Dear Reader,

Welcome to the October edition of the ***COHERENCE Newsletter***. This month, I'm pleased to share with you Phase 2 of a study that Dee Edmonson and I are conducting. But first, I'd like to make you aware that COHERENCE is offering a 20% discount on most everything between now and January 10, 2009. To avail yourself of this discount, input the coupon code "COHERENCE" on the order form at checkout. You have to know the code to get the discount, so if you know anyone that would like to take advantage of this holiday offer, please forward on. **Thank you for your support!**

The study at hand focuses on the relationship between blood pressure and heart rate variability amplitude. It aims to test the thesis that relatively high blood pressure and relatively high heart rate variability amplitude (HRV) are mutually exclusive, that they cannot co-exist. The reasoning is that in order for the heart rate variability cycle to be high, the vascular system must be relaxed. And when the vascular system is relaxed, blood pressure cannot be high. Make sense?

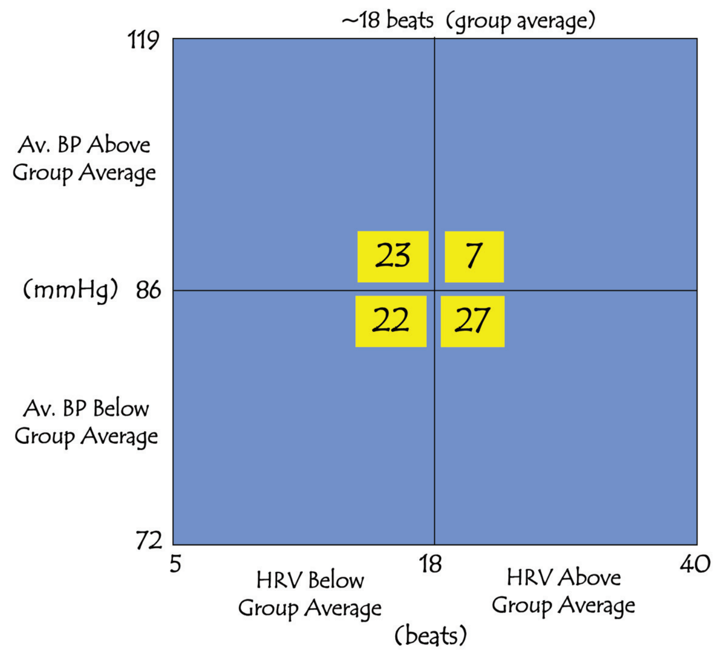

Fig. 1 - Four Quadrant Analysis of BP vs. HRV Amplitude

So, the study aims to correlate "average blood pressure" with heart rate variability amplitude, the degree to which the heart beat rate changes. Average blood pressure is defined as [(systolic pressure + diastolic pressure)/2]. Why use "average" blood pressure? Because we believe it to be the most useful general measure of arterial pressure and that it effectively captures the functional relationship between arterial pressure and heart rate variability amplitude.

The study has been underway for going-on 2 years. Phase 1 results were presented in *Coherent Breathing - The Definitive Method*. At that time, the study included 15 subjects and 42 assessments. As of Phase 2, the study includes 28 subjects and 79 assessments. All of the participants are adults or young adults. Our goal is to reach 100 clients and 300 assessments. (For a more complete treatment of the study than is possible here, please refer to *Coherent Breathing - The Definitive Method*.)

Figure 1 (previous page) offers a simple high level analysis of the Phase 2 data, placing each assessment into one of four categories. The average average blood pressure of the group is 86mmHg. The average HRV amplitude of the group is 18 beats. Here we can see that we have 30 (23+7) instances where blood pressure is the above the group average (>86mmHg). 77% of those instances occur when HRV amplitude is below the group average of 18 beats; 23% occur when HRV amplitude is above group average. Figure 1 gives us a "sense" of the blood pressure/HRV relationship.

Let's zoom in a bit closer. Figure 2 presents a scatter plot of the same data. In the absence of a good statistical analysis (which we eventually intend), this gives us a pretty good view of whats happening.

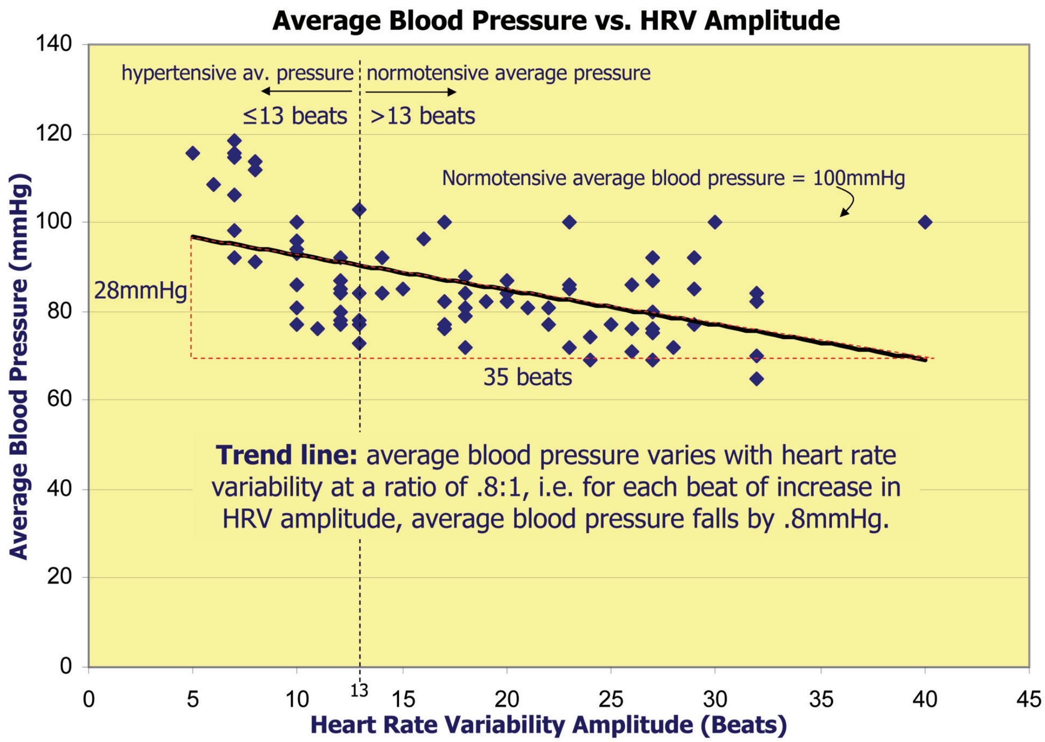

Fig. 2 - Scatter Plot of Average Blood Pressure vs. HRV Amplitude

While there are many implications of this data, let's focus on a couple. If we say that normotensive pressure is below 100mmHg, [(120+80)/2] = 100, and hypertensive (or pre-hypertensive) pressure is greater than 100mmHg, then we see that all (9) of the instances of hypertensive pressure occur when HRV amplitude is 13 beats or less. Secondly, there are zero instances where blood pressure *exceeds* 100mmHg when HRV amplitude is above 13 beats. (There are four instances that fall exactly on the line. In *Coherent Breathing - The Definitive Method*, we theorize that this is because slower, deeper, more synchronous breathing actually elevates arterial pressure somewhat.)

If we examine the trend line, we see that it exhibits a slope of approximately .8mmHg/beat (28mmHg/35 beats). In other words, across this data, 1 beat of HRV amplitude correlates with .8mmHg average blood pressure. In summary (although preliminary), it appears clear that: a) higher blood pressure relates to lower HRV amplitude, and that, b) higher HRV amplitude relates to lower blood pressure.

This is summarized by Figure 3, which clearly demarcates the 100mmHg average blood pressure boundary. The overall numbers are also a little easier to see here. From this we can see there are no instances (0/47) where HRV amplitude is above 13 beats and average blood pressure is above 100mmHg. Below 13 beats of HRV amplitude, 9/32 or 28% of instances are above 100mmHg.

I find the "23" instances in the lower left category to be of particular interest. These 23 demonstrate an average arterial pressure lower than 100mmHg and an average HRV amplitude lower than 13 beats. So it is clearly possible to have relatively low HRV amplitude AND relatively low blood pressure. This seems to indicate that the relationship between HRV amplitude and blood pressure is not acute. In other words, if we were to facilitate a short term reduction in HRV amplitude, we would not expect it to result in a dramatic short term rise in blood pressure.

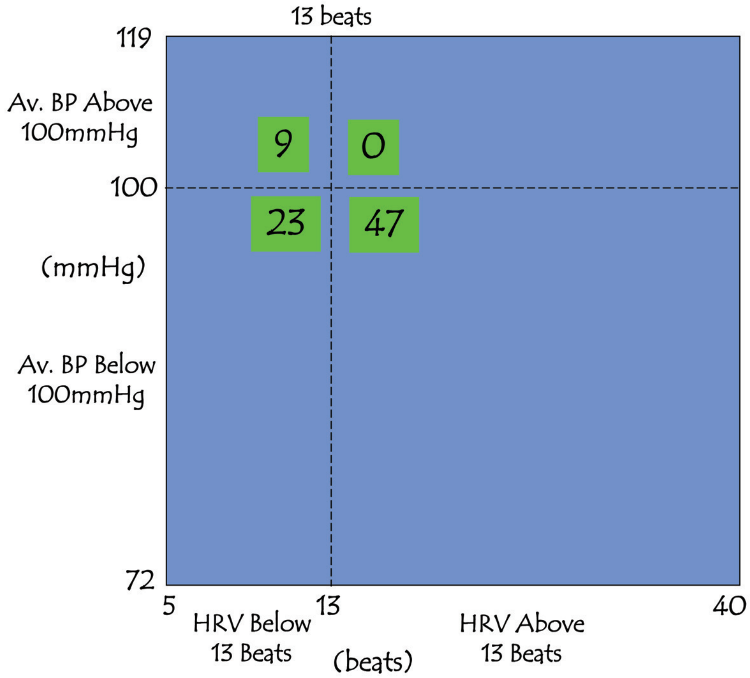

Fig. 3 - Four Quadrant Analysis of BP vs. HRV Amplitude

However, I anticipate that we will find that a longer term relationship exists. That in time, low HRV amplitude results in elevated arterial pressure. The mechanism by which this might occur is not entirely clear. I suspect that it will be found to be the combination of low HRV amplitude (as a consequence of relatively rapid shallow respiration) AND reduced arterial capacity as a function of longer term systemic tension - that when both are true, the autonomic nervous system attempts to increase blood flow by increasing arterial pressure, this resulting in hypertension. Time will tell.

As a secondary part of this same study, we also collected "before and after" data for each assessment. Here we measured the client's blood pressure before and after 8-12 minutes of Coherent Breathing. I hope to share this information with you next month.

Until then, thank you for your interest and consideration.

Stephen Elliott
COHERENCE