

MHR=220-Age

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This formula is as likely to be wrong—way wrong!—as it is to be right. In sport science, where a reliability quotient of 0.95 is considered good, this formula's reliability is 0.51. In other words, it's reliable about half the time. And yet exercise physiology textbooks continue to quote it as if it was the gospel. Your family doctor probably uses it to estimate your heart rate, and if you are tested in a clinic they also will predict your maximum heart rate from this formula. Gyms and aerobics rooms have posters on the wall based on 220-age.

This old formula grew out of a 1971 review of the scientific literature on the topic of the relationship between physical activity and heart rate (Fox). Interestingly, the paper cites only 35 data points to support the formula and concludes that the margin of error is “not far from many of the data points.” A subsequent review of the same literature in 2002 showed that predicting heart rate from those same 35 data points would result in an error of at least 21 beats too high or too low—a massive swing of 42 beats per minute!

Newer formulae have done somewhat better, but are still well off the mark. For example, the formula

$$208.754 - 0.734 \times \text{age}$$

has been shown to have an error of about plus or minus 7.2 bpm. A bit more accurate is the even newer formula

$$205.8 - 0.685 \times \text{age}$$

proved to be off 6.4 bpm high or low. But don't count on them even being that close. For example, the formulae produce about the same predicted max heart rate for me—163.2 and 163.3. For cycling they are about nine beats per minute low and for running about seventeen beats low.

There is currently no fool proof way to estimate max heart rate because there are simply too many variables such as age, gender, fitness, health and mode of exercise used. The only way to know your maximum heart rate is to exercise to your maximum capacity wearing a heart rate monitor. But that isn't recommended either. The only reason you might even want to know this number is to set up your heart rate training zones. There are less stressful and more accurate ways to do that by determining lactate threshold heart rate as described in my accompanying article, *The 30-Minute Test*.

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