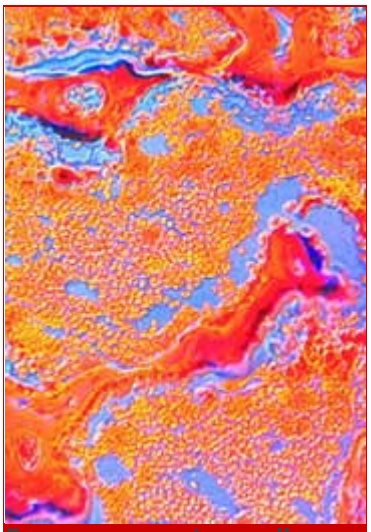
Stretching changes stem cells' fate

Cells under tension make bone not fat.
13 December 2003

HELEN PEARSON



Bone marrow stem cells can become bone, fat, cartilage or muscle.
© SPL

Stretching stem cells can influence whether they turn into fat or bone, say researchers. This might partly explain why exercise strengthens the skeleton.

The group studied mesenchymal stem cells. These dwell in bone marrow and can create new fat, cartilage, muscle and bone. The scientists perched single cells on one of two different growth-enhancing carpets: either squares that gave cells room to stretch out, or tiny dots that reined them in.

Stretched cells were more likely to become bone cells, the group found; huddled ones became fat. Forcing the cells to tighten up by injecting a gene called *RhoA*, also created bone cells. Discovering the molecules involved is "really cool", says lead researcher Christopher Chen of Johns Hopkins University in Baltimore, Maryland.

Walking and jogging, which help to strengthen bones, might place bone-marrow stem cells under stress and trigger the production of bone cells, Chen speculates. He will present the results at this week's American Society for Cell Biology meeting in San Francisco.

Repair mechanics

relatedstories

- **Squashed embryos switch on genes**
  21 August 2003
- **Tiny rack tests cells' pulling power**
  17 December 2002
- **Sperm marks the spot**
  25 January 2001

linksout

- **ASCB**

morenews

- **Centenary of powered flight celebrated**
  13 December 2003
- **Parasite protein shows promise for Ebola treatment**
  13 December 2003
- **Stretching changes stem cells' fate**
  13 December 2003
- **Genome scan shows human-chimp differences**
  12 December 2003
- **Mutant worms withstand boozy bender**
  12 December 2003

Cell biologists know that squeezing or stretching can determine whether cells die, divide or transform into another cell type. But few such experiments have been done on stem cells that produce many tissue types and are of interest to doctors as a potential way to repair the body.

There's mechanics as well as chemistry

Donald Ingber
Harvard Medical School

Many scientists are searching for the molecules that drive a stem cell to make muscle, say, instead of blood; RhoA might be one of these. But to build new bone or tendon, stem cells may also need the correct position or orientation, says cell biologist Donald Ingber of Harvard Medical School in Boston, Massachusetts. "There's mechanics as well as chemistry," he says.

Ingber points out that many medical treatments already work because they place cells under tension: such as implanting a sac under the skin to grow new material for a graft, or physical therapy to heal strains. "These ideas have been around for ages, but only recently they've come into vogue," Ingber says.