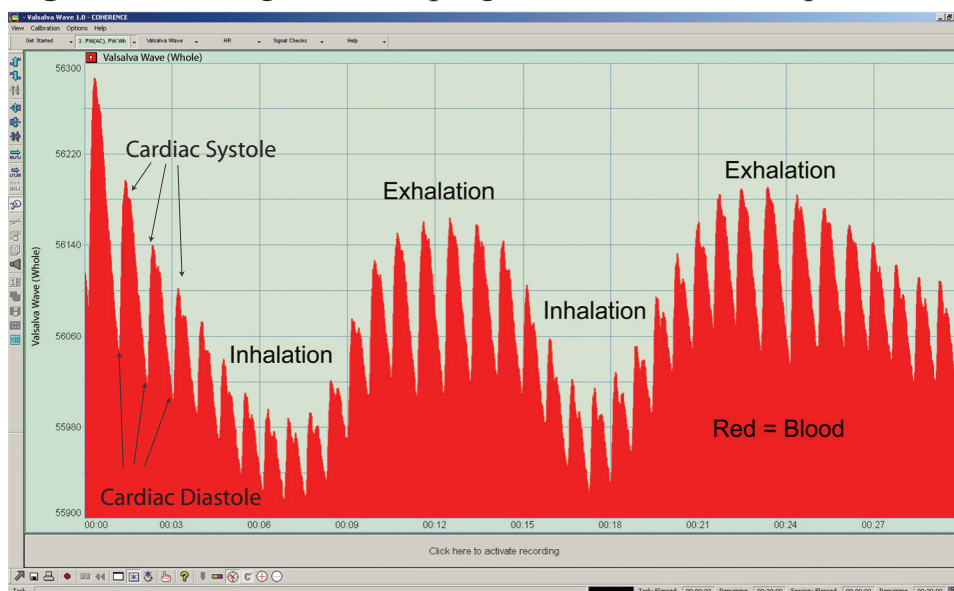


Hello all,

Welcome to the July **COHERENCE Newsletter**. This month I'm excited to share with you another biometric that we're able to observe with **Valsalva Wave**, the new **COHERENCE** instrument that I'm planning to release later this summer. I'm presently calling this biometric the "*whole* Valsalva Wave", *whole* because it provides us with a much more complete view of what the blood is doing, including respiratory, heart beat, and vascular components. I hope you enjoyed last month's newsletter, **Six Breaths - Six Bridges**. "Six Bridges" is the progressive relaxation aspect of the **Coherent Breathing** method involving relaxation of certain "trigger zones" or *bridges*. Stephen Michael Hawley and I are currently working on a new CD that guides one through the formal **Six Bridges** exercise. We also hope to have it available before summer's end.

The graphic to the right depicts blood rising and falling in the left index finger during Coherent Breathing as captured by the **Valsalva Wave** instrument.

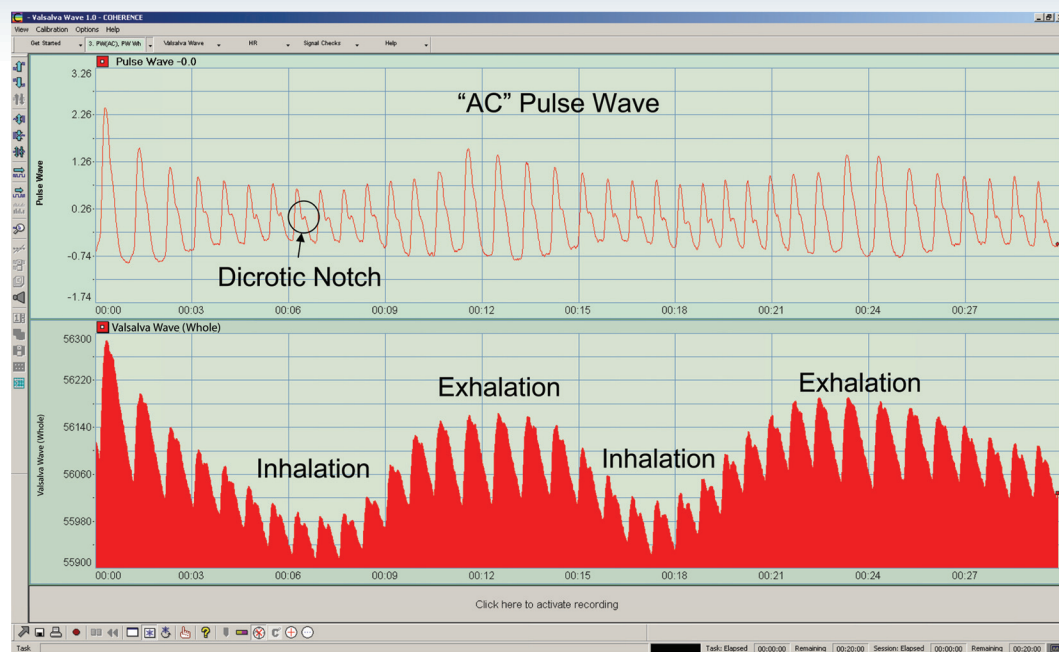


The "Whole" Valsalva Wave (During Coherent Breathing)

The large waves are a function of respiration. The shorter waves riding on the respiratory waves are the heart beats or "pulses", their peaks being the cardiac systole, their valleys, the cardiac diastole. As the respiratory wave crests during exhalation, the amplitude of pulses increase and heart rate slows; as the respiratory wave troughs during inhalation, pulse amplitude decreases and heart rate increases. The larger pulses, riding atop the respiratory wave carry more blood and are a function of increased heart output coincident with increased pulmonary output during exhalation. The smaller pulses resting in the trough are a consequence of decreased heart output coincident with decreased pulmonary output during inhalation.

The **Valsalva Wave** instrument employs an optical DC plethysmograph. You've probably heard me use this term before in previous newsletters. For our purposes, a plethysmograph allows us to observe the action of the blood noninvasively in a specific body part, for example the finger, thumb, earlobe, etc. The "DC" (direct current) plethysmograph is designed to capture a wide frequency spectrum, allowing us to see blood phenomena that are rapid, for example the heart beat, as well as actions that are much slower, specifically blood phenomena relating to respiration. We can use this information to further our understanding of how the body works, and for *biofeedback*, in this case training of the Valsalva Wave.

The conventional plethysmographic device is “AC”, standing for “alternating current”. Basically this means that the raw signal is filtered to exclude everything but the relatively rapid heart beat. The AC plethysmograph is the basis of all heart rate variability instruments that we’re familiar with where it has been used as the principal means of detecting the heart beat and *pulse wave*. Once detected, the interval between beats can be measured and when divided into 60 seconds yields the instantaneous heart beat rate in the familiar “beats per minute”. From this, the heart rate variability (HRV) graph is plotted. (See my May 2009 Newsletter.)



“AC” Pulsewave and “DC” Valsalva Wave During Coherent Breathing

The figure above presents simultaneous “AC” pulse wave and “DC” Valsalva Wave views. The AC pulse wave contains much of the information contained in the Valsalva Wave including inter beat interval, pulse amplitude, and the dicrotic notch (a function of arterial compliance/elasticity and autonomic governance of arterial dimensions). However, you can see what happens once the signal is “filtered” - it loses its overall context, i.e., the fact that the pulse rides on the *variable* surface of the blood, much as waves ride on the surface of the ocean. Referring to the Valsalva Wave (bottom graph), we can clearly see *pulse amplitude* rising and falling as well as *pulse rate* decreasing and increasing, as a function of blood volume rising and falling. This is perfectly consistent with the current understanding of the “thoracic pump” and of the elegant coordination that exists between respiration, the heart, and autonomic governance of blood flow and pressure.

I’m particularly excited about this *whole Valsalva Wave*. I believe it represents a key advancement in our understanding of the subtle mechanics of cardiopulmonary resonance as well as providing a compelling new biometric for feedback purposes. Its interesting to note that this “whole Valsalva Wave” is the blood aspect of the “pulse” that acupuncturists assess at the wrist when “taking the pulse” (recognizing that there is also an energy aspect). Next month, we’ll talk more about this and compare the *whole Valsalva Wave* of an untrained subject before and during Coherent Breathing.

Thank you for your interest and consideration,

Stephen Elliott, COHERENCE