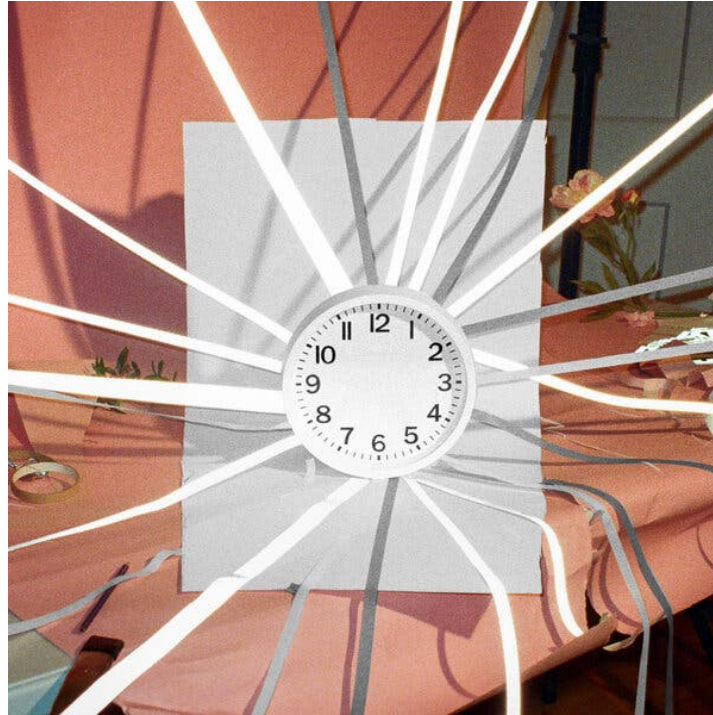


The New Science of Aging Can Predict Your Future



By Eric Topol

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The dream of reversing aging has captivated humans for centuries, and today science is closer than ever before to achieving that goal. Which is to say: It’s still pretty far away.

That’s not for lack of trying. Some researchers are attempting to reprogram cells to make them biologically younger, which has been shown to reverse features of aging in older animals. Unfortunately, this can also induce cancer. Other researchers are studying drugs called senolytics, which aim to clear aging cells out of the body. However, they can also destroy other cells humans need to survive.

Transfusions of blood from young mice appear to rejuvenate older mice, but companies offering this unproven treatment for humans are charging a lot for a potentially dangerous therapy. And while some longevity enthusiasts are taking the drug rapamycin because studies have shown it

helps animals live longer, it also weakens the immune system and hasn't been proved to work in people.

I find these efforts intriguing and worth pursuing. But most people don't simply want to live until 110. They want to extend the amount of time they live free of serious disease, a concept known as health span. That's why the most sensible approach is to reduce the toll of three major age-related diseases: cancer, heart disease and neurodegenerative disorders, such as Alzheimer's disease. It may be less flashy, but it's more attainable than ever.

It's estimated that at least 80 percent of cardiovascular disease cases, 40 percent of cancer cases and 45 percent of Alzheimer's cases are preventable. Even with a long lag — these diseases can take 20 years or more to develop — researchers have struggled to accurately define a person's risk early enough to intervene effectively. Sure, someone can take a genetic test and learn he's at a heightened risk for Alzheimer's disease, but what good is that if he doesn't know if the disease will emerge early, at 95 or not at all?

In the near future, doctors may not only be able to identify whether a person is at high risk for a serious, age-related disease; they may also be able to predict when that disease is most likely to manifest and how quickly it could progress. Several recent discoveries from the science of aging are making this increasingly possible.

Since the 2000s, scientists have used a person's genetic sequence to calculate his inherited risk for certain diseases. In just the past five years, the amount of data the medical field can glean about a person's health on top of that has ballooned. Beyond traditional tools such as medical records, routine lab results and imaging, doctors can draw from a range of biological clocks that help track how the body is aging.

For example, scientists can now measure thousands of proteins from a single vial of blood to generate what are called proteomic organ clocks. These recently discovered clocks can estimate the pace of aging for the brain, heart, liver, kidneys and immune system. These clocks can reveal, for instance, if a person's heart is aging faster than the rest of her body — like a car mechanic discovering everything is working as it should, except for the rear brakes. Other molecular clocks can calculate a person's biological age compared with his chronological age. The most rigorously studied one is the so-called epigenetic clock — a reading of parts of our DNA that can be taken from a saliva sample. New blood tests can also detect early signs of the three major diseases linked to aging.

Layering all of this biological information with recent advances in artificial intelligence allows health providers to make increasingly sophisticated predictions about a person's likelihood of developing a disease.

Take a person who wants to determine her risk of Alzheimer's disease. She can now undergo a blood test for a protein that quantifies plaque buildup in the brain that's associated with the disease. Soon a doctor might also use a proteomic organ clock to assess whether her brain appears to be aging faster than the rest of her body or analyze a photo of her retina, an emerging tool that, when combined with A.I., can help estimate the likelihood of developing Alzheimer's disease in the next five to seven years. There are similar tests that can be done to assess cancer and heart disease risk.

This level of insight can usher in a new way to approach such diseases: active surveillance paired with aggressive lifestyle changes. A person deemed at high risk for Alzheimer's might undergo regular assessments and brain imaging while taking preventive steps to lower her risk. That could include cutting back on ultraprocessed foods, increasing physical activity and addressing any changes to hearing or vision loss — factors that can influence cognitive decline. Doctors could also recommend prioritizing sleep, reducing alcohol and social isolation or getting the shingles vaccine, which has recently been shown to reduce dementia risk. Some might also consider taking GLP-1s, diabetes and weight loss drugs, which appear to reduce harmful inflammation in the brain and body and are being tested in clinical trials to prevent Alzheimer's.

Pulling together this medical information and turning it into individual plans for preventing chronic diseases is different from today's approach. Cancer screening protocols, for instance, rely largely on a person's age. This is also where A.I. models can best benefit medicine. These models are improving in accuracy and reasoning and could one day incorporate data from our gut microbiomes or immune systems to make disease predictions even more precise.

Getting this right will require further study and investment. We don't want to exacerbate health inequalities by making this kind of medical care accessible only to a wealthy few. The Trump administration's major reductions in governmental support of medical research will dim these prospects.

Getting an injection of youthful blood or taking the latest trendy anti-aging supplement might seem like a shortcut to a longer life. But extending the years people live without the burden of major age-related diseases is what should be a national priority.