Could ibuprofen be an anti-aging medicine? Popular over-the counter drug extends lifespan in yeast, worms and flies

18 December 2014

Generic ibuprofen. Credit: Wikipedia

Ibuprofen, a common over-the-counter drug used to relieve pain and fever, could hold the keys to a longer healthier life, according to a study by researchers at the Buck Institute for Research on Aging. Publishing in *PLoS Genetics* on December 18th, scientists showed that regular doses of ibuprofen extended the lifespan of yeast, worms and fruit flies.

"There is a lot to be excited about," said Brian Kennedy, PhD, CEO of the Buck Institute, who said treatments, given at doses comparable to those used in humans, extended lifespan an average of 15 percent in the model organisms. "Not only did all the species live longer, but the treated flies and worms appeared more healthy," he said. "The research shows that ibuprofen impacts a process not yet implicated in aging, giving us a new way to study and understand the aging process." But most importantly, Kennedy said the study opens the door for a new exploration of so-called "anti-aging medicines." "Ibuprofen is a relatively safe drug, found in most people's medicine cabinets," he said. "There is every reason to believe there are other existing treatments that can impact healthspan and we need to be studying them."

The work was the result of a collaboration between the Buck Institute and Texas A & M's Agrilife program. Michael Polymenis, PhD, an AgriLife Research biochemist started the work in baker's yeast and then moved it into worms and flies. Polymenis, who also is a professor in the biochemistry and biophysics department at Texas A&M University, said the three-year project showed that ibuprofen interferes with the ability of yeast cells to pick up tryptophan, an amino acid found in every cell of every organism. Tryptophan is essential for humans, who get it from protein sources in the diet. "We are not sure why this works, but it's worth exploring further. This study was a proof of principle, to show that common, relatively safe drugs in humans can extend the lifespan of very diverse organisms," he said. "Therefore, it should be possible to find others like ibuprofen with even better ability to extend lifespan, with the aim of adding healthy years of life in people."

"Dr. Polymenis approached me with this idea of seeing how his cell cycle analysis corresponded with our aging studies," said Kennedy. "He had identified some drugs that had some really unique properties, and we wanted to know if they might affect aging, so we did those studies in our lab," he said. "The Buck Institute is interested in finding out why people get sick when they get old. We think that by understanding those processes, we can intervene and find ways to extend human healthspan to keep people healthier longer to slow down aging. That's our ultimate goal."

Ibuprofen is in the class of compounds known as NSAID's - nonsteroidal anti-inflammatory drugs used for relieving pain, helping with fever and reducing inflammation. It was created in the early 1960's in England and was first made available by prescription and then, after widespread use, became available over-the-counter throughout the world in the 1980s. The World Health Organization includes ibuprofen on their "List of Essential Medications" needed in a basic health system. Although deemed relatively safe and commonly used, ibuprofen can have adverse side effects, particularly in the gastrointestinal tract and the liver at high doses.

Chong He, PhD, a postdoctoral fellow at the Buck Institute and lead author on the paper, said the extended lifespan in the model organisms would be the equivalent to another dozen or so years of healthy living in humans. "Our preliminary data in the worms showed that ibuprofen also extended their healthspan," she said. "Healthy worms tend to thrash a lot and the treated worms thrashed much longer than would be normally expected. As they aged, they also swallowed food much faster than expected."

More information: Enhanced longevity by ibuprofen, conserved in multiple species, occurs in yeast through inhibition of tryptophan import. *PLOS Genetics*, 2014.

Provided by Buck Institute for Age Research