Scientists identify new longevity genes

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Scientists at the University of Washington and other institutions have identified 25 genes regulating lifespan in two organisms separated by about 1.5 billion years in evolutionary change. At least 15 of those genes have very similar versions in humans, suggesting that scientists may be able to target those genes to help slow down the aging process and treat age-related conditions. The study will be published online by the journal *Genome Research* on March 13.

The two organisms used in this study, the single-celled budding yeast and the roundworm C. elegans, are commonly used models for aging research. Finding genes that are conserved between the two organisms is significant, researchers say, because the two species are so far apart on the evolutionary scale -- even farther apart than the tiny worms and humans. That, combined with the presence of similar human genes, is an indication that these genes could regulate human longevity as well.

"Now that we know what many of these genes actually are, we have potential targets to go after in humans," said Brian Kennedy, UW associate professor of biochemistry and one of the senior authors of the study. "We hope that in the future we could affect those targets and improve not just lifespan, but also the 'health span' or the period of a person's life when they can be healthy and not suffer from age-related illnesses."

Several of the genes that the scientists identified as being involved in aging are also connected to a key nutrient response pathway known as known as the Target of Rapamycin, or TOR. That finding gives more

evidence to the theory that calorie intake and nutrient response affect lifespan by altering TOR activity. Previous studies have found that drastically restricting the caloric intake of organisms, an approach known as dietary restriction, can prolong their lifespan and reduce the incidence of age-related diseases. TOR inhibitors are being tested clinically in people for anti-cancer properties, and this work suggests they may also be useful against a variety of age-associated diseases.

"What we'd like to eventually do is be able to mimic the effects of dietary restriction with a drug," explained Matt Kaeberlein, another senior author on the paper and a UW assistant professor of pathology. "Most people don't want to cut their diet that drastically, just so they may live a little longer. But someday in the future, we may be able to accomplish the same thing with a pill."

These findings also give new insight into the genetic basis of aging, the scientists said, and provide some of the first quantitative evidence that genes regulating aging have been conserved during the process of evolution. Earlier evolutionary theories suggested that aging was not genetically controlled, since an organism does not get any advantage in natural selection by having a very long lifespan that goes far past their reproductive age.

To find these lifespan-controlling genes, the scientists took a genomic approach to comprehensively examine genes that affect aging in yeast and worms. Based on published reports, they first identified 276 genes in C. elegans that affected aging, and then searched for similar genetic sequences in the yeast genome. Of the 25 aging-related genes they found in both worms and yeast, only three had been previously thought to be conserved across many organisms.

Source: University of Washington