~Coherent Breathing~

A Synopsis

Stephen Elliott – President & Life Scientist, COHERENCE

Introduction:

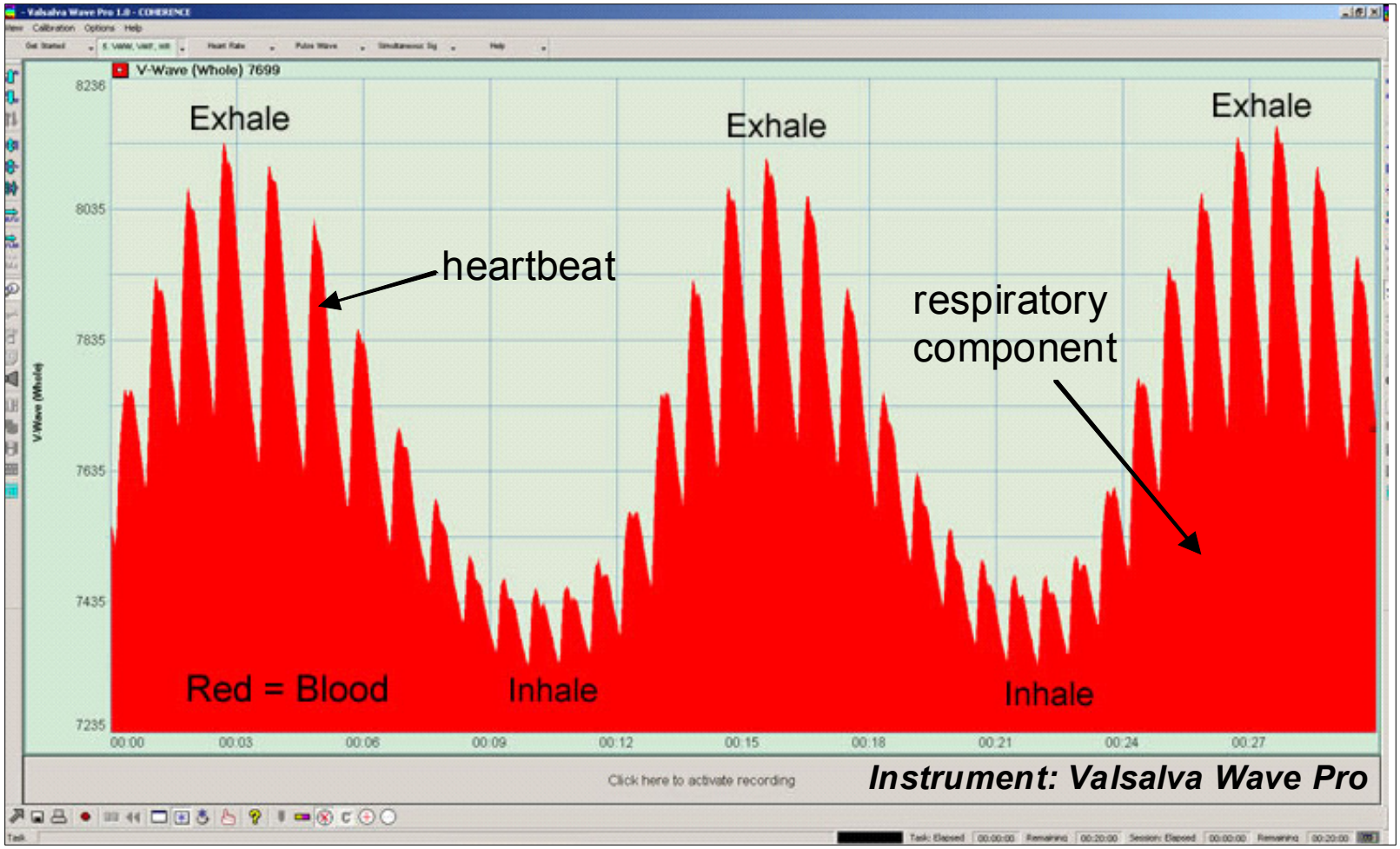
1. Coherent Breathing is used by 10s of thousands of users across 30+ countries.
2. It is employed for mitigation of many maladies including anxiety, depression, sleep dysfunction, ADD/ADHD, fibromyalgia, and hypertension, as well as optimal performance including dance, martial arts, sports, yoga, and meditation.
3. Elliott believes that its advantages accrue primarily from optimal circulation and its result, balanced blood flow, enhanced vitality at the cellular level, and optimal autonomic nervous system functioning.
4. The physiological effects of Coherent Breathing can be easily observed in EEG, EKG, EMG, hand temperature & skin conductivity.
5. Elliott also asserts that breathing poorly shortens the healthful life of the heart – by increasing its circulatory burden.

Coherent Breathing Defined:

1. Breathing at the nominal rate of 5 breaths/minute with commensurate depth
2. Equal periods of inhalation and exhalation
3. Conscious relaxation of “bridges” during exhalation
4. Practice this for 20 minutes/day for 21 days
5. Goal: Learn to breathe “coherently” all the time circumstances permitting.

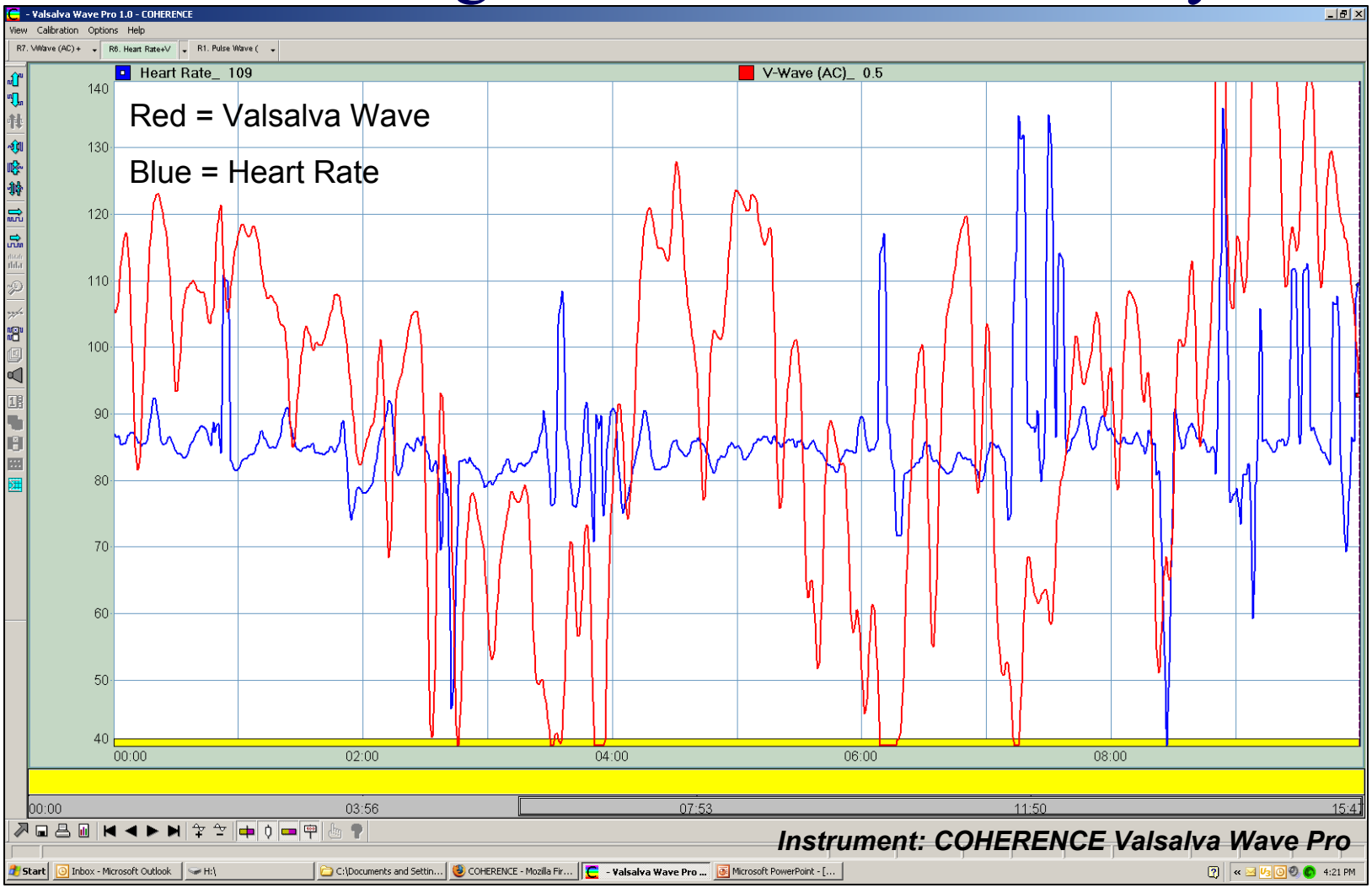
The practice of Coherent Breathing is supported by numerous products including Valsalva Wave Pro and BreatheHeart, state of the art biofeedback instruments.

Coherent Breathing Elicits The Valsalva Wave



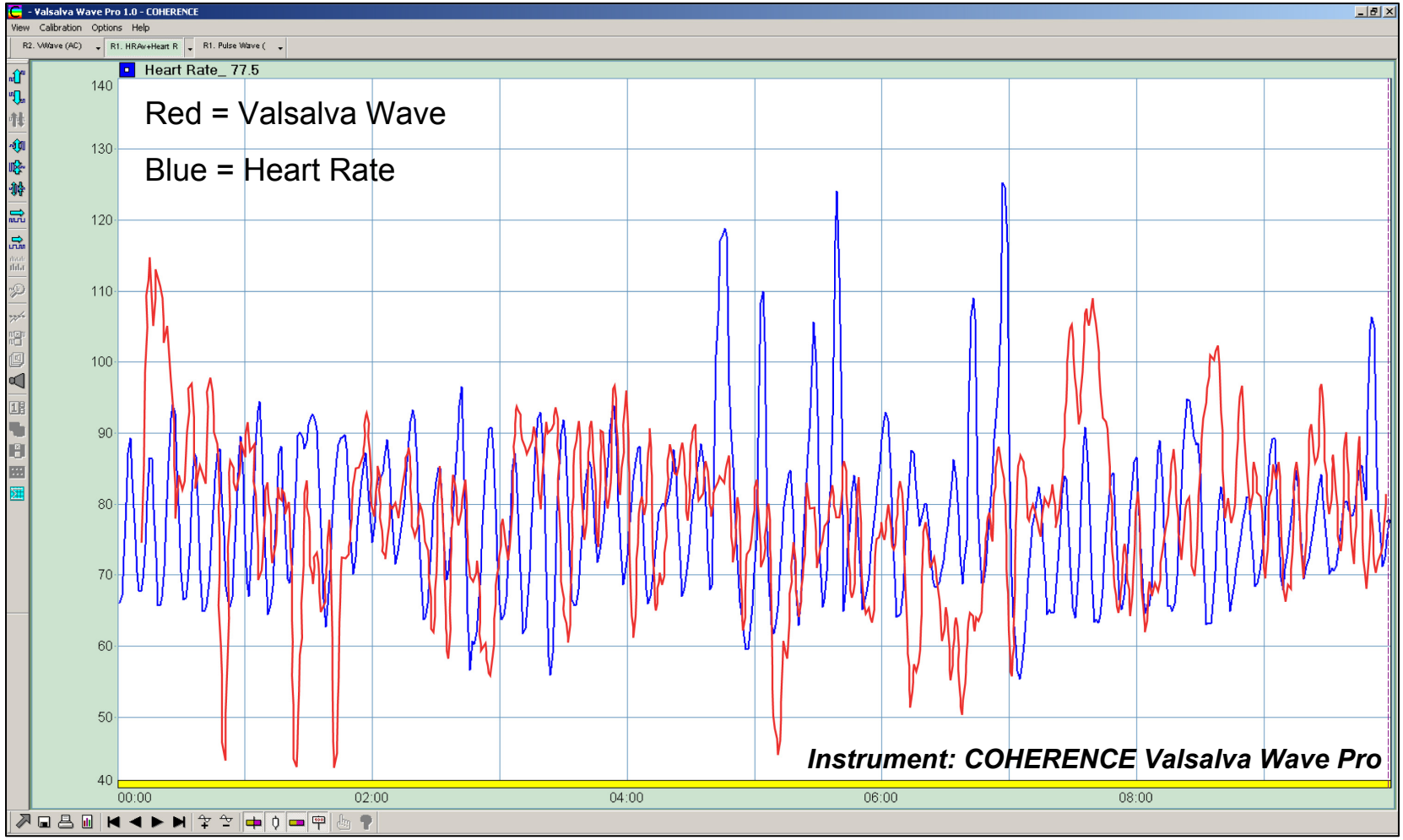
The Valsalva Wave rises in the arterial tree during exhalation and rises in the venous tree during inhalation. The slow component is the respiratory component, the faster one is the heartbeat.

Coherent Breathing & Heart Rate Variability



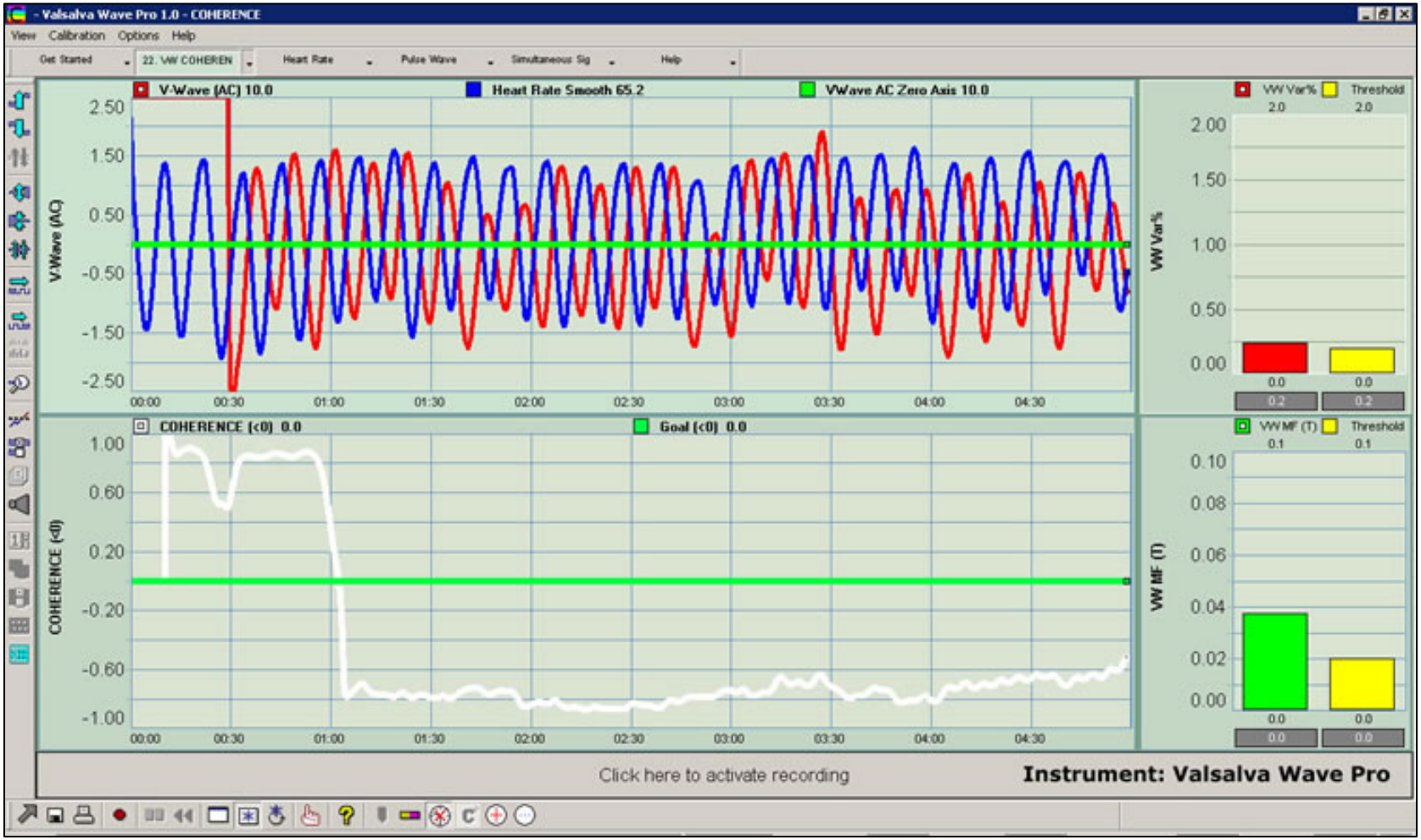
The heart beat synchronizes with respiration – here they appear asynchronous and chaotic. This client is anxious and is breathing rapidly with neither depth or regularity (not atypical of the normal adult). This was recorded during the 1st session.

Coherent Breathing & Heart Rate Variability



Same client, 3rd Coherent Breathing session. Client expressed feelings of calm, comfort, light-heartedness, and greater ability to cope.

When Breathing Is “Perfectly” Coherent...

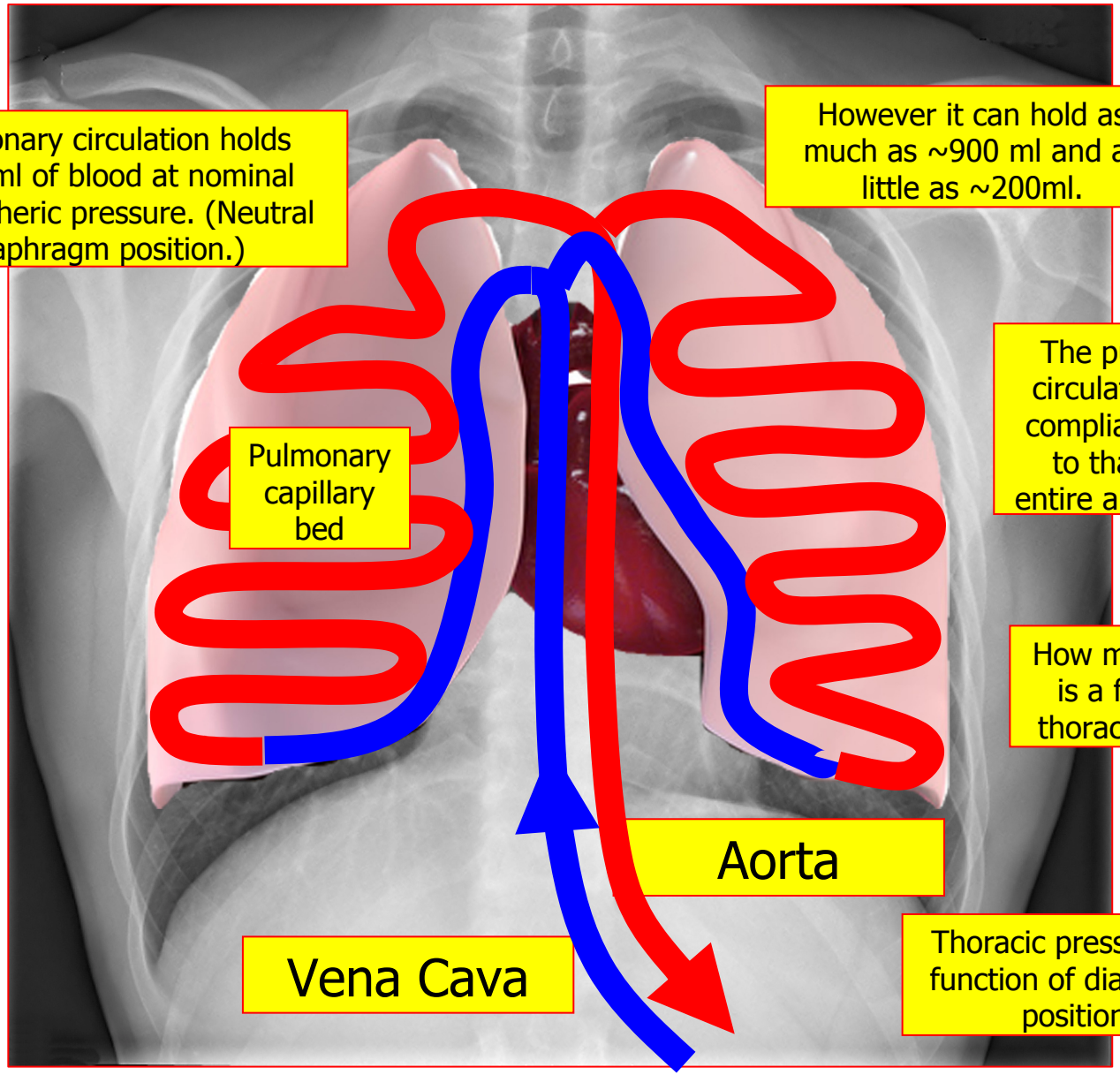


When breathing is “perfectly” coherent, heart rate phase locks with the Valsalva Wave. The “Coherence Curve” (phase correlation between the two) approaches -1.

Elliott's Thesis:

1. The Valsalva Wave (and related blood flow and pressure) is the primary impetus for the phenomenon of breathing induced Heart Rate Variability (via baroreceptors).
2. Variability of the heart rate relates highly to health and well-being. Diminished HRV relates highly with morbidity and mortality risk.
3. Why? Elliott asserts that breathing plays a critical role in circulation, ushering oxygenated blood to the extremities during exhalation and venous blood to the lungs during inhalation.
4. How? Via the action of the thoracic pump which plays a critical role in moving blood. It is the means by which artificial respiration keeps us alive even when the heart has stopped.

The Thoracic Pump



Pulmonary circulation holds ~450ml of blood at nominal atmospheric pressure. (Neutral diaphragm position.)

However it can hold as much as ~900 ml and as little as ~200ml.

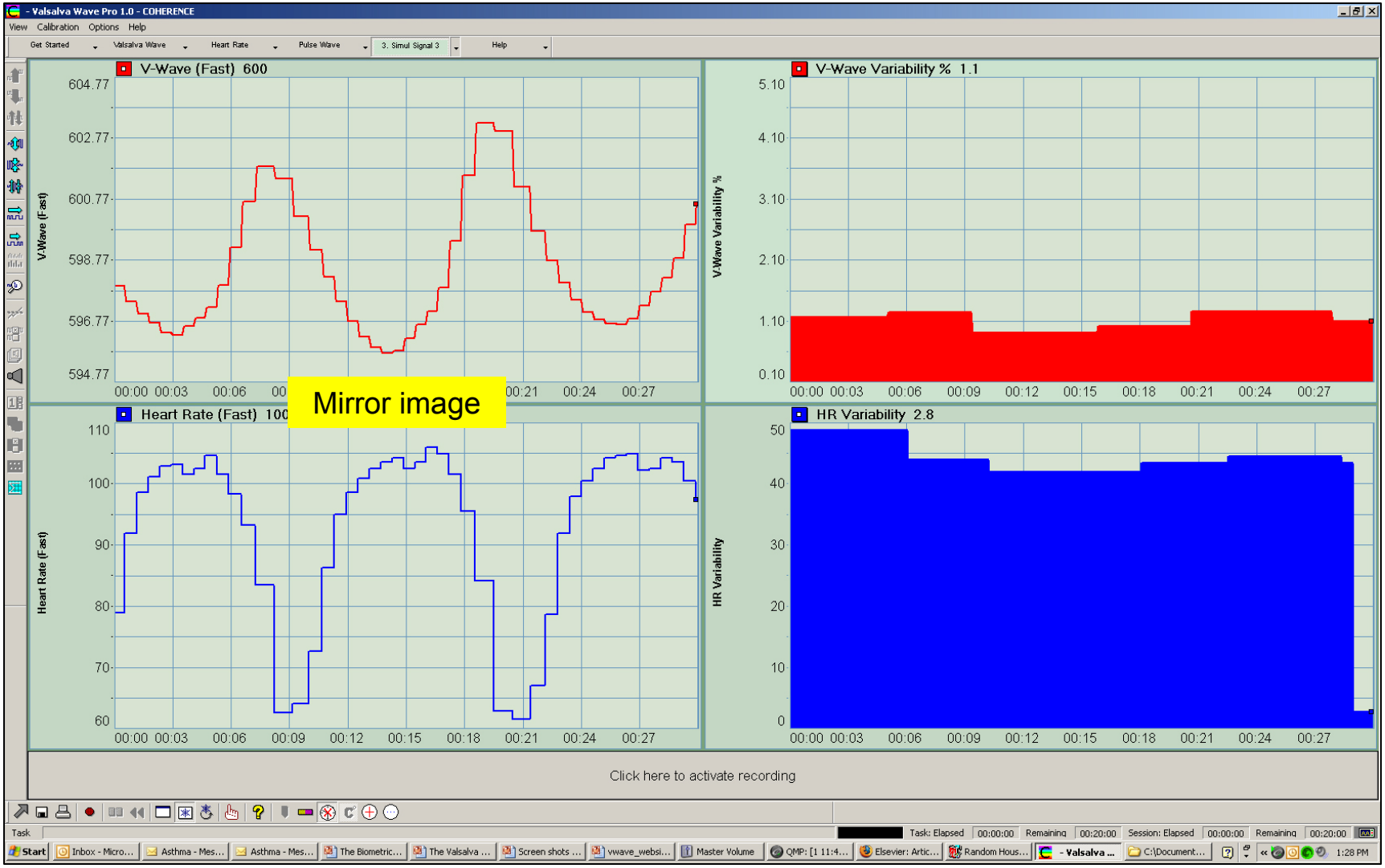
The pulmonary circulation has a compliance equal to that of the entire arterial tree.

How much it holds is a function of thoracic pressure.

Thoracic pressure is a function of diaphragm position.

anatomy is simplified for purposes of illustration

HRV Mirrors The Valsalva Wave



Heart rate mirrors the Valsalva Wave when breathing coherently.

Summary:

1. The typical adult breathes at a rate of 17-19 breaths per minute, employing 5-10% of diaphragm range. This defeats any circulatory contribution that the thoracic pump might make, hence the full burden of circulation falls on the heart.

2. In the absence of effective breathing, the autonomic nervous system must insure that blood in the arterial and venous trees is equal. It does this through micromanaging the heart and vascular system. This can be seen in instantaneous heart rate and blood volume.

3. When we breathe “coherently”, the action of the diaphragm, a large strong muscle, contributes substantially to blood flow and pressure. Under these conditions, the heart synchronizes with breathing, heart rate rising during inhalation and falling during exhalation.

~ The End ~

Thank you for your interest.

Stephen Elliott – President & Life Scientist, COHERENCE