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Mouse stem cells good for the (sheep) heart

Embryonic stem cells (ESCs) from mice can help to repair sheep hearts after a heart attack. This recent discovery, made by a team at the French National Centre for Scientific Research in Montpellier, may help scientists determine if these undifferentiated cells could mend damage induced by heart attack in humans.

A heart attack weakens the myocardium's contractile power, which may lead to heart failure. ESC transplantation has previously shown therapeutic benefits in rodent studies, but no one has yet determined such benefits in a large-animal model.

Michel Pucéat's group injected labeled mouse ESCs into the hearts of sheep that had experienced experimentally induced myocardial infarction. One month later, the ESCs had engrafted in the damaged tissue and differentiated into cardiomyocytes. ESC-treated hearts pumped blood 15% more efficiently than control sheep hearts (*Lancet*, 17 September).

The transplanted ESCs did not develop into teratomas, nor did immunocompetent recipient sheep reject them. These results suggest that human ESC transplants may provide a safe and effective way to treat heart failure in humans.

Old mice run to learn

Old mice that exercise learn more effectively than their sedentary counterparts, suggesting that exercise may help stave off age-related memory loss in humans.

Morphological and functional changes to the hippocampus—the brain region important for learning—result in the cognitive decline that many people experience as they get older. Previous studies have shown a direct correlation between exercise and improved learning in young rodents.

Now, Fred H. Gage and his colleagues at The Salk Institute for Biomedical Studies (La Jolla, CA) show that voluntary exercise in old mice increases neurogenesis and improves learning. The researchers housed 19-month-old mice for 1 month in cages with running wheels and then subjected them to a water maze test to gauge spatial learning. Mice in the running-wheel group learned to find a hidden platform significantly faster than did age-matched sedentary control mice. By injecting the mice with retrovirus to label new cells, Gage's group showed that this increase in learning was associated with the development of new neurons. (*J. Neurosci.*, 21 September).

These results suggest that taking up an activity that stimulates the cardiovascular system, such as walking, may help older people to stimulate the development of new brain cells, thereby slowing memory loss.

Could Kermit be carrying a cure?

Don't expect Prince Charming to appear, but scientists may have found a good reason to kiss a frog: the skin of certain of these amphibians produces compounds with potent inhibitory effects on the human immunodeficiency virus (HIV).

Many animals produce antimicrobial peptides (AMPs) as a defense against infection, but frogs are a particularly rich source of AMP diversity; more than one-fifth of known AMPs are produced by the skins of frogs and toads. AMPs can counter a wide variety of pathogenic challenges, and Vanderbilt University researcher Derya Unutmaz, working with colleagues from around the world, decided to investigate the impact of different AMPs on HIV infection.

As reported in the *Journal of Virology* (September), the results were striking. Several compounds showed inhibitory properties, but one, caerin 1.9, proved particularly effective, markedly inhibiting the infection of cultured T cells without negatively affecting the health of the cells. Subsequent experiments showed that this compound works by disrupting the viral envelope of HIV, as well as other enveloped viruses. The researchers also found that caerin 1.9 was effective at blocking transmission of virus to T cells by dendritic cells, even as long as 8 hours after the dendritic cells had taken up the virus.

The effectiveness of this compound leads the authors to conclude that a wide variety of potentially invaluable therapeutic agents might be just a pond away.