

January 10, 2006

## Researcher Faked Evidence of Human Cloning, Koreans Report

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Dr. Hwang Woo Suk, the South Korean researcher who claimed to have cloned human cells, fabricated evidence for all of that research, according to a report released today by a Seoul National University panel investigating his work.

The finding strips any possibility of legitimate achievement in human cell cloning from a researcher who had been propelled to international celebrity and whose promise to make paralyzed people walk had been engraved on a Korean postage stamp.

In his string of splashy papers, his one legitimate claim was to have cloned the dog he named Snuppy, the panel said.

"Dr. Hwang's team cannot avoid taking grave responsibility for fabricating its papers and concealing data," said Chung Myunghee, the head of the university's investigatory panel.

Last month the panel said there was no evidence to support Dr. Hwang's claim in June 2005 to have cloned cells from 11 patients with an efficient new technique using very few human eggs.

But that still left open the possibility that he had gotten the cloning technique to work to some degree, as he wrote in the report first announcing his success in an earlier article in March 2004. The panel found that the 2004 article was also fabricated.

Dr. Hwang's professional demise is a severe embarrassment for the Korean government, which invested some \$65 million in his laboratory and in making him a national hero. But the blow to Korea's scientific reputation abroad may be cushioned by the fact that other Korean institutions, notably the television program "PD Notebook" and a group of skeptical young Korean scientists, took the lead in discovering the problems with Dr. Hwang's work and in eventually forcing the investigation by the university.

Dr. Hwang still has public support. Last night 150 people festooned trees and shrubs at the gate of Seoul National University with strips of yellow, blue and green cloth. Banners that were hung between the trees showed the Korean flag and slogans such as "The Pride of Korea" or "Biotechnology is Our Future."

Korean prosecutors, however, have barred Dr. Hwang and nine other South Korean scientists from leaving the country. They have said they will launch an investigation as soon as the university panel announced its findings.

The Seoul panel said Dr. Hwang had accomplished only the first steps toward creating embryonic stem cell lines from people, and had failed to create any successful line, despite the many resources at his disposal. Those included skilled technicians and a bountiful supply of human eggs - as many as 2,061 eggs from 129 women, an extraordinary number, given the pain and difficulty of extracting eggs from their donors.

The cell colony he presented in his 2004 report as being derived from a person was in fact a human egg, induced to develop by parthenogenesis, also known informally as virgin birth because no sperm is used. With humans, however, such eggs do not develop very far.

The panel criticized Dr. Hwang for fabricating data and said his "scandalous case" would be a learning experience for Korean science. "The young scientists who courageously pointed out the fallacy and precipitated the initiation of this investigation are our hope for the future," the panel said.

As for the field of embryonic stem cells, researchers in the United States say it should not be much affected in the long run, at least on a scientific level, since its theoretical promise is unchanged by one man's misdeeds.

In practical terms, however, the panel's new finding is a sharp setback for therapeutic cloning, the much discussed goal of converting a patient's own cells into new tissue to treat a wide variety of degenerative diseases from diabetes to heart disease. The technique for cloning human cells, which seemed to have been achieved since March 2004, now turns out not to exist at all, forcing cloning researchers back to square one.

The Seoul panel's finding also raises the question of how an important but fabricated result could survive unchallenged, in a presumably rigorous and competitive scientific field, for almost two years.

Dr. Hwang's escapade may have prevented other researchers entering the field of human cloning because he seemed to have it all sewn up. "I have to admit that I decided not to push the efforts here at Stanford because it would have been almost unethical to work with human eggs if he had made the process so efficient," said Dr. Irving Weissman, a leading stem cell researcher.

Dr. Robert Lanza, vice president of Advanced Cell Technology, a Massachusetts company that had been active in the human cloning research, said the company's financing dried up after Dr. Hwang claimed success in 2004.

Dr. Lanza said that the unusual design of Dr. Hwang's 2004 report, in which the woman who provided the cloned nucleus also provided the eggs, might have been intended to evade a critical test of cloning.

Dr. Hwang's 2005 article, in which he claimed great improvements on the cloning process, might have been intended as a confirmation of his first claim, Dr. Lanza said. By that time, he said, Dr. Hwang evidently felt confident enough to present his nucleus donors and eggs donors as being different people.

One reason Dr. Hwang's results seemed credible is that he gave lectures in the United States in which he explained each step of his process. "He went through the exact method, telling people how to do it," Dr. Weissman said. Dr. Hwang also enlisted a leading American expert on cloning monkeys, Dr. Gerald Schatten of the University of Pittsburgh, as the senior co-author on his 2005 report, even though Dr. Schatten had done none of the experiments. "Everyone wondered how Schatten got to be the senior co-author, but his vouching for Hwang made it a little more likely," Dr. Weissman said.

Scientific journals play an important gatekeeping role in science by screening out fallacious reports. But Dr. Hwang's two reports on human cloning were published by Science and his claim to have cloned a dog was accepted by Nature, another leading journal and Science's rival in recruiting important papers. The editors of each journal have said that the expert reviewers who scrutinize submitted manuscripts could not be expected to detect fabricated data. Not everyone agrees.

"It sounds as though their processes were rather sloppy," said Dr. Benjamin Lewin, the founder and former editor of Cell, a biology journal known for its rigor. "At a minimum, Science should have been more careful and should never have reached the stage" of publishing a paper with several identical photos.

Dr. Lewin said that a journal editor needed to develop an intimate knowledge of his reviewers' strengths and weaknesses, and that "Nature and Science don't have the reputation for rigorous review." A spokesman for Science declined to comment immediately, and Nature editors could not be reached.

With Dr. Hwang's professional implosion, the goal of cloning human cells is once again open. Dr. George Daley, of Harvard Medical School, said there was no reason to suppose human cells could not be cloned, despite Dr. Hwang's failure to do so even with rich financing and copious supplies of human eggs.

Dr. Daley said two laboratories at Harvard, his own and Dr. Kevin Eggan's, had been seeking approval for more than a year to clone human cells. Two groups in England are pursuing the same goal, one at Newcastle University and the other led by Ian Wilmut, the cloner of Dolly the sheep. Advanced Cell Technology, of Worcester, Mass., is also back in the game.

"I think it's just a matter of time before other groups produce this," Dr. Daley said, although he added that it may be a long time before anyone attains the level of efficiency claimed by Dr. Hwang.