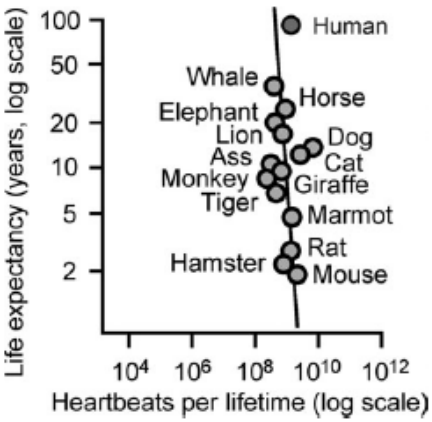
# AFFAIRS OF THE HEART
## Why slow is better.

It's a remarkable fact that on average the number of heart beats in an animal's lifetime is virtually the same for all mammals – except humans.

Take blue whales, for example, whose hearts weigh 600*kg* and pump 350*l* of blood per beat. Whales have very slow resting heart rates, about 20 beats per minute, and live for roughly 60 years. So in its lifetime a blue whale's heart beats $20 \times 60 \times 24 \times 365 \times 60 \approx$ 600 million times. Shrews, on the other hand, have tiny hearts which weigh only 2*g* and pump only 1,2 micro-litres per beat – no more than a drop of blood per beat! Shrews have resting heart rates of almost 1000 per minute, and live for only a year; so in its short life a shrew's heart beats $1000 \times 60 \times 24 \times 365 \times 1 \approx$ 500 million times – almost the same number of beats in one year as the blue whale's in 60 years. Remarkable!

This average, of about 600 million heart beats per lifetime, applies to almost all mammal species, in spite of a 60-fold variation in life expectancy and a 500 million-fold variation in body weight. The only exception is man. Human hearts beat on average about 3000 million times per lifetime ─ about six times more than our fellow mammals.




Human life expectancy is thus greater than we would predict from our resting heart rates. How has this happened? Advances in science, medicine and sociology may account for some of the difference, although these advances are relatively recent. The truth is nobody really knows. The limit to the number of heart beats per lifetime appears to be due to some fundamental quality of biological tissues, which we still don't understand.

What has all this got to do with running? you may ask. Well, perhaps a little. There is now strong evidence that the life expectancy of individual humans is closely connected to their resting heart rates. This is true not only for people with various heart conditions, for example heart failure and high blood pressure, but also for apparently healthy people with no known heart disease. In the famous Framingham study, for example, of more than 5 000 people followed for 36 years, mortality was strongly related to resting heart rate.

So, a slow heart rate is a valuable thing to have. But how do you get hold of one? Not from Pick 'n Pay, unfortunately! In healthy people there are only three ways I know of. You can choose your parents wisely; you can take drugs, such as beta blockers; or you can exercise regularly.

As we all know, the fitter you are, the lower your resting heart rate. So perhaps this is one reason why fit people live longer on average than unfit people – because their heart rates are low and it takes longer for their hearts to use up the number of beats which their genes have allocated to them. Of course there may be many other explanations. Whatever the reason, there is no doubt that people who exercise, and

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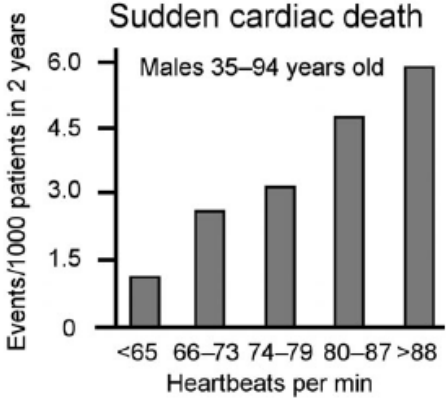
people who have low heart rates, live longer. Although it's true that exercise slightly increases the risk of things like heart attack while you are exercising, the long term benefits of exercise far outweigh this small risk ─ the so-called "exercise paradox".




Which takes us to the whole question of how to measure heart rate, how to calculate maximal heart rate, how to set training heart rate, etc.

Measuring heart rate is easy enough: simply count the number of pulses or hearts beats in 20 seconds and multiply by 3; or the number in half a minute and multiply by 2, etc. For resting heart rate, make sure you only make the measurement when you are truly at rest. Before you get out of bed in the morning is a good time – depending, of course, on what you do just before you get up! You can use any pulse which is easy to feel. The pulse at the wrist is convenient, but you can just as easily use the pulse in your neck or your groin or your elbow, or even your heart itself for that matter. Normal resting heart rate is anything from 50-90 beats per minute, but very fit runners will often have heart rates between 40 and 50 and sometimes even below 40 per minute. Resting heart rate, unlike maximal heart rate, does not depend much on age.

Maximal heart rate on the other hand is a bit more difficult and depends very much on age. It can either be measured, for example, by counting heart rate during a maximal exercise test, or roughly predicted using a formula based on age. The most widely used formula is simply:

Maximal heart rate (MHR) = 220 – age

So for example predicted maximal heart rate for a 30 year old would be about 190 beats per minute, and for a grandmaster of 65 would be 155 per minute. Remember however that there is a lot of variation from person to person, so no formula can be very accurate. There are others, but this one is close enough.

Different training heart rates or training zones can be calculated from maximal heart rate to fulfil different training functions. Your aerobic zone, for example, is the zone you should use for endurance training and is 70-80% of maximal heart rate. For a 30 year old with a maximal heart rate of 190 per minute this means aiming to maintain a heart rate of 130 to 150. The anaerobic zone is 80-90% of maximal heart rate and is the zone to aim for during speed training. During long slow distance training you should aim to maintain a heart rate in the fitness zone of 60-70% of maximal heart rate.

Heart-rate monitors are devices that do exactly that – provide you with information about your heart rate at any moment in time. They are reliable and accurate – and have more functions than most people ever need, or use. An entry level monitor will give you all the information you need, and add an extra dimension to your training.

So – use your exercise heart rate to help you get fitter; and get fitter to help you lower your resting heart rate, and live longer!

***Joe Tyrrell***