

News Release
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UAMS, International Collaborators Use FDA-Approved Drugs to Extend Life in Worms

LITTLE ROCK — An international research collaboration that includes the University of Arkansas for Medical Sciences (UAMS) has discovered that aging in nematodes (worms) can be slowed and even reversed by a number of Food and Drug Administration (FDA)-approved drugs, findings that have the potential to extend human lifespan.

The study findings are published in [Scientific Reports](#).

The collaboration was led by [Robert J.S. Reis](#), D.Phil., at UAMS, and Peter Fedichev, Ph.D., a founder of the longevity biotech startup Gero. Other collaborators are from the Skolkovo Institute of Science and Technology (SIST) and Moscow Institute of Physics and Technology (MIPT).

The research team identified 10 FDA-approved drug compounds that slowed the aging process in nematodes.

“This gives us a chance to find drugs that could be used in some combination to optimize human lifespan,” said Reis, a professor in the departments of Geriatrics, Biochemistry and Molecular Biology, and Pharmacology and Toxicology in the UAMS College of Medicine.

Reis brought extensive experience to the project, including expertise in lifespan research, genetics and model systems to study aging. He led a team of UAMS researchers who created the necessary *C. elegans* strains for the study and performed the drug testing. A nonparasitic roundworm, *C. elegans* is one of the most intensively studied animals on the planet. Its genome was the first to be sequenced among multicellular organisms. *C. elegans* adults typically live just 15-25 days, but their lives can be extended by a variety of mutations and gene-silencing interventions.

Srinivas Ayyadevara, Ph.D., in the Reis group, made a key discovery that mutations in one particular gene extend worm lifespan tenfold — a world record for any animal. They created a panel of worm strains varying in lifespan across that 10-fold range, which were all genetically identical apart from one or two mutations. They determined the

“expression profile” of each strain at several ages, by sequencing their RNA contents, to see if there were features that change predictably with age or lifespan.

Using these data, Fedichev’s group used novel methods to extract an “RNA signature of aging,” which they cross-checked and expanded using previous expression patterns from aging worm strains. They used this signature to search for drugs that tended to reverse the RNA-expression changes that accompany aging by screening the Connectivity Map (CMAP), a database created by scientists at the Broad Institute of MIT and Harvard University. CMAP contains information about the effects on gene activity in human cells of almost all available FDA-approved drugs. From the 1,309 drugs in the CMAP database, the researchers found 10 that alter human gene expression in a way opposite to the age-related changes observed for corresponding genes in nematodes.

Six of these drugs had been previously documented to have anti-aging potential, while four had never been studied in that context. All of the tested drugs slowed aging in nematodes. The most efficient compound extended nematode lifespan by 30%.

Reis emphasized how extraordinary these results are. “Previous studies of several thousand pharmacologically active compounds had found less than one in 20 that were able to extend *C. elegans* lifespan, in striking contrast to our observation of life extension by all 10 drugs predicted to oppose aging, including four drugs for which there were no previous aging data,” he said. “This is remarkably compelling evidence that the expression profile of aging must be conserved from nematodes to humans, and is likely to be fundamental to all animals.”

UAMS is the state’s only health sciences university, with colleges of Medicine, Nursing, Pharmacy, Health Professions and Public Health; a graduate school; hospital; a main campus in Little Rock; a Northwest Arkansas regional campus in Fayetteville; a statewide network of regional campuses; and seven institutes: the Winthrop P. Rockefeller Cancer Institute, Jackson T. Stephens Spine & Neurosciences Institute, Harvey & Bernice Jones Eye Institute, Psychiatric Research Institute, Donald W. Reynolds Institute on Aging, Translational Research Institute and Institute for Digital Health & Innovation. It is the only adult Level 1 trauma center in the state. UAMS has 2,727 students, 870 medical residents and five dental residents. It is the state’s largest public employer with more than 10,000 employees, including 1,200 physicians who provide care to patients at UAMS, its regional campuses, Arkansas Children’s Hospital, the VA Medical Center and Baptist Health. Visit www.uams.edu or www.uamshealth.com. Find us on [Facebook](#), [Twitter](#), [YouTube](#) or [Instagram](#).

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