Factor in naked mole rat's cells enhances protein integrity

August 30 2014

The naked mole rat, a long-lived rodent, is being studied for the secrets its biology can reveal about healthy aging. Investigators at The University of Texas Health Science Center at San Antonio found a factor in the rodent's cells that protects and alters function of the proteasome, a garbage disposer for damaged and obsolete proteins. Credit: UT Health Science Center at San Antonio

Scientists at the Barshop Institute for Longevity and Aging Studies, part

of the School of Medicine at the UT Health Science Center at San Antonio, have found another secret of longevity in the tissues of the longest-lived rodent, the naked mole rat.

They reported that a factor in the cells of naked mole rats protects and alters the activity of the proteasome, a garbage disposer for damaged and obsolete proteins.

The factor also protects proteasome function in human, mouse and yeast cells when challenged with various proteasome poisons, studies showed. These proteasomes usually rapidly stop functioning, leading to the accumulation of damaged proteins that further impair cell function, contributing to the vicious cycle that leads to cell death.

"I think this factor is part of an overall process or mechanism by which naked mole rats maintain their protein quality," study first author Karl Rodriguez, Ph.D., said.

Generally, as an organism ages, not only are there more damaged proteins in need of disposal, but the proteasome itself becomes damaged and less efficient in clearing out the damaged proteins.

As a result, protein quality declines and this contributes to the functional declines seen during aging. Enhancement of protein quality, meanwhile, leads to longer life in yeast, worms, fruit flies and naked mole rats, Dr. Rodriguez said.

Dr. Rodriguez, a San Antonio native who completed both his master's and doctoral degrees at the Health Science Center, is a postdoctoral fellow in the laboratory of Rochelle Buffenstein, Ph.D., professor of physiology at the Barshop Institute. For this study, the Buffenstein lab also collaborated with Pawel Osmulski, Ph.D., assistant professor of molecular medicine; Susan Weintraub, Ph.D., professor of biochemistry;

and Maria Gaczynska, Ph.D., associate professor of molecular medicine.

Naked mole rats, which burrow through underground tunnels in their native East Africa, are nearly hairless rodents. They live as long as 32 years. Naked mole rats maintain cancer-free good health and reproductive potential well into their third decade of life.

These findings are reported in the journal *BBA: Molecular Basis of Disease*.

More information: *Biochim Biophys Acta* 2014 Jul 10. Epub 2014 Jul 10. www.sciencedirect.com/science/ … ii/S0925443914002166

Provided by University of Texas Health Science Center at San Antonio