Team finds DNA repair is high in heart, nonexistent in brain

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Nova Southeastern University (NSU) researchers recently discovered that, contrary to prior belief, tissues of different mammalian organs have very different abilities to repair damage to their DNA.

These new findings indicate that the heart has the greatest capacity to repair its DNA, followed by the intestines, kidneys, spleen, testes, and lungs. The brain, however, exhibited no ability to repair damage to its DNA.

These studies were performed in murine cell tissue culture, but, based on previous human studies performed by the same investigators, such "tissue specificity" is true of humans, as well.

Using skin as the control, the researchers exposed growing cells derived from each of these tissues to a defined dose of ultraviolet (UVC) light, a part of normal sunlight, causing extensive DNA damage. Although there are five types of DNA repair performed by mammalian cells, the investigators then specifically measured the amount of repair performed by one type called nucleotide excision repair.

This type of DNA repair is a complicated process that requires a high level of metabolic investment by the cell. Brain cells may focus their energies on other more essential activities, and are not commonly exposed to UVC light, perhaps explaining their undetectable level of repair.

"The human body was not designed to live past 30 or 40 years, so our brains haven't prioritized DNA repair over other necessary functions," said lead investigator Jean Latimer, Ph.D., associate professor of pharmaceutical sciences, NSU's College of Pharmacy. "Our brains are frequently not physically prepared to last as long as medical science is now allowing our bodies to live. These findings could help explain a root cause behind memory loss and dementia."

The research team consisted of Latimer; Stephen Grant, Ph.D., associate professor of public health, NSU's College of Osteopathic Medicine; NSU College of Pharmacy students Vongai Majekwana, Pharm.D. candidate; and Yashira Pabón-Padín, Pharm.D. candidate; and Manasi Pimpley, Ph.D. candidate.

Their findings are published in the peer-reviewed journal, *Photochemistry and Photobiology* in an article titled "Regulation and dysregulation of mammalian nucleotide excision repair: a pathway to non-germline breast carcinogenesis."

More information: Read the full article at: http://onlinelibrary.wiley.com/doi/10.1111/php.12387/full.

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