

## KOREAN CLONING SCANDAL

## Prosecutors Allege Elaborate Deception and Missing Funds

**SEOUL**—Once-famed, now-disgraced stem cell pioneer Woo Suk Hwang was indicted on 12 May on charges of fraud, embezzlement, and violations of a bioethics law. Five other members of his team have also been indicted, three on fraud charges, one on a bioethics law violation, and one for destroying evidence and obstructing business operations. Hwang claims that he has been falsely accused on several points, according to Geon Haeng Lee, one of Hwang's seven lawyers.

Hwang, formerly a professor at Seoul National University (SNU), had claimed in a 2004 *Science* paper (12 March 2004, p. 1669) to have made a breakthrough in so-called therapeutic cloning by creating a stem cell line from a cloned human blastocyst. He followed that up a year later with a second *Science* paper claiming to have created 11 stem cell lines derived from tissue contributed by patients suffering from spinal cord injury, diabetes, or an immune disorder (17 June 2005, p. 1777). Together, these papers seemed to pave the way toward creating replacement cells and tissues for these and other diseases that would be genetically matched to individual patients. Hwang was feted by scientists around the world and became a national hero in South Korea, which hoped to ride his achievements to worldwide prominence in stem cell research.

The claims started unraveling last fall. First, bioethical lapses in collecting oocytes were alleged, then problems with manipulated photos and other supporting data were identified (*Science*, 23 December 2005, p. 1886). In January 2006, SNU announced that an investigating committee had concluded that no cloned stem cell lines existed. Hwang and his co-authors retracted both papers, and Seoul public prosecutors launched an investigation (*Science*, 6 January, p. 22).

The prosecutors' conclusions are documented in a 150-page report that fills in some of the remaining holes in the Hwang saga. According to the prosecutors, Hwang and his

team apparently believed that the "number 1" stem cell line that formed the basis for the 2004 *Science* paper was truly derived from a cloned blastocyst. Two separate investigations by SNU, however, concluded that the blastocyst most likely resulted from parthenogenesis,



**Sweeping charges.** In Gyu Lee of the Korean public prosecutor's office released a long-awaited report on the cloning scandal, indicting Woo Suk Hwang and five others on charges including fraud and embezzlement.

a form of asexual reproduction. The prosecutors' report leaves it up to academics to sort out whether the blastocyst was the result of cloning or parthenogenesis.

However, the report says Hwang's team did not keep proper records and did not have evidence to support any scientific claims about stem cell line number 1. So, the prosecutors allege, Hwang ordered associates Jong Hyuk Park and Sun Jong Kim to fabricate photos, DNA test results, and other supporting data for the 2004 *Science* paper.

For the June 2005 paper claiming the creation of 11 patient-specific cell lines, the report says that Kim, a member of the team from MizMedi Hospital in Seoul, was in charge of deriving stem cells from cloned blastocysts that had been created at the SNU lab. He was unable to do so. But, the report says, feeling pressure to perform and wanting to make a name for himself, he took fertilized stem cells from MizMedi's collection and mixed them with material from Hwang's lab. He reportedly told other researchers that light was "not good for the cells" and did most of

the work in semidarkness. Prosecutors concluded that no one else in the lab, including Hwang, realized what had been done until suspicions were raised after the paper was published, when DNA fingerprinting tests in December 2005 showed that the customized stem cell lines were identical to the fertilized stem cells from MizMedi.

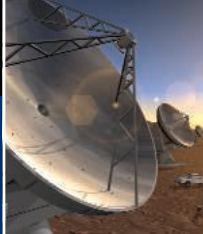
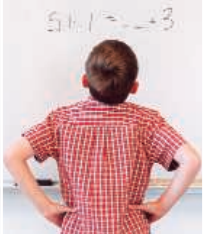
The report alleges that Kim created two lines, and Hwang, believing they were real, ordered him to fabricate data to make it look as though they had made 11. Kim was indicted for obstructing research work at SNU, as well as for destroying evidence. The prosecutors allege that, in addition to deleting related computer files from his laptop and computers at MizMedi, Kim told MizMedi researchers to hide the fact that he was removing stem cells from its labs.

Although Kim allegedly deceived Hwang, the prosecutors say that Hwang was ultimately responsible for ordering subordinates to fabricate data. The prosecutors did not file any charges against Hwang for publishing fraudulent research reports, however, saying it would be a complicated procedure that would have to involve *Science*.

The prosecutors confirmed earlier reports that Hwang had used many more oocytes than the several hundred he acknowledged, collecting 2236 eggs from 122 women, 71 of whom were compensated. Paying for oocytes continued even after a bioethics law banned the practice in January 2005, the prosecutors' report states.

Meanwhile, in addition to research misconduct, the prosecutors claim Hwang misappropriated \$2.99 million in state funds and private donations. Their report outlines an elaborate scheme in which Hwang withdrew large amounts of cash and carried it in bags to other banks to avoid a paper trail of bank transfers. The prosecutors say he had 63 accounts under different names, including those of junior researchers and relatives. To cover up some of the alleged embezzlement, he wrote false tax statements claiming to have bought pigs and cows for research purposes. Hwang faces up to 3 years in prison for violating the bioethics law and up to 10 years for the misuse of state funds.

The prosecutors also indicted two of Hwang's colleagues at SNU, professors Byeong Chun Lee and Sung Keun Kang, for ▶



fraud. The report says the two provided false evidence in order to receive government grants and then misappropriated the money. SNU has begun taking steps to fire the two professors.

Sang Sik Chang, head of the Hanna Women's Clinic in Seoul, which provided Hwang with eggs in 2005, was charged with violations of the bioethics law in connection with egg procurement. Hyun Soo Yoon, a professor of medicine at Hanyang University in Seoul, was indicted for creating false receipts and embezzling research funds approved for a joint research project to create stem cells at MizMedi.

Sung Il Roh, director of MizMedi, who also gave oocytes to Hwang, was not indicted; prosecutors say Roh did not pay for any oocytes after the bioethics law went into effect. Shin Yong Moon, a stem cell specialist at SNU who was co-lead author with Hwang on the 2004 *Science* paper, was cleared of wrongdoing by the prosecutors.

Hwang's lawyer, Lee, says Hwang maintains that he did not order junior researchers to fabricate data for the 2004 article and that he believed a member of his team had created the number 1 stem cell line from a blastocyst resulting from somatic cell nuclear transfer, not parthenogenesis. "Prosecutors based their conclusion on testimonies from Jong Hyuk Park and Sun Jong Kim and did not take into consideration Hwang's statements that he did not order them to fabricate data," Lee says.

Hwang's lawyer also denied that Hwang embezzled funds, saying that the scientist had made huge profits from lectures and publications, which amounted to about \$840,000. That money was put into the same bank accounts as his grants, but items such as his wife's car were bought with those private earnings, he contends. He says Hwang's lawyers will fight the charges in court. The first trial is scheduled for 20 June.

Meanwhile, the South Korean government says that it will try to retrieve the grant money given to Hwang and his lab at SNU. The Ministry of Science and Technology says, however, that about \$3.2 million has already been spent on design and construction of a new research facility that was being built adjacent to the College of Veterinary Medicine; those funds will be considered losses. SNU has not yet decided what to do with the unfinished building.

Hwang's supporters continue to urge Hwang to restart his research and the South Korean government to acquire a patent on the first stem cell line. "Hwang may have rushed to publish the 2005 article, but he should be acknowledged for creating the first stem cell line and cloning Snuppy" the dog, one supporter says. "We have to obtain a patent for the country's sake, not Hwang's."

Last weekend, hundreds of Hwang's supporters gathered in front of the prosecutors' office, protesting Hwang's indictment. Police sealed off access to rooftops of nearby buildings to prevent suicide, as has been attempted in the past. Before the indictment, the Venerable Seol,

had damaged many junior researchers and collaborators who had no idea of what Hwang and his close associates were up to.

South Korea's research community seems to be taking the lesson to heart, says Kye Seong Kim, a stem cell researcher at Hanyang Univer-



**Woo Suk Hwang**

Former SNU professor  
Charges: Fraud, embezzlement, bioethics law violation



**Sung Keun Kang**

SNU professor  
Charges: Fraud in procuring government grants and misappropriating funds



**Sun Jong Kim**

Former MizMedi Hospital researcher  
Charges: Destroying evidence, obstructing research work



**Byeong Chun Lee**

SNU professor  
Charges: Fraud in procuring government grants and misappropriating funds



**Hyun Soo Yoon**

Hanyang University professor  
Charges: Falsifying receipts and embezzling research funds



**Sang Sik Chang**

Director, Hanna Women's Clinic (photo not available)  
Charges: Bioethics law violation

a Buddhist monk, announced on 8 May that three individuals had pledged to contribute \$65 million to help Hwang, a fellow Buddhist, restart his research. After the prosecution's announcement on 12 May, several monks began a 24-hour relay bowing ritual next to Jogye Temple in central Seoul in support of Hwang.

Looking beyond individual culpability, senior prosecutor In Gyu Lee said at a press briefing that he placed partial blame for the scandal on "the strict Korean lab culture," which leaves junior researchers powerless to refuse unethical demands by lab heads. He added that although the scandal demonstrated that "a lot of scientists lacked ethics," he also noted that the fraud

sity College of Medicine. He believes universities will now set up offices of research integrity. "That's one good thing that might come out of this tragedy," he says. Others think reforms must go further. Duck Hwan Lee, a chemistry professor at Sogang University in Seoul, places partial blame on the government for pouring so much money into Hwang's project without sufficient information. "[The government] should create a system that enables more transparent research funding. Scientists should be able to compete for grants fairly instead of relying on lobbying or personal ties," he says.

**-D. YVETTE WOHN AND DENNIS NORMILE**  
D. Yvette Wohn is a reporter in Seoul.