

**Research project: The Effect of Triathlon Training on Resting Heart Rates With Aging.** By Bill Gaertner, MD, MS; Email: bgaertner@sbcglobal.net.

**Introduction:** As a Family Physician (scientist) & fellow age-group triathlete for 35+ years, I would like to invite you (& one of your family or friends if they want to be in the control group) to participate in a brief, non-invasive research project that I have been wanting to investigate for the past several years.

**What I'm asking:** If you volunteer to join my study, you will learn how fit your heart & lungs are & possibly contribute to the advancement of sports medicine as it applies to triathletes. Baring a friendly side-conversation your participation will only take 1-2 min., is totally anonymous & 100% painless.

I would like about 100 volunteer triathletes to answer questions about **how long**, (in approximate **years** of training) & how hard (in approximate **hrs./wk.**) they train; then ask & record your age, & gender. Your name will not be needed.

Then I'd like to place a small hand-held **Pulse Oximeter** (ZacUrate 500DL) on your index finger to measure 1. Your **Resting Heart Rate (RHR)** & 2. The % of hemoglobin in your red blood cells (RBC's) that is **oxygenated (O2 % Saturation)**. A pulse oximeter works by passing a beam of red & one of infrared light through the pulsating capillary bed of your finger & then measures the amount of red & infrared light emerging at the sensor opposite the 2 lights. A miniature high-tech device.

Trust me, only the light will enter your skin, & you will not feel anything besides the gentle pressure of the device on your finger. Pulse oximeters of non-medical grade (for sports) are built into many smart phones & can be purchased at many drug stores for about \$50.00 or online for < \$20. They are a great way to track your Cardio-Respiratory (C-R) fitness level over time. My ZacUrate 500DL cost \$18.95 from Amazon, & it accurately displays the results (RHR & O2%) in a few sec.

**What we already know about this subject:** Regular Physical Activity (RPA) strengthens both skeletal & heart (cardiac) muscles. As the heart muscle (like skeletal muscle) gets bigger, stronger & more efficient through training, it doesn't have to beat as fast (work as hard) when we are sitting & resting. This allows the measurement of the RHR to be an excellent proxy for C-R fitness. **The fitter the**

**person, the slower the RHR & higher the O<sub>2</sub> & visa-versa.** (Assuming the subject is truly relaxed & that no chemicals/medications, esp. Beta-blockers or stimulants, are affecting the normal RHR.)

We also know that the average (RHR) does get a little faster with age, reflecting the normal effect of age (& accumulated lifestyle habits) on every other organ in the body. (It is accepted in the sports medicine world that skeletal muscle gets weaker at about ½% per yr. from approximately age 30 to 70 (a 20% decline in those 40 yrs.), & then at 1%/yr. after age 70 (another 20% decline for the 20 yrs. from 70 - 90 ) This weakening of skeletal muscle with age even gets called a fancy medical name: **Sarcopenia**. That's why USA Triathlon uses 5-year age groups!

**Goal of this research project:** To test the hypotheses that: **long-term, consistent triathlon training allows cardiac muscle to lose its efficiency at a significantly slower rate than skeletal muscle (& slower than the cardiac muscle of people who don't train as endurance athletes do), as we age.** I hope to answer the question: Is the 75 Y/O triathlete's heart almost as fit & strong (young at heart!) as the 25 Y/O's, if they both work out approximately the same number of hrs./week?

If we find out that this is true, not only would it be reassuring to us senior endurance athletes, but it might allow us elderly triathletes to donate our hearts to younger recipients when we pass on. (A secondary question would be is there any gender difference in this process, i.e. are men's hearts as "good" as women's?)

**You may be asking?:** Will I get to see the results of the study? **Answer:** I will do my best to compile these results in a somewhat scientific, yet readable manner to present in one or more of the USAT publications for all to read. I'm also working on getting one of the local colleges to take this on for one of their students or faculty.

**Interpretation of RHR's:** Most authorities say that the average RHR (barring excitement or medications) is anywhere between 60 & 100 beats per min., but to be more precise for fitness, I've always said the average is **72 bpm for men, & 76 bpm for women.** (This difference is largely due to the gender difference in the size of hearts. Men's hearts are bigger, thus don't have to beat as fast as a woman's! Both slow down when one takes a slow, deep relaxing breathe.

When evaluating fitness, it's safe to say that any RHR below the average for gender, is fit, the lower the better. Likewise, any RHR above the average for gender, is unfit, the higher the worse. (You want to save as many heart beats as you can for later life!)

For ease of remembrance, most sport's medicine people would say that RHR's in the **70's are average; 60's are fit; 50's are very fit; & 40's are world class!** On the other hand, 80's are not so fit, 90's definitely not fit, & >100 RELAX (but see your MD if you're consistently running >90bpm)!

**Oxygen %:** The average for non-smokers is 95-97% with 98% or 99% seen in more fit people. (Tobacco gives you look a mistakenly good O2 % reading because carbon monoxide (CO) binds to hemoglobin in RBC's even more strongly than oxygen (a half-life of > 5 hours). This creates an even brighter red color in hemoglobin than does oxygen, & the Pulse Oximeter gets fooled. Tobacco users are politely rejected from the study, as are people taking beta-blockers or other drugs that impact the RHR.

Thanks for being such a good sport & helping with my project.

Sincerely, Bill Gaertner. MD, MS