ARTERIES

Arteries carry blood \underline{\underline{\text{through}}} the heart. They have \underline{\underline{\text{elastic}}} walls composed of distinct layers. The outer and inner layers are primarily \underline{\underline{\text{muscle}}} tissue while the middle layers are made of \underline{\underline{\text{elastic}}} tissue, fibers and elastic connective tissue. Every time the heart contracts, \underline{\underline{\text{blood}} \underline{\underline{\text{surges}}} \underline{\underline{\text{from} \underline{\underline{\text{the} \underline{\underline{\text{heart}}}}}}} \underline{\underline{\text{and enters}}} \underline{\underline{\text{the}}} \underline{\underline{\text{arteries}}}}. The arteries \underline{\underline{\text{expand}}} to accommodate the blood. The \underline{\underline{\text{pulse}}} you can feel near your wrist and on either side of your neck is created by changes in the \underline{\underline{\text{artery}} \underline{\underline{\text{walls}}} \underline{\underline{\text{following} \underline{\underline{\text{heart} \underline{\underline{\text{contraction}}}}}}}}. Heart contractions are followed by a \underline{\underline{\text{filling}}} phase. During this phase, \underline{\underline{\text{blood}} \underline{\underline{\text{pressure}}}} drops and elastic fibers in the walls of the artery \underline{\underline{\text{recoil}}}.

A birth defect of injury can cause the inner wall of the artery to bulge. Known as an \underline{\underline{\text{aneurysm}}}, this condition is infrequent in young people but can lead to serious problems for those who have the condition. The weakened segment of the artery \underline{\underline{\text{weakens}} \underline{\underline{\text{as} \underline{\underline{\text{blood}} \underline{\underline{\text{pulses}}} \underline{\underline{\text{through}}}}}}}. A weakened artery in the \underline{\underline{\text{heart}} \underline{\underline{\text{is}}} \underline{\underline{\text{one of the conditions that can lead to a}}} \underline{\underline{\text{stroke}}} \underline{\underline{\text{or} \underline{\underline{\text{heart} \underline{\underline{\text{attack}}}}}}}}.

Blood from the arteries passes into smaller arteries called \underline{\underline{\text{arterioles}}}. The diameter of arterioles is controlled by the \underline{\underline{\text{nervous}} \underline{\underline{\text{nerves}}} \underline{\underline{\text{from}}} \underline{\underline{\text{the}}} \underline{\underline{\text{nervous}} \underline{\underline{\text{system}}}}}. A nerve impulse causes \underline{\underline{\text{muscle}}} \underline{\underline{\text{in} \underline{\underline{\text{the} \underline{\underline{\text{arterioles}}}}}}} \underline{\underline{\text{to}} \underline{\underline{\text{contract}}} \underline{\underline{\text{and it decreases blood flow}}} \underline{\underline{\text{to}}} \underline{\underline{\text{the}}} \underline{\underline{\text{tissues}}} \underline{\underline{\text{area}}}}}. Relaxation of the muscle causes dilation and blood flow increases. This process, called \underline{\underline{\text{vasodilation}}}, increases delivery of blood to tissues.

- EXAMINE FIG. 1 AND NOTE THE DIFFERENT SHAPES OF THE ARTERY (RIGHT) AND VEIN (LEFT)

FAT IN THE ARTERIES

As fat droplets grow into larger and larger blockages, they slowly close off the opening of the blood vessel. \underline{\underline{\text{Calcium}} \underline{\underline{\text{and} \underline{\underline{\text{other} \underline{\underline{\text{minerals}}}}}} \underline{\underline{\text{deposit}} \underline{\underline{\text{on} \underline{\underline{\text{top} \underline{\underline{\text{of}} \underline{\underline{\text{the} \underline{\underline{\text{lipid}}}}}}}}}}} \underline{\underline{\text{forming a net of}}} \underline{\underline{\text{calcification}}}}. This condition is known as \underline{\underline{\text{atherosclerosis}}}, the most common of a group of disorders known as \underline{\underline{\text{atherosclerotic}}}. Blood \underline{\underline{\text{clot}} \underline{\underline{\text{also}}} \underline{\underline{\text{form}} \underline{\underline{\text{around}}} \underline{\underline{\text{the} \underline{\underline{\text{fat}} \underline{\underline{\text{deposits}}}}}}}}. Inadequate amounts of blood and \underline{\underline{\text{oxygen}} \underline{\underline{\text{are}} \underline{\underline{\text{delivered}}} \underline{\underline{\text{to}}} \underline{\underline{\text{the} \underline{\underline{\text{heart} \underline{\underline{\text{muscle}}}}}}}}}, resulting in \underline{\underline{\text{ischemia}}}.

- EXAMINE FIG. 2 AND NOTE THE DIFFERENCE IN THE ARTERY WITH Atherosclerosis
CAPILLARIES

Capillaries, composed of a __________ layer of cells, are the sites of _______ and ______ exchange between ___________ and body cells. No cell is further than _______ cells away from a capillary. The diameter is so small that _______ blood cells must pass in single file. Capillary walls are so thin that they may be easily damaged by _______ blood pressure or any _______ such as a punch. __________ occurs when blood rushes into spaces between tissues.

__________ diffuses from the blood into surrounding tissues through the thin walls of the ____________ into the body cells. De-oxygenated blood collects in small veins called ________________ and is carried back to the heart.

- EXAMINE FIG. 3 AND NOTE THE RBC’S MOVING THROUGH A CAPILLARY

VEINS

Capillaries merge and become larger vessels, called ___________. These merge into veins which have greater diameter. Blood pressure is _______ (low? high?) in the veins. This pressure is not enough to drive the blood back to the _________.

William ____________ conducted experiments to determine how the blood gets back to the heart. He created bulges by pressing on the veins and discovered the existence of ____________. The valves open in one direction, steering blood toward the heart. They do not allow blood back in the other direction. This keeps blood moving toward the heart and not back into the lower limbs.

__________ muscles also aid in venous blood flow. Venous pressure increases when the muscles ____________. This helps push blood in veins back to the heart.

- EXAMINE FIG. 4 AND NOTE THE OPENING AND CLOSING OF VENOUS VALVES