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Both very low and very high heart rates are significantly associated with stroke risk, novel study finds

(Wednesday, 6 May, Maastricht, the Netherlands) A new study presented today at the European Stroke Organisation Conference (ESOC) 2026 suggests that both very low and very high resting heart rates are linked with an increased risk of stroke.¹

As the largest population-level study to examine this relationship, the findings challenge the assumption that lower heart rates are always a sign of good cardiovascular fitness and carry no risk.

In an analysis of the UK Biobank, researchers followed 460,000 participants for an average of 14 years, during which 12,290 strokes occurred. Analyses were adjusted for age, sex and cardiovascular risk factors, including atrial fibrillation – a heart condition that causes an irregular heartbeat and is a major cause of stroke.²

Stroke risk was lowest at resting heart rates of 60 to 69 beats per minute (bpm) but increased at both extremes – below 50 bpm and at or above 90 bpm – forming a clear U-shaped pattern. At these extremes, stroke risk was 25% higher in those with very low heart rates and 45% higher in those with very high heart rates.

Importantly, in the overall population, this relationship remained after adjustment for established stroke risk factors including hypertension, diabetes and atrial fibrillation, suggesting it reflects a genuine biological signal.

However, when participants were analysed separately, the pattern was only seen in people without atrial fibrillation. In those with the condition, the relationship was not apparent.

Lead author Dr Dexter Penn, from the Department of Brain Sciences at Imperial College London, explained: “This is likely because atrial fibrillation is such a strong risk factor for stroke, increasing risk by around fivefold, that it outweighs the contribution of heart rate and limits our ability to detect its effect. Heart rate was therefore most informative in people without atrial fibrillation, where it may provide a valuable additional tool for identifying and stratifying stroke risk.”

The researchers also explored the potential mechanisms underlying the relationship between heart rate and stroke. Very low heart rates were primarily associated with ischaemic stroke. This would be consistent with the hypothesis that very low heart rates could be associated with reduced blood flow to the brain by prolonging the relaxation phase between heartbeats.

In contrast, elevated heart rates were associated with both ischaemic and haemorrhagic stroke and may suggest increased stress on blood vessel walls that could contribute to both ischaemic injury and a greater predisposition to bleeding.

Commenting on the clinical implications of the findings, co-author Professor Alastair Webb, Clinical Associate Professor in Stroke Medicine, Department of Brain Sciences at Imperial, said: “Resting heart rate is a simple, widely available measure that deserves greater attention in cardiovascular risk assessment, particularly in people without atrial fibrillation.”

“More research is required to understand why both low and high heart rates may be associated with an increased stroke risk and what implications this may have for treatment, but very low or very high heart rates should act as a signal for clinicians to look more closely at an individual’s overall cardiovascular risk and take action to reinforce lifestyle changes and standard prevention strategies,” he concluded.

The authors emphasise that further research is needed to better understand whether resting heart rate plays a causal role in stroke or reflects underlying health. This will include studies exploring genetic factors linked to heart rate, as well as research using repeated or continuous monitoring to better capture how heart rate changes over time. It will also be important to confirm these findings in more diverse populations.

END

References:

1. Penn, D., Gill, F., Warrington, O., Webb, A. (2026). Reduced and elevated resting heart rates predict risk of stroke, independently of atrial fibrillation: A UK Biobank analysis. Oral presentation. *European Stroke Organisation Conference (ESOC) 2026*.
2. Stroke Association. (n.d.). *Atrial fibrillation*. <https://www.stroke.org.uk/health/atrial-fibrillation>