HOW TO?

Feel for pulse. Once pulse is felt, then start timer for 60 seconds. During these 60 seconds count the number of pulses.

Eg. You count 80 beats within the minute: pulse is 80bpm (beats per minute)

Quicker: Can also do for 30 seconds and multiply pulse number by two.



Radial artery

Can feel for this artery on the thumb side of the wrist with the palm facing up, 2 cm from the base of thumb.



Carotid artery

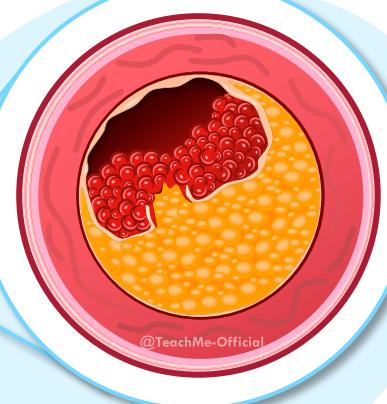
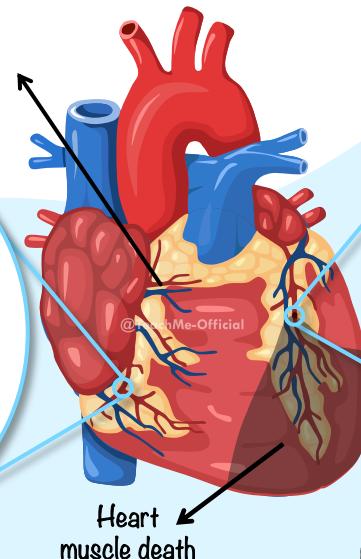
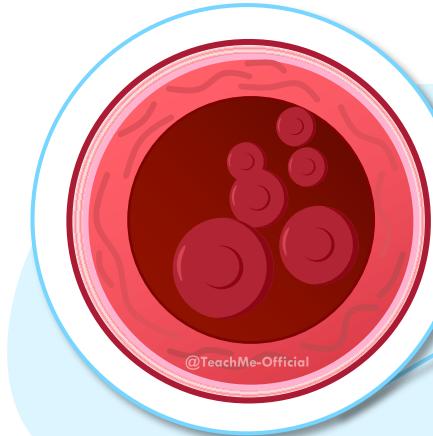
Can feel for this large artery on either side of your neck (either side of trachea).

What if...
blood flow ISN'T normal?

Coronary arteries (an example)
The arteries that supply blood to cardiac muscle

NORMAL ARTERY

Normal blood flow can supply the heart muscle with sufficient nutrients



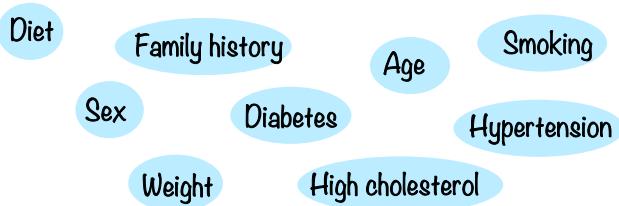
OCCLUDED ARTERY

PLAQUE BUILDUP PROGRESSIVELY narrows the lumen of the coronary artery, preventing blood flow to the heart muscle
- also called CORONARY HEART DISEASE (CHD)

DID YOU KNOW?

Occlusion of a coronary artery can cause what we call a "HEART ATTACK" !

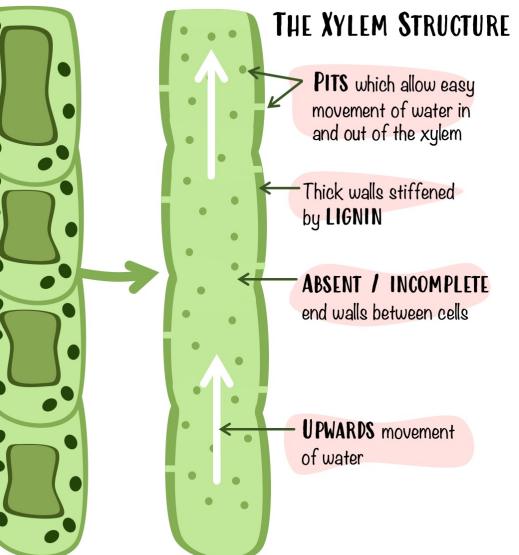
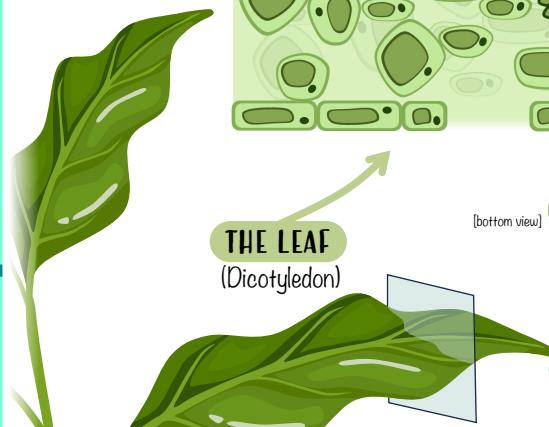
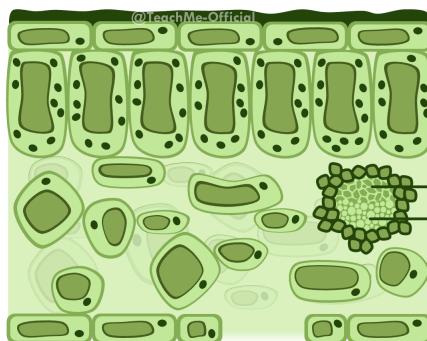
CORONARY HEART DISEASE is a multifactorial disease
(many factors are correlated with it)



Transport

II. PLANTS

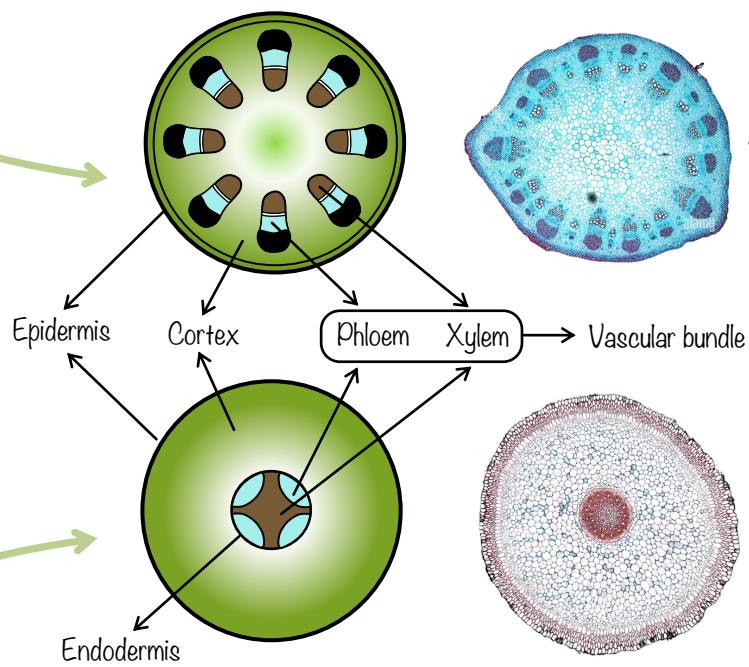
Structure of leaf is learned in B3.1



BIG BRAIN TIP!

XYLEM is the DEAD leftover walls of cells, while PHLOEM is LIVING tissue.

THE STEM (Dicotyledon)



Capillary Action

THE ROOT (Dicotyledon)

STRUCTURE	FUNCTION IN THE ROOT	FUNCTION IN THE STEM
Epidermis	Grows root hairs that increase the surface area for water uptake.	Prevents water loss and provides protection from microorganisms.
Cortex	An unspecialized cell layer that stores food reserves.	An unspecialized cell layer that stores food reserves.
Xylem	Transport tubes for water and minerals, starting in the roots.	Transport tubes for water and minerals up from roots. Also serves as mechanical support.
Phloem	Transport tubes that receive sugars from leaves.	Transport tubes for transporting sugars (carbs) from leaves to other parts of the plant.
Vascular bundle	The area in the center of the root containing xylem and phloem.	Contain multiple vessels of both xylem and phloem.



Transport

TRANSPERSION

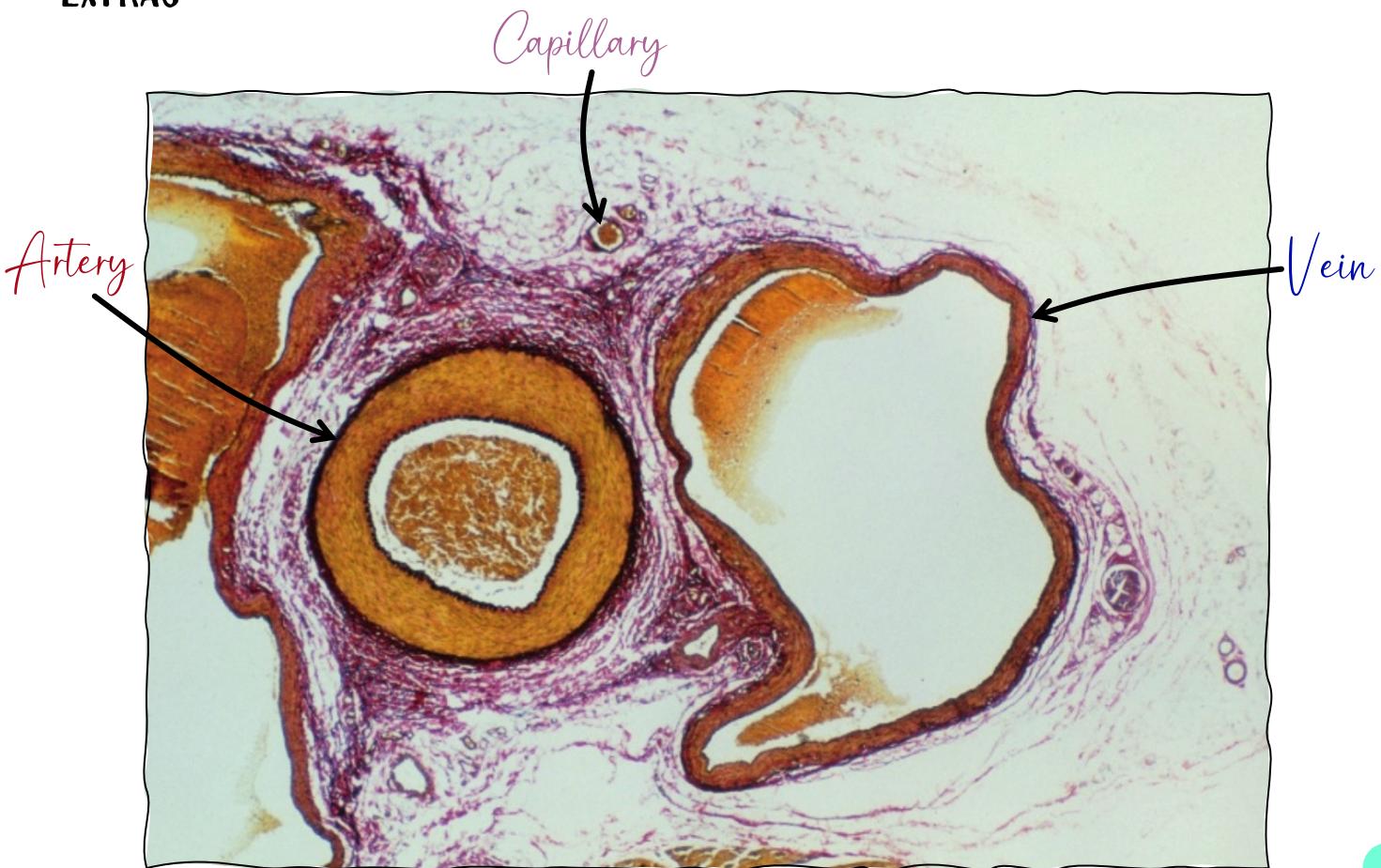
the evaporation of water through an open stomata

1. Water uptake occurs at the root.
2. Water enters the xylem & moves up the xylem
3. Water moves from the xylem to leaf cells.
4. Water evaporates into empty spaces in the leaves.
5. Water transpires out of stomata into the air.

How?

The negative pressure created by the water transpired pulls water up the xylem: with the help of the **COHESIVE** and **ADHESIVE** properties of water (learned in A1.1)

EXTRAS



Real image of an artery, vein and capillary (under the microscope)



Notes

1. **What is the primary purpose of the study?** The study aims to evaluate the effectiveness of a new treatment for hypertension in a diverse population.