



Are late dinners making us sick? New research says yes

Confining one's eating to a shorter period of time during the day appears to confer numerous health benefits

By **STEVE HENDRICKS**

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Woman with fork, knife and empty plate at black table (Getty Images/Liudmila Chernetska)

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It's news to no one that what we eat is important for our health. But scientists are increasingly learning that *when* we eat may be nearly as important — and two of their biggest recent findings may forever change how we think about **dinner**.



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escalating trend of **daily fasting**.

But few people know of the other big finding: we're even healthier when we set our eating window early in the day—specifically, when we eat from an hour or two after we wake until mid-afternoon. Most people who practice intermittent fasting do so by skipping breakfast, but the research shows it's far healthier to skip dinner; or, better said, to eat dinner no later than about 3 p.m.

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These discoveries have implications even for those who don't intermittent fast, because researchers are increasingly finding that if we make our evening meal the biggest of the day, as so many of us do, we're putting ourselves on a path to disease and maybe even early death. Their advice? Follow the adage "Eat breakfast like a king, lunch like a prince, and dinner like a pauper."



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In 2012, a Salk Institute researcher named Satchin Panda **published** a groundbreaking study in which he fed a high-fat diet to genetically identical mice. Half of the mice ate all their food in 8 hours during the night, as mice usually do, while the other half ate *ad libitum*, anytime they wanted. That meant that the mice stretched their feeding across both night and day, much as humans do today. Both groups ate the same amount of food, a special chow that, in 11,000 previous rodent studies, induced obesity and other metabolic disorders. Sure enough, after three months, the mice who ate ad lib were stricken with obesity, diabetes, liver disease, and a host of other ugly conditions.

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The advertisement is set against a dark red background. On the left, there is a video player showing a man in a light blue shirt. Below the player is a white pill-shaped button that says "Posted 1 Day Ago". To the right of the player is a "Watch More" button. On the far right, there is a vertical stack of five video thumbnails. The top thumbnail shows two men in a video call, with text identifying them as "DEAN OBEIDALLAH SALON" and "ASHLY BORDOWITZ, AUTHOR, 'PROFILES IN IGNORANCE'". The second thumbnail shows a person walking. The third thumbnail shows two women in a video call. The fourth thumbnail shows a bowl of food.

But a quite remarkable thing happened to the mice who ate within eight nocturnal hours: they stayed healthy, utterly free of the metabolic diseases their siblings developed. Their weight, blood sugar, and cholesterol were normal, their livers were less fatty than those of the free-eating mice, their motor coordination was better, and their entire bodies were less inflamed.

~~Eating in an eight-hour nighttime window had, in Panda's slightly humorous words,~~



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Since the cellular repairs don't start until six hours into our fast, most of us are getting only three or four hours a night of repairs — and we're never reaching repair overdrive at 12 hours.

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Researchers have long focused on *what* animals — including humans — should eat to be healthy. But in a couple of simple experiments, Panda brilliantly showed *when* animals eat might matter as much as what.

What, to be clear, still mattered. When Panda ran the experiment again but with different diets, mice who ate healthier, low-fat chow in the nighttime eight-hour window fared even better than mice who ate high-fat chow in the same window. The eight-hour window, it seemed, could negate much of the harm of a bad diet, but optimal health required good food.

Other researchers duplicated Panda's findings, and trials were run in humans to see if longer overnight fasts would make us healthier too. They did. In multiple trials, volunteers who ate in

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As researchers explored the mechanisms, they found that longer fasting periods gave the body time to make more repairs. Our bodies are constantly repairing and replacing damaged cellular parts—patching up faulty DNA, recycling worn-out organelles—which, if not taken care of, can result in disease. But these repairs usually occur at a very low rate because the body is so busy doing all the other tasks that make up our lives, including the immense work of digesting our meals, processing the nutrients from those meals, and putting the nutrients to work in cells all over the body.

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But when we stop eating for long enough, the body takes advantage of the break from all that heavy work, and our cells use the downtime to supercharge their repairs. There is, however, a catch: it's a lot of work for the body to switch from its daytime mode of digesting and ~~processing nutrients to its nighttime mode of making repairs, so the body doesn't start those~~



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Unfortunately, studies **show** that most of us are eating or drinking something caloric across 14 or 15 hours a day, which means we're fasting just 9 or 10 hours a night. Since the cellular repairs don't start until six hours into our fast, most of us are getting only three or four hours a night of repairs — and we're never reaching repair overdrive at 12 hours.

But we can change that. If we confine our eating to, for example, an 8-hour window and fast the other 16 hours, we'll get 10 hours of substantial repairs, 4 of those hours in overdrive.

These findings, the work of several labs, were a big leap toward making out eating habits healthier. But an even bigger leap lay just ahead, when scientists discovered that eating in *early* windows induce far more repairs than eating in late windows.

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For years, researchers had been picking up clues that this was so. Many of the clues came from studies that showed skipping or skimping on breakfast was unhealthy. For instance, in



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like princes, and dined like paupers — lost more weight, had better blood pressure and cholesterol, and were far more sensitive to insulin than the group that breakfasted like paupers, lunched like princes, and dined like kings.

This rhythm of insulin is so potent that you can feed prediabetics the same meal at 7 a.m. and again at 7 p.m., and although their blood sugar will hardly rise after the morning meal, after the evening meal the sugar lingers so long in their blood that some of them will test fully diabetic.

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A 2007 [study](#) from the National Institute on Aging found something similar. In that study, volunteers were asked to eat between 5 p.m. and 9 p.m. every day for eight weeks in the expectation their health would improve. But they hardly got better at all, and a few of their

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One reason people do better when taking more of their calories in the morning is because our circadian rhythms have hardwired us to process food more efficiently early in the day. Take our body's management of the hormone insulin, for example. Insulin's job is to move glucose (the sugar from our meals) out of our arteries and into the cells that use the glucose for fuel. Cued to a circadian rhythm, our pancreases make a lot of insulin in the morning and early afternoon, but production wanes by mid-afternoon. When we eat in the late afternoon or at night, there's less insulin in our bloodstream, so glucose lingers longer in our arteries, where it dings up the arterial walls. Over time, the arteries can harden, putting us at risk of heart attacks, strokes, dementia, and other calamities.

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~~This fact was demonstrated even more startlingly in a 2012 **analysis** of 15,000 attempted~~



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were found and rushed to a hospital, they were usually beyond saving. In evening suicide attempts, by contrast, the poison moved more slowly and the victims could frequently be saved.

On the same principle, scientists have learned there's an **ideal time** to give chemotherapy — which is, after all, a glorified poison. Against some cancers, chemo can be up to five times less toxic to the patient and twice as effective against the cancer when delivered at the right hour.

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There's apparently little we can do to change the circadian hardwiring that makes our bodies digest, absorb, and store nutrients more efficiently in the morning and early afternoon than in the evening. We can, however, learn to eat in accordance with the rhythm, as was shown by a pair of brilliant trials from **2018 and 2019** by Courtney Peterson, a nutritional biochemist now at the University of Alabama at Birmingham.

In one trial, Peterson fed her volunteers for half the study in an early window that began an ~~hour or two after they woke and finished six hours later. In the other half of the trial, they ate~~

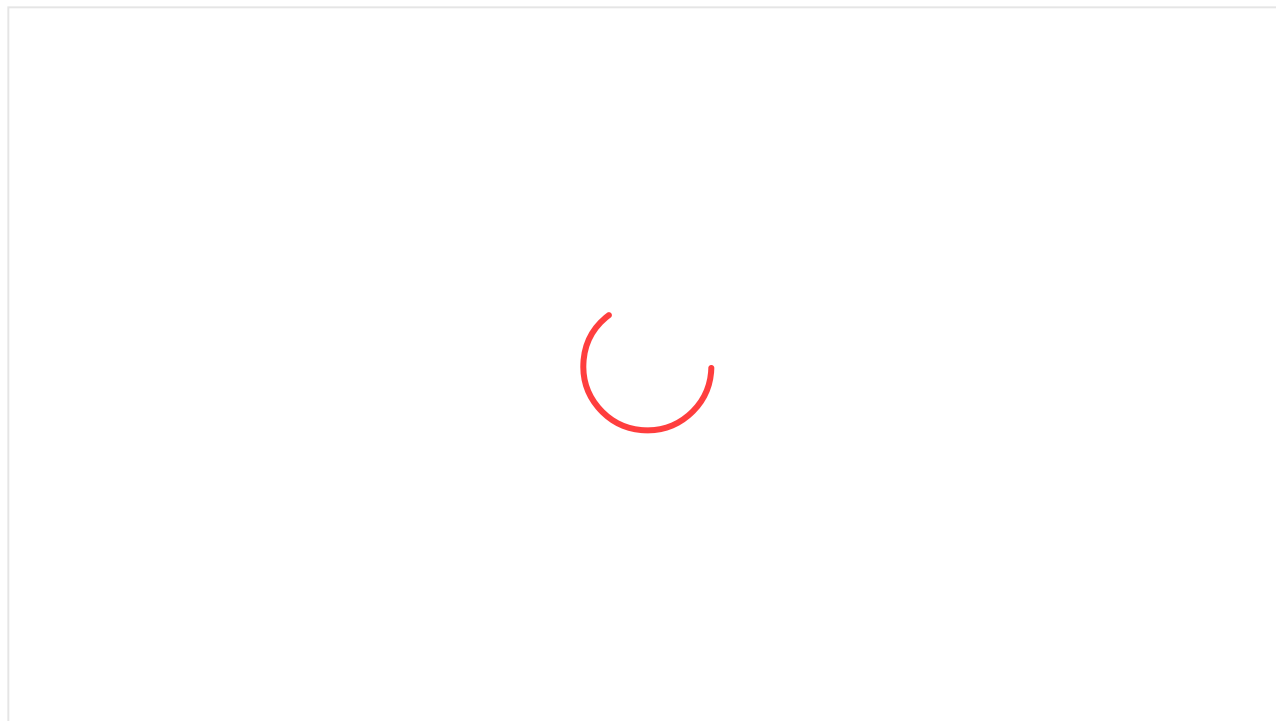


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antihypertensive drugs could achieve.

Peterson's volunteers were all prediabetics, so it was especially gratifying that their cells became about 20 percent more sensitive to insulin. That meant their overworked pancreases could produce less insulin to clear the same amount of sugar from their blood as before and were consequently less exhausted. They also had smaller sugar spikes, probably because, since the day's three meals were so close together, there was more insulin hanging around in their bloodstream from the last meal to move the next meal's sugar along. Also, the insulin-making factory in their pancreases probably hadn't shut down from the previous meal, so when more insulin was called for, their pancreases needed less effort to produce it.

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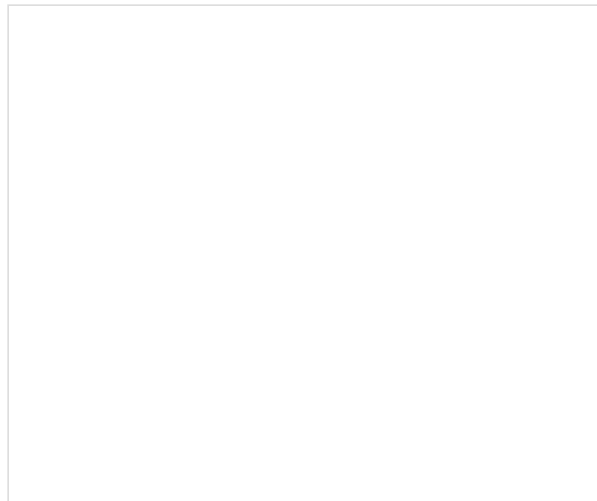


For those who wish to eat dinner at the normal time, scientists advise keeping it light and earlyish and stacking most of the

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In Peterson's other trial, which used the same six-hour window but only for four days, the volunteers enjoyed a 22 percent increase in autophagy, which is the vital recycling of worn-out cellular parts. They also saw a 10 percent increase in the activity of their *SIRT1* gene, which has been nicknamed the longevity gene because it not only keeps our telomeres (the protective tips at the ends of our DNA, which are crucial to long life) from disintegrating but also reduces life-shortening inflammation and oxidative stress. Those were awfully big gains in longevity markers from just four days of changing not *what* but only *when* the volunteers ate.

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Better still, Peterson's volunteers were no more hungry, and were sometime less hungry, while eating in the six-hour morning window than when eating across 12 hours. That was probably because they burned a little more fat during the night, and the fat was broken down into ketone bodies, which suppress hunger. All in all, it was a spectacular set of findings, and other labs **have since corroborated** them.

Early time-restricted eating (eTRE), as the practice is known, has been declared safe in study ~~after study, and scientists in the field now recommend nearly all adults eat in a narrowed~~



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calories before mid-afternoon: breakfast like a king, lunch like a prince, dinner like a pauper.

There are a few caveats. Scientists strongly recommend that people on medications inform their doctors before changing their eating schedule. Diabetics, for example, may need less insulin during their fasting hours to avoid hypoglycemia. Scientists also say adolescents can safely practice a TRE of about 12 hours, but the verdict is still out for younger children, and infants should never be put on TRE.

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Steve Hendricks is a freelance reporter and author of the newly published "The Oldest Cure in the World: Adventures in the Art and Science of Fasting." One of his previous books, "The Unquiet Grave: The FBI and the Struggle for the Soul of Indian Country," made several best-of-the-year lists. He lives in Boulder, Colorado.

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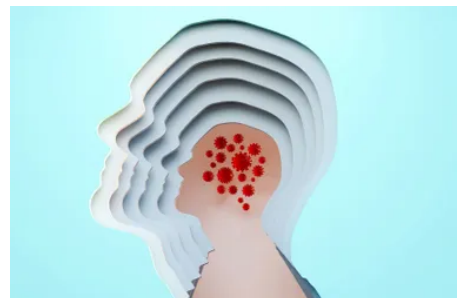
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