Immortal or mortal?

It finally happened. Just six years after the creation of the first human embryonic stem cell line and seven years after the cloning of Dolly by nuclear transfer, researchers have generated a human embryonic stem cell line from a donor nucleus.

In the 13 February *Science*, Woo Suk Hwang *et al.* report that they have created a single embryonic stem cell line from a total of 242 donor oocytes. What's more, 20% of the oocytes yielded 100-cell blastocysts, a new achievement in longevity. Oocytes were collected from six women and were transplanted with nuclei from cumulus cells, cells lining the ovary.

The hope for the technique is that nuclear transfer could provide a source of cells for stem cell therapies that will circumvent problems of immune rejection. But the investigators hold out one caveat: they transplanted oocytes with nuclei from the same individual. This raises the possibility that the oocytes developed without help from a donor nucleus, by parthenogenesis (like certain lizard and fruit fly species, and at least one monkey embryonic stem cell line). The investigators found imprinting patterns consistent with nuclear transfer, but they still cannot rule out parthenogenesis.

Matrix revolutions

Two research groups have created new tools for neuronal stem cell therapy experiments. One team has generated an immortal neuronal stem cell line, and another has devised a three-dimensional scaffold that prompts differentiation, at least in cell culture.

In the 1 March *Nature Biotechnology*, Neeta Roy *et al.* gave cells an edge using the now-familiar cell booster human telomerase reverse transcriptase (hTERT), the rate-limiting component of the telomerase enzyme complex. Beginning with cells from the human fetal spinal cord, the investigators derived stem cell lines that gave rise to either neuronal or glial cell types in cell culture.

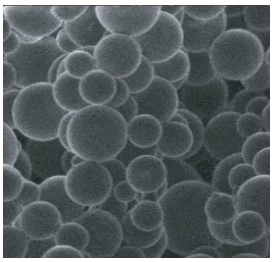
The cells were unstoppable: one line has already survived more than 168 doublings in cell culture, with no sign of senescence or karyotype breakdown. In animal experiments, the neuronal line differentiated and integrated into a lesioned area. The cells do not appear to promote tumorigenesis in animals, which sets them apart from other immortalized neuronal stem cell lines.

In the 22 January *Science*, Gabriel Silva *et al.* present a jelly-like scaffold that polymerizes only upon contact with water—which makes it useful for injecting into the body. The polymer can also bind a variety of biologically active molecules. The investigators linked the scaffold to one such molecule, a peptide epitope that directs neurite growth and sprouting. They then added a dose of neural progenitor cells to create a three-dimensional matrix of differentiated neurons.

The investigators note that the matrix could contain bioactive molecules in the body and control where cells migrate and differentiate. But the investigators still need definitive animal tests—so far they know only that the gel does not kill animals and that it turns into a jiggly solid upon contact with tissues.

Written by Charlotte Schubert

Polyester's back in



Nature Materials

A new sphere has landed. In the March issue of *Nature Materials*, Chun Wang *et al.* reveal the design for a polyester particle that delivers DNA vaccines to the interior of dendritic cells. The particle consists of positively charged monomers that clamp onto negatively charged DNA. At neutral pH, the DNA cargo stays stuck—until it is swallowed by a dendritic cell, which consumes the spheres like popcorn. These antigen-presenting cells have a pH close to 5, prompting the sphere to slowly release DNA. The slow release may give the dendritic cells time to migrate to lymph nodes and activate killer cells, avoiding the premature display of antigens that could lead to immune tolerance. In cancer vaccine experiments, the investigators compared the new sphere with others now in clinical trials. The new spheres suppressed tumor growth more effectively than naked DNA or other spheres. An ideal sphere—yet to be developed—could release a vaccine over time to avoid the need for booster shots.

Putting on the heat

Infections can set the body ablaze with fever, triggered by TNF-α and other molecules that spur the hypothalamus to turn up the heat. What happens next is one of the least understood aspects of the acute inflammatory response. In the 20 January *Immunity*, Qing Chen *et al.* examine one heat-inspired event: the rolling behavior and stickiness of lymphocytes that precedes their migration into lymph nodes and other immune centers. The investigators found that at fever temperatures, complexes containing the cytokine IL-6 induce lymphocytes to stick to endothelial cell surfaces. This stickiness is due to activation of the adhesion molecule L-selectin. Curiously, the concentrations of IL-6 and its known binding partners do not seem to be upregulated by fever temperatures. One possibility, say the authors, is that high temperatures induce the release of additional factors that influence IL-6 signaling.

Don't hesitate

J. Neuroscience

After suffering a stroke, patients can sometimes wait weeks before starting therapy. Work on rats now suggests that starting therapy sooner results in the greatest improvement. To rehabilitate rats, Jeff Biernaskie *et al.* turned to mini-M&Ms. They used the candy in reaching tasks (shown here), along with other exercises to stimulate limb use after induced stroke. In the 4 February *Journal of Neuroscience*, the investigators report that animals beginning rehabilitation early—at 5 days after injury—were much more agile and well-coordinated than rats starting later (14 or 30 days). What's more, rats whose rehabilitation began early had sprouted many more branches in an area of the motor cortex than rats who began therapy later. Within the first two weeks after stroke, numerous growth and repair proteins flood areas surrounding damage and the undamaged contralateral region. Others have found that starting therapy immediately—instead of after a few days—could damage neurons that have become hyperexcitable after injury.