Exercise alone relieves arthritis symptoms

The links between diet, obesity, exercise and arthritis have been the focus of much research attention, partly because arthritis is estimated to affect as many as 20% of adults in the US. One form of arthritis, called osteoarthritis, is characterized by inflammation, joint degeneration and development of osteophytes (bony outgrowths around joints), resulting in pain. Conventional wisdom may lead arthritis sufferers to avoid activity in order to minimize joint pain. But many cases of arthritis are associated with obesity and inactivity.

To address this conundrum, researchers from Duke University (Durham, NC) led by Farshid Guilak designed a study to test two hypotheses: first, that obesity resulting from consumption of a high-fat diet would encourage development of osteoarthritis in mice and second, that running-wheel activity would inhibit this development. The study included 20 male C57BL/6J mice, half of which were fed regular chow (with 13.5% of its calories coming from fat) and half of which were given a very high-fat diet (60% of calories coming from fat). Half the mice in each diet group were then given access to a running wheel during part of the study.

Guilak's group assessed severity of osteoarthritis in the knee by histopathology and measured serum cytokine levels, body composition and insulin resistance in all the mice (*Arthritis Rheum.* doi:10.1002/art.3332; published online 27 September 2011). Mice on the high-fat diet gained weight rapidly; their percent body fat tripled relative to that of mice that received standard chow. They also had higher osteoarthritis scores and cytokine levels and had impaired glucose processing abilities relative to mice that ate regular chow. The data confirmed the study's first hypothesis, linking ingestion of a high-fat diet with obesity and osteoarthritis. Mice that used the running wheels, however, were protected from further arthritis progression. Even though their body weight, percent body fat and serum cytokine levels remained elevated, their arthritis scores were lower, co-expression of pro-inflammatory cytokines was disrupted and glucose tolerance improved. Overall, development of arthritis was slowed in obese mice that used running wheels, confirming the study's second hypothesis.

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The study results suggest that although obesity contributes to the development of osteoarthritis, the increased load on joints resulting from obesity is not its sole cause. Furthermore, it seems that weight loss is not required, and reduction of physical activity is not desirable, to slow arthritis progression or relieve symptoms.

Monica Harrington

TARGETING A VIRUS TO FIGHT CANCER

Medulloblastomas are the most common malignant brain tumors in children. This type of tumor is very difficult to treat, resulting in low survival rates and poor health outcomes. As a result, new methods for treating this type of cancer are needed.

New research shows that human cytomegalovirus (HCMV) infects over 90% of medulloblastomas (*J. Clin. Invest.* doi:10.1172/JCI57147; published online 26 September 2011). The virus is prevalent in the human population but usually goes undetected and has few physiological effects. When the virus infiltrates tumors in the body, however, it seems to help the tumors survive and grow.

A team led by John Inge Johnsen and Cecilia Soderberg-Naucler (Karolinska Institute, Stockholm, Sweden) suspected that medulloblastomas may rely on HCMV to help it elude immune system attack and to promote tumor growth. They explored the idea that targeting CMV in mice with antiviral drugs might therefore destroy the infected tumors. Use of the anti-HCMV drug valganciclovir effectively reduced tumor cell growth in mice transplanted with medulloblastomas and was extremely effective at eliminating the virus from the tumors.

The scientists also discovered that both HCMV and medulloblastomas were associated with an increase in expression of the genes encoding COX-2 and PGE_2, which act as growth factors for tumor cells and drive cancer progression. The researchers tested whether eliminating these tumor growth factor proteins produced by the virus would also be an effective treatment strategy for the tumors. They found that a COX-2 inhibitor called celecoxib was highly effective in treating the tumors. Furthermore, when they used this drug in combination with the antiviral drug valganciclovir, the scientists were able to shrink medulloblastoma tumors by over 70%.

The authors of the study hope that their research has opened the door to a new area of investigation for cancer treatment. Soderberg-Naucler explained, "The virus infection isn't cured by the treatment, nor is the tumor, but the virus in the tumor decreases, which affects its growth. This therefore presents a new approach to treating tumors and could henceforth be used as a possible complementary therapy." Next, the researchers will test the efficacy of using this drug combination along with traditional chemotherapy approaches in human cancer patients.

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