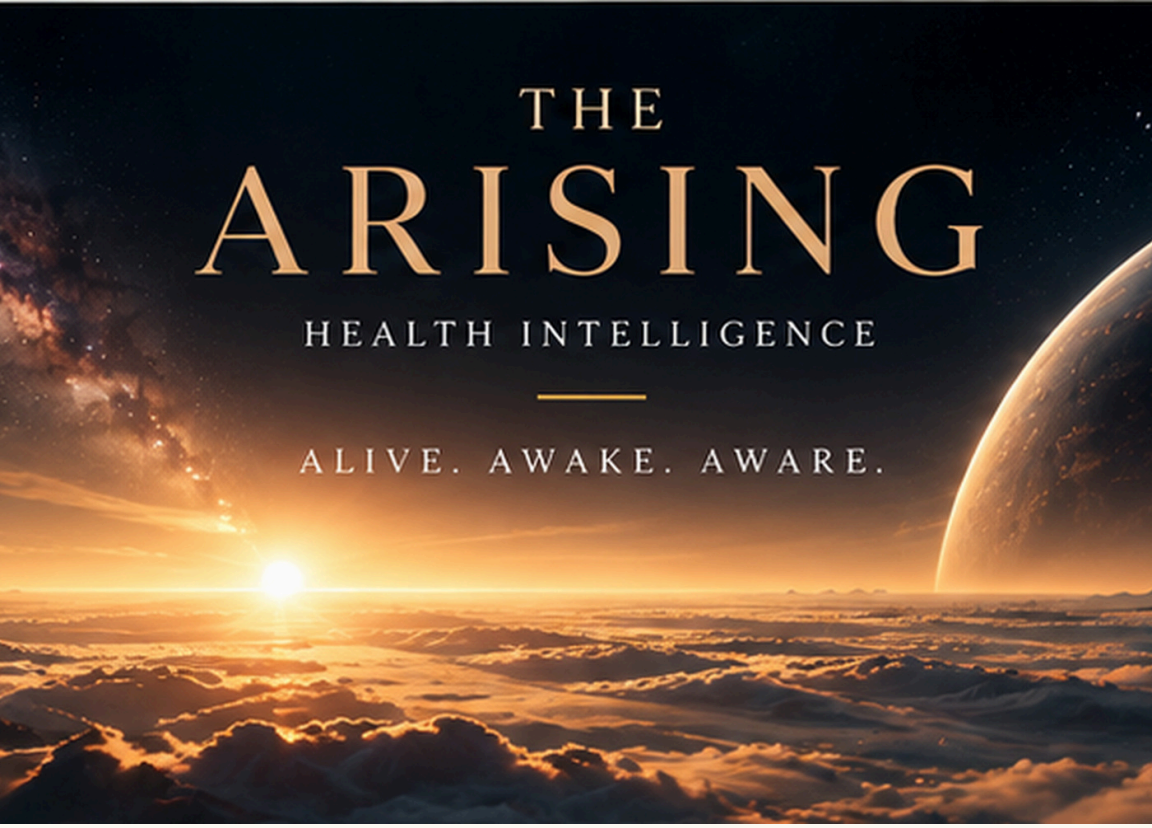


44 / INTELLIGENCE AND DISCOVERY

A Signal You Can Use

Wearables, digital biomarkers, and the path from more data to a better decision.

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Begin with a useful question

A device can produce a stream of measurements long before there is a clear reason to act on them. The useful starting point is the question: what change are we trying to understand, and what would we do differently if the measurement were dependable?

This keeps the device in a supporting role. The score should serve the person who is living the day.

Separate the stages of validation

A sensor's agreement with a reference measurement, an algorithm's ability to classify an event, and a prediction's value for future care are different forms of validation. A result at one stage does not automatically establish the next.

The overnight ECG study in this booklet illustrates predictive research using data from clinical sleep studies. It does not validate every consumer wearable or show that a new score improves outcomes when used at home. [1]

Change can be real and still be difficult to interpret

Repeated measurements can reflect biology, conditions of measurement, or technical variation. The reliability work on aging clocks offers a broader lesson: even technically reproducible measurements need a clear account of biological variability. [2]

A useful interface should therefore show uncertainty and the circumstances of a reading, rather than imply that every daily fluctuation requires a response.

Keep the burden in the picture

Monitoring can consume attention. It can also help someone describe a pattern more clearly. The balance depends on the purpose and the person. A device should make room for review, correction, and a sensible response to unexpected results.

The best next step may be a clinical conversation, a repeat measurement, a change in how data are collected, or no action at all. More data become valuable when they support a decision that is worth making.

FROM THE ARISING / 2026-10-13

The heart signal hidden inside a night of sleep

An externally tested AI model finds predictive information in ECG recordings already collected during sleep studies.

A sleep study records more than breathing. It often contains a single-lead electrocardiogram—a stream of cardiac information collected while someone is asleep. A new modeling study asks whether that already-recorded signal can reveal more about future cardiovascular risk.

This is an appealing idea because it begins with data already obtained for another clinical purpose. But using an existing measurement more efficiently is not the same as proving that an extra risk score improves care.

How the model was tested

Researchers fine-tuned a deep neural network on overnight ECG and sleep-stage data from 15,809 Massachusetts General Hospital patients. They then evaluated it in separate cohorts at Emory, with 9,810 patients, and Beth Israel Deaconess, with 12,576.

The model’s output was associated with later atrial fibrillation, stroke, heart failure and mortality after adjustment for several conventional risk factors and sleep characteristics. For example, a one-standard-deviation increase in the output was associated with atrial-fibrillation hazard ratios of 2.03 and 2.72 in the two external cohorts.

Those ratios describe relationships between a score and later outcomes. They are not reductions in risk caused by using AI. Not every endpoint was equally consistent: the myocardial-infarction estimate in one validation cohort had a confidence interval crossing one.

Prediction is only part of the job

External validation is valuable, but clinical usefulness also requires reliable calibration, appropriate thresholds and a plan for the person receiving a high-risk result. A model can identify a statistical pattern without telling a clinician which action would improve that person’s health.

The study used outcomes derived from health records, including diagnostic codes. Differences in coding, referral patterns and the populations sent for sleep testing can affect generalizability. This is not evidence that every person needs a sleep study to screen for heart disease.

What would make the next study stronger

The next useful comparison would test what changes when clinicians receive the model’s result: appropriate evaluation, treatment decisions, patient experience, unnecessary testing and ultimately clinical outcomes. The burden of a false alarm belongs beside the possible benefit of earlier recognition.

The opportunity is not merely to collect more data. It is to discover whether information already present can answer a better question. That is a promising role for AI—as long as the pathway from prediction to useful care remains visible.

Sources and evidencePrediction of cardiovascular outcomes using electrocardiography from overnight polysomnographyOctober 9, 2026 · Retrospective prediction-model development and external validation Open research →

SOURCES & READING SCOPE

Keep the claim beside its evidence

1. Zuzana Koscova, Samaneh Nasiri, Matthew A Reyna, et al. Prediction of cardiovascular outcomes using electrocardiography from overnight polysomnography. Sleep. 2026 Oct 09:zsag229. doi:10.1093/sleep/zsag229. PMID:42852996. Open source →

2. Raghav Sehgal, Daniel S Borrus, John Gonzalez, et al. Biological Versus Technical Reliability of Epigenetic Clocks and Implications for Disease Prognosis and Intervention Response. Aging cell. 2026 Aug;25(8):e70635. doi:10.1111/acel.70635. PMID:42525215. Open source →

Selected primary publication records and abstracts checked 25–26 October 2026. This is a focused reading companion, not a systematic review, a treatment protocol, or a complete appraisal of methods, supplements and later evidence. The following readings retain the complete article prose from the October 11–25 publishing package; original study context and limitations are preserved.

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