Researchers in Shanghai have produced a promising new way of creating embryonic stem cells -- fusing human skill cells with rabbit eggs -- that may one day be used for treating disease.

Elaine Kurtenbach reports Dr Sheng Huizhen has traveled far in her career as a medical researcher. But for her most advanced work, she returned home to China.

Sheng led a team of scientists at the Shanghai No 2 Medical University who have reported fusing human skin cells with rabbit eggs to produce early stage embryos, which in turn yielded stem cells. The approach suggests a new way to produce human embryonic stem cells, which many scientists hope to use eventually for treating disease. The Shanghai scientists' work, published last month in *Cell Research*, a peer-reviewed journal of the Chinese Academy of Sciences, is likely to intensify debate over the ethical ramifications of embryonic stem cell research. Embryos must be destroyed to harvest such cells. Aided by a growing corps of foreign-trained scientists like Sheng, China is investing aggressively in biotech research. Sheng studied in Australia and worked for 11 years at the US National Institute of Health before returning to Shanghai in 1999 to head a stem cell research center. The focus of the research is about a new specialty known as "regenerative medicine," stem cells form in the first few days of embryonic development. They later develop into the many different types of cells that make up the body's bone, muscle, organs and other tissue. Some scientists believe that by using skin cells or other cells from a patient to create an embryo through cloning, they could extract stem cells that could be grown into tissue that genetically matches the patient's own. That tissue could then be used for transplants and medical procedures in the patient without rejection. The Chinese scientists fused human skin cells with rabbit eggs from which they had removed the nuclei, which contains DNA. The DNA from the skin cells took over and underwent "reprogramming," no longer directing the life of a skin cell, but rather driving embryonic development. The resulting embryos were clones of the human donors, although they were never intended to develop into babies. After about a week, researchers were able to obtain stem cells from the embryos, Sheng says. "We would regard this work as preliminary but very interesting and very promising," says Martin Pera, director of the Center for Early Human Development at Monash University in Australia. "Their work may have important implications for the field." Stem cells can be found in some adult tissue as well as in umbilical cord blood, aborted fetuses or discarded test-tube embryos. But the use of embryonic and fetal tissue is controversial.

Worldwide, regulations on cloning and stem cell research vary. In Britain, scientists can get licenses to create human embryos by cloning for the purpose of extracting stem cells. Australia bans human cloning of any kind. China bans cloning humans for reproductive purposes, but has allowed cloning for research. Researchers in Beijing say they have regenerated and duplicated gastrointestinal cells by culturing human stem cells -- a technology they hope to use to treat gastric and intestinal ulcers. Other advances have been reported using stem cells from human embryos to treat paralysis in a mouse and brain injuries in a human. Sheng says her work with rabbit eggs was
inspired by the lack of a supply of human eggs for stem cell research. "We did not have any access to human oocytes (eggs), and it would be a waste to use precious human oocytes to practice even if we had access to them," Sheng says. While US researchers reported success using cow eggs to clone human and animal cells, Chinese scientists have grown early stage panda embryos using rabbit eggs. So the Shanghai lab tried rabbits. Sheng believes the stem cells her research team has grown may eventually be used to study and treat diseases and to grow tissue for transplants. But her report in the journal Cell Research acknowledges that the work remains rudimentary, with many unanswered questions. It is unclear whether embryos created by fusing human skin cells with rabbit eggs can produce stem cells that will grow indefinitely and thus remain viable for therapeutic purposes, though Sheng believes they will. "This is an entirely new territory," Sheng says. But, she adds, "So far, I have not seen a single piece of evidence suggesting that the (stem cells) have a limitation in their potential to grow or to differentiate." It took Sheng more than two years to get her research results published -- a delay she attributes to questions over the viability of the stem cells produced by reprogramming.

"Our paper is dealing with an important issue," she says. "It can be expected that people will examine it very seriously."

(Eastday.com September 29, 2003)