Research News

Statins target multiple sclerosis

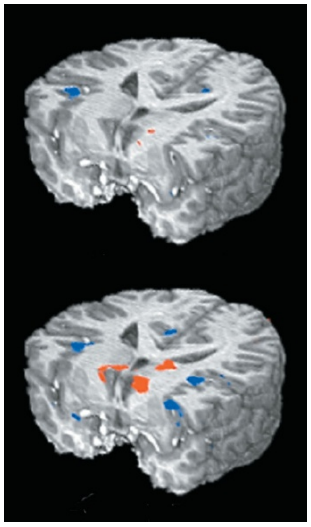
Statins, drugs widely used to lower cholesterol, alleviate symptoms in a mouse model of multiple sclerosis, according to Sawsan Youssef *et al.* in the 7 November *Nature*. But there are marked difference between the mouse model and humans, so whether the approach is likely to work in people is still uncertain. In the mice, oral administration of atorvastatin (Lipitor) prevented or reversed chronic and relapsing paralysis, and prevented inflammation in the nervous system. It appears that the statins shift the profile of immune mediators released by T cells—from inflammatory cytokines to anti-inflammatory cytokines. Exactly how this shift happens is unclear, but it may occur independently of statins' known effects on HMG–CoA reductase, an enzyme needed for cholesterol synthesis. The authors provide evidence that atorvastatin inhibits the expression by brain cells of a protein that regulates the expression of MHC class II antigen-presenting molecules. The mouse experiments bode well for current clinical trials testing statins for the treatment of multiple sclerosis.

Light heart, young heart

The heart is the most demanding muscle in the human body, contracting on average more than 3 billion times in the life of an individual. Now, Cheol-Koo Lee *et al.* find that as a heart ages, its pattern of transcriptional activity shows marked changes. In the November 5 early online edition of the *PNAS,* the authors examined expression profiles of 9,997 genes from the hearts of young and old mice using DNA microarrays. The profiles indicated that with aging comes a metabolic shift from high-energy, slow-burning fatty acid metabolism to carbohydrate metabolism. Carbohydrates burn faster but provide less power, leaving older hearts with less energy to perform the same work. Previous work from the same group had shown that low-calorie diets could slow the aging process in multiple tissues in the body. In this study they found that the heart was no exception. Mice on low-calorie diets showed nearly 20% fewer age-related changes in gene expression than mice on high-calorie diets. Calorie reduction also suppressed the expression of genes that may cause apoptosis and immune-mediated tissue damage. At least for mice, staying skinny may help keep the heart young.

Nicotine edge

Nicotine can enhance mental focus in chronic users of the drug—ask any smoker or refer to any number of studies. In the October 24 *Neuron*, Natalia Lawrence *et al.* get a close look at how it happens. They measured brain activity using functional MRI in subjects performing tasks that required sustained attention. Subjects tried to pick out special sequences from a stream of digits presented faster than one per second. Smokers who received nicotine through a patch on the arm performed the task more nimbly than nicotine-deprived smokers. Nicotine enhanced activation in areas of the brain traditionally associated with visual attention, but not memory. Nicotine also enhanced activation in areas of the brain associated with arousal and motor performance (top) compared to a placebo (bottom). Despite the strong differences in brain activity in nicotine and placebo-treated smokers, the differences in mental performance were less marked. And when it came to tasks that did not require attention, nicotine made no difference. Deprived smokers may be living on the edge when it comes to optimal performance during situations that require concentration.



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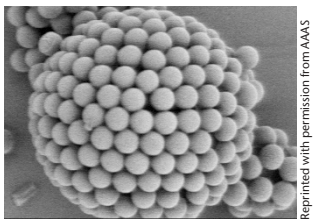
Walk or run?

Exercise can lead to a healthy heart, but just how long or how hard you have to exercise to reduce the risk of cardiovascular disease is uncertain. Now, William Kraus *et al.* report that it's not the intensity of activity but its duration that seems to have the greatest cardiovascular benefit, as measured by levels of cholesterol-containing lipoproteins. In the 7 November *NEJM*, the authors examined 84 overweight patients randomly assigned to different exercise groups for six months: high amount/vigorous intensity, low amount/vigorous intensity, or low amount/moderate intensity. Even though none of the patients experienced significant weight loss, exercise still had a positive effect on lipoprotein profiles—boosting the number of "good" high density lipoprotein (HDL) particles while decreasing the number of "bad" low density lipoprotein (LDL) particles. The size of the LDL particles also increased. Individuals who exercised for the longest periods of time experienced the greatest benefit, but all exercise groups had healthier profiles than the sedentary control group. Notably, people who walked for 12 miles or ran for 12 miles experienced similar benefit. That's only good news for people who find it easier to exercise than lose weight.

Designer capsules

There's a science to making the right pill—and in the 1 November *Science*, Anthony Dinsmore *et al.* begin to perfect it. They describe a process of capsule manufacture that allows for precise control of capsule properties—including size, permeability and mechanical strength. The process begins with suspension of a drug, live cells or other material of choice in a fluid, such as water. The fluid is then emulsified in another, immiscible fluid, such as oil. Next, spherical "colloidal particles" are added to the mixture and self-assemble onto the surface of droplets. The size of the droplet of emulsified fluid determines the overall capsule size, while the diameter of the colloidal particles determines the size of the capsule pore. Finally, the particle-coated spheres are locked together through one of a number of processes, such as the addition of molecules that connect the spherical particles. Such molecules can also affect the flexibility—the breaking point—of the capsule. The approach could ultimately lead to better-designed delivery systems for drugs, cells, vitamins or any other substances that might require controlled release in the human body.



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