

Caffeine and exercise can team up to prevent skin cancer

July 30 2007

Regular exercise and little or no caffeine has become a popular lifestyle choice for many Americans. But a new Rutgers study has found that it may not be the best formula for preventing sun-induced skin damage that could lead to cancer. Low to moderate amounts of caffeine, in fact, along with exercise can be good for your health.

According to the National Cancer Institute, sunlight-induced skin cancer is the most prevalent cancer in the United States with more than 1 million new cases each year. A research team at Rutgers, The State University of New Jersey, showed that a combination of exercise and some caffeine protected against the destructive effects of the sun's ultraviolet-B (UVB) radiation, known to induce skin cancer. The caffeine and exercise seemingly conspire in killing off precancerous cells whose DNA has been damaged by UVB-rays.

The studies, conducted in the Susan Lehman Cullman Laboratory for Cancer Research at Rutgers' Ernest Mario School of Pharmacy, appear in the July 31 *Proceedings of the National Academy of Sciences*.

Groups of hairless mice, whose exposed skin is vulnerable to the sun, were the test subjects in experiments in which one set drank caffeinated water (the human equivalent of one or two cups of coffee a day); another voluntarily exercised on a running wheel; while a third group both drank and ran. A fourth group, which served as a control, didn't run and didn't caffeinate. All of the mice were exposed to lamps that generated UVB radiation that damaged the DNA in their skin cells.

Some degree of programmed cell death, also known as apoptosis, was observed in the DNA-damaged cells of all four groups, but the caffeine drinkers and exercisers showed an increase over the UVB-treated control group. Apoptosis is a way in which cells with badly damaged DNA commit suicide – UVB-damaged cells in this case.

“If apoptosis takes place in a sun-damaged cell, its progress toward cancer will be aborted,” said Allan Conney, director of Rutgers’ Cullman Laboratory and one of the paper’s authors.

To determine the extent of programmed cell death among the four groups of UVB-treated mice, the Rutgers team looked at physical changes in the cells. The scientists also relied on chemical markers, such as caspase-3 – an enzyme that is involved in killing DNA-damaged cells – and p53, a tumor suppressor.

“The differences between the groups in the formation of UVB-induced apoptotic cells – those cells derailed from the track leading to skin cancer – were quite dramatic,” Conney said.

Compared to the UVB-exposed control animals, the caffeine drinkers showed an approximately 95 percent increase in UVB-induced apoptosis, the exercisers showed a 120 percent increase, while the mice that were both drinking and exercising showed a nearly 400 percent increase.

“The most dramatic and obvious difference between the groups came from the caffeine-drinking runners, a difference that can likely be attributed to some kind of synergy,” Conney said. The authors suggested several mechanisms at the biochemical level that might be responsible for the protective effects of caffeine and exercise, but acknowledged that what is happening synergistically is still somewhat of a mystery.

“We need to dig deeper into how the combination of caffeine and exercise is exerting its influence at the cellular and molecular levels, identifying the underlying mechanisms,” Conney said. “With an understanding of these mechanisms we can then take this to the next level, going beyond mice in the lab to human trials. With the stronger levels of UVB radiation evident today and an upward trend in the incidence of skin cancer among Americans, there is a premium on finding novel ways to protect our bodies from sun damage.”

Source: Rutgers, the State University of New Jersey

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