Dogged by doubts

Is Snuppy really a clone? With the credibility of his creator Woo Suk Hwang under fire, the dog's credentials are being challenged.

The Afghan hound was supposedly the first dog to be cloned (B. C. Lee *et al. Nature* **436,** 641; 2005). Cloning dogs presents unusual challenges because, compared with other mammals, the egg cells are difficult to mature *in vitro*. Hwang's group says it used the same technology as in its human experiments — removing the nucleus from a donor's cell and inserting it into an egg cell, a process called somatic-cell nuclear transfer (SCNT).

But Robert Lanza, a stem-cell expert at Advanced Cell Technology in Worcester, Massachusetts, and a competitor with Hwang in human therapeutic cloning, says the paper should now be seriously re-examined.

Lanza says that Snuppy, seen on the right with the dog from which he was supposedly cloned, might have been created by a technique called embryo splitting, in which cells from an early-stage embryo are divided and then implanted separately. The technique creates identical twins. One set of cells could have been used immediately to create a dog while another was frozen and stored. If the frozen cells were later used to create a dog with identical DNA, that could be presented as an SCNT clone.

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Such trickery could be caught by examining mitochondrial DNA, which is passed maternally with the egg cell. If Snuppy were really a SCNT clone, he should have the mitochondrial DNA of the dog from which the egg was taken. If he's a fake, he'd share it with the dog from which he was supposedly cloned.

Mitochondrial DNA data have not been part of previous cloning papers, and were not presented in *Nature*. Lanza suggests that it would now be a good idea to do the test. "If the mitochondrial DNA is the same, that's the end of that paper," says Lanza.

Nature is starting an investigation, including a mitochondrial DNA test, that is unlikely to be complete before January 2006. ■

David Cyranoski

Medical College in Changsha, Hunan, had cloned human blastocysts from adult cells (*Chinese Sci. Bull.* **48,** 1840–1843; 2003), although she had not been able to extract stem cells from any of them. Also, Huizhen Sheng of Shanghai Second Medical University claimed to have extracted stem cells from embryos created by introducing adult human DNA into rabbit eggs stripped of their own chromosomes (Y. Chen *et al. Cell Res.* **13,** 251–263; 2003).

And in August, Murdoch's group reported the creation of a single blastocyst from a cloned cell (M. Stojkovic *et al. Reprod. BioMed. Online* **11,** 226–231; 2005). The blastocyst died before yielding any stem cells. And as the cloned cell was itself an embryonic stem cell, the paper does not show a way of making stem cells matched to adult patients from scratch.

Murdoch says she does not relish now being a leader in the field. "I'm not interested in striving to be the first to get somewhere," she says. "The problems in South Korea highlight the difficulties in racing to get results."

She also laments the rules and regulations that many scientists think have hamstrung stem-cell research (see map, opposite). "The more people who are working on this the better," she says. "But the fundamental problem is that it is banned in so many countries."

But researchers in the field are hopeful that progress can be made. "This needs to be done right," says Michael West of ACT. "And many of us are determined to make it happen." He says his company now plans to revisit the work. Eggan and Douglas Melton, also at Harvard University, hope to get approval from the review boards that oversee their research in time to start work cloning human embryos early next year. Daley is planning experiments similar to those done by Murdoch's group. And Arnold Kriegstein and his group at the University of California, San Francisco, plan to try to replicate Hwang's methods with their own materials.

But for others, the episode merely confirms that therapeutic cloning is not the way forward. "I always had my doubts about therapeutic cloning to generate patient-matched cells," says Stephen Minger, a stem-cell researcher at the Wolfson Centre for Age Related Diseases in London, UK. He believes that banking stem-cell lines from normal embryos, so that they can be matched to patients once they are made, is a more realistic prospect. ■

Erika Check

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