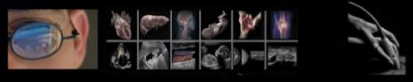

BEFORE WE BEGIN… AND FOREVER AFTER WE DEPART….

1. Blood vessels are just **tubes** (and round for a reason). Thus, **they're open on both ends**.
2. Liquid blood is as **incompressible as steel**. Thus, in a tube full of blood, **if you push against one end, the fluid on the other end (and all in between) moves**.
3. Blood does not flow simply because the heart pushes it. In reality, the heart **energizes** the blood within it and **then displaces it** (from the left ventricle) into the aorta and thus all branches. It is this energy (we call ***pressure***) that the blood uses to make its way throughout the arterial tree, down to—**and through—the capillaries** and back through the veins.
4. Every **segment** of each artery or vein has a name, even though the vessel is simply part of a **continuum**. Each named segment has some precise value to the clinician charged with managing the patient's condition.
5. The large vessels convey blood into and out of the capillaries, the most important vessels of all. It is here that nutritional support to the cells takes place, and flow through the capillary depends on a **high enough pressure coming in** (from the arterial supply side) and a **low enough pressure on the venous drain side** to let it out.
6. The heart usually **produces enough pressure to drive blood into all capillaries**, provided there's no process **to cause blood pressure to drop along the way**. It is the goal of the vascular diagnostic exam to identify **whether and where some such process might be found**.
7. Our priority is to **uncover and localize any narrowing along the course of the arterial network**. This can take on the form of a **localized, tight stricture** and/or **multiple lesser degrees of narrowing all along the course of the vessel.** Either of these causes a **theft of blood pressure energy** at each site, proportionate to the degree of stricture and/or the

numbers of them along the way. We use motion-tracking ultrasound (Doppler) to measure the **features of blood flow** all along a vessel of interest. Changes in arterial blood velocity from point to point and moment to moment all feed into the diagnosis of vascular disease. We need to simply chart this information from multiple points along the tube.

8. By judging the **fact and degree of change in blood velocity** from point-to-point we can detect and classify **severity** of arterial vascular obstruction. In many (but not all) cases, the ultrasound image can reveal the obstruction at the site and we can measure the degree of stricture for the purpose of clarifying the cause of the blood velocity disturbance. Fortunately, when technical findings are clear, the image and blood-velocity findings provide credible evidence of disease that thus warrants further documentation with an eye toward **timing intervention**.
9. For the last half-century, other **simpler physiologic tests have also shown powerful contribution in shaping the patient's arterial vascular diagnosis**. They will be discussed in the framework of our Course.
10. Venous vascular diagnosis is also important, as it is **critical that blood can freely flow out of a capillary, to permit fresh arterial blood to flow in** and thus continually bathe the tissue's cells. To this end, we use imaging and Doppler ultrasound to detect **thrombosis** of main drain veins and/or **venous valvular leakage which can constipate the usually low-pressure drain system**.

The concept of vascular diagnosis involves a broad list of test protocols, each targeting a specific element of dysfunction. Thus, many tests are involved in the step-by-step evaluation of circulatory problems. In the United States reimbursement is set for each of these specific tests; thus, the clinician must be proficient in following the many standardized protocols whose specific steps have now been standardized. Fortunately, none of the tests—or the integration of their unique findings—is secret. Anyone can master them.

-These are the untold secrets lying beneath vascular ultrasound testing-