

# Lay Summary — Longevity Platform Grant

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## What this proposal is, in plain language

Aging is not a single problem with a single fix. Today's longevity marketplace is full of expensive supplement stacks and influencer protocols that promise to slow it; almost none have been validated against the kind of rigorous clinical evidence we use elsewhere in medicine.

Our team at Michigan Medicine, led by Marschall S. Runge with collaborators across pathology, computational medicine, perioperative outcomes, and mitochondrial genetics, has drafted a research program to address this. The premise is simple: *aging-genomics* extends the same paradigm that pharmacogenomics already uses for drug-prescribing decisions. Pharmacogenomics asks *which drug for which person, given their genome?* Aging-genomics asks *which way of living, and which interventions, are right for which person, given their genome, epigenome, mitochondrial state, and real-time physiology?*

## What we will measure

Three things, in combination:

- Whole-genome and mitochondrial DNA from up to 20,000 carefully-selected participants across University of Michigan biobanks and federal exercise-stress-test cohorts.
- A focused panel of inflammation and mitochondrial markers from blood, paired with continuous physiologic data from an FDA-cleared wearable (the BioIntelliSense BioButton) so we can see how each individual's body responds in real time to sleep, exercise, stress, and recovery.
- Long-term health outcomes — cardiovascular events, mortality, multimorbidity, adverse drug events — at population scale through the Oracle Health 150-million-patient health-record system, accessed via Michigan Medicine's partnership with the Ellison Institute of Technology.

## What we will deliver

A clinically-deployable diagnostic that combines genetics, epigenetics, and real-time physiology into a single *Longevity & Cardiovascular Health Index* score; a blood-based panel that tracks biological age over time; and a decision-support layer that translates each person's score into specific lifestyle and therapeutic recommendations. The work is structured for FDA clearance and commercial deployment over a 7-year horizon.

## Why now, and why Michigan

The mechanistic biology has been mature for two decades — the role of damaged mitochondrial DNA in age-related inflammation was established in the early 2000s through work by Marschall Runge and Scott Ballinger that this proposal builds on. What's new is the ability to read it at clinical scale: long-read sequencing, continuous wearable monitoring, CRISPR-based causal-discovery experiments, and access to electronic-health-record data at the size needed to validate predictions against real outcomes. Michigan has each of these pieces in place — no other institution does at this combination.