New research provides new insight into age-related muscle decline

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If you think the air outside is polluted, a new research report in the September 2009 issue of the journal *Genetics* might make you to think twice about the air inside our bodies too. That's because researchers show how about 3 percent of the air we breathe gets converted into harmful superoxides, which ultimately harm our muscles. Specifically, these superoxides lead to the creation of a toxic molecule called "reactive oxygen species" or ROS, which is shown to be particularly harmful to muscle tissue, and may lead to problems ranging from aging and frailty to Parkinson's disease and cancer.

"At a minimum, we hope this research leads to new ways of addressing inevitable declining physical performance and other age-dependent infirmities among the elderly," said Atanu Duttaroy, associate professor of biology at Howard University in Washington, D.C. and one of the researchers involved in the work.

To make their discovery, Duttaroy and colleagues built on their previous research showing that ROS-induced cellular damage happens in the same way in fruit flies and in mice. They started with fruit flies that lack mitochondrial superoxide dismutase enzyme (SOD), which provides the primary line of defense against ROS by capturing the superoxides and converting them to water. This lack of SOD caused the fruit flies to die within a day after hatching. Then, through genetic manipulation, the researchers "turned on" the production of SOD separately in nerves and muscles. SOD in nerves did not appear to make a significant difference in prolonging the fruit flies' lives, but it did make a difference when it

was activated in their muscles. The survival of fruit flies with SOD "turned on" in their muscles increased, and for several days, they remained as active as their normal counterparts. Measurement of their muscle activity also showed that SOD helped the muscle work normally, helping survival.

"It's long been known that the oxygen we breath can be toxic, and this work provides a concrete example of that with real consequences." said Mark Johnston, Editor-in-Chief of the journal *Genetics*. "As baby boomers get older, the need to help older people stay mobile and fit has never been greater in our lifetimes. This study helps address this need by providing insight into what causes physical decline, and in turn, bringing us a step closer toward finding ways to stop or reverse it."

More information: Tanja Godenschwege, Renée Forde, Claudette P. Davis, Anirban Paul, Kristopher Beckwith, and Atanu Duttaroy Mitochondrial Superoxide Radicals Differentially Affect Muscle Activity and Neural Function Genetics 2009 183: 175-184. www.genetics.org/cgi/content/abstract/183/1/175

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