



Hwang-gate: Lessons for Science Governance

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Lessons for Research Integrity

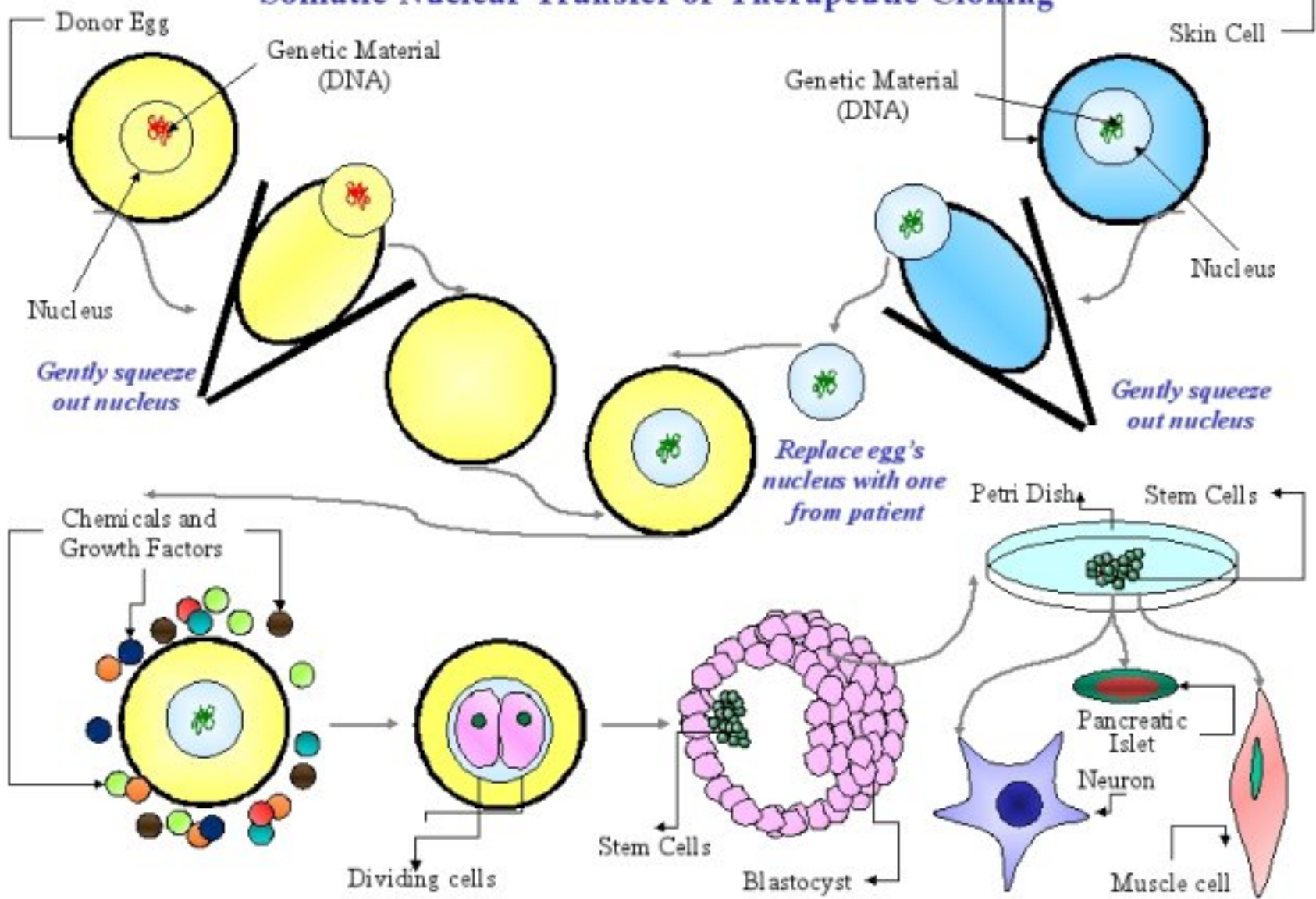
Governance from “Hwang Gate”

- ▶ Hying science can lead to fraudulent science (1)
- ▶ Peer-review is no substitute for good science governance (2)
- ▶ Research integrity is increasingly a matter of network integrity (3)
- ▶ The globalization of science leads to a globalization of the idea of research integrity (4)
- ▶ When dealing with cases of the scientific fraud: act quickly and decisively – and have the right institutions in place (5)

The Kingdom of Cloning (November 1, 2005)



Somatic Nuclear Transfer or Therapeutic Cloning





12 February 2004

Science (1) paper

Woo Suk Hwang and colleagues announced that they have cloned 30 human embryos and gained stem cells from one of them

May 2004

Ethical questions

Questions are raised about ethical practices in Hwang's work after investigations by *Nature*.



19 May 2005

Science (2) paper

Hwang's team at the Seoul National University in South Korea reports it has established 11 embryonic stem-cell lines derived from the skin cells of individual patients

11 November 2005

Science: Schatten says he has stopped working with Hwang, because he believes Hwang misrepresented facts about consent issues related to the 2004 paper.

12 November 2005

Schatten publicly cuts all ties to Hwang and his team at Seoul National University.



24 November 2005

Hwang admits that his stem-cell research used eggs from paid donors and junior members of his team. He resigns from his official positions, saying he will continue his research.

11 December 2005

Investigation opened
Seoul National University announces an investigation of Hwang's research, as requested by Hwang himself.

16 December 2005

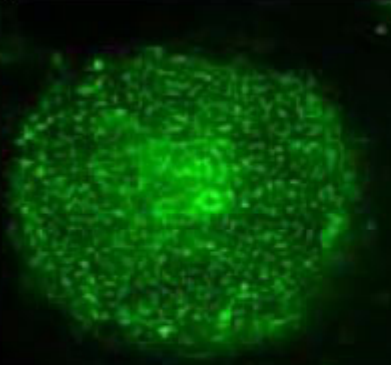
Science announces that Hwang and Schatten have written to request a retraction of their 2005 paper

10 January 2006

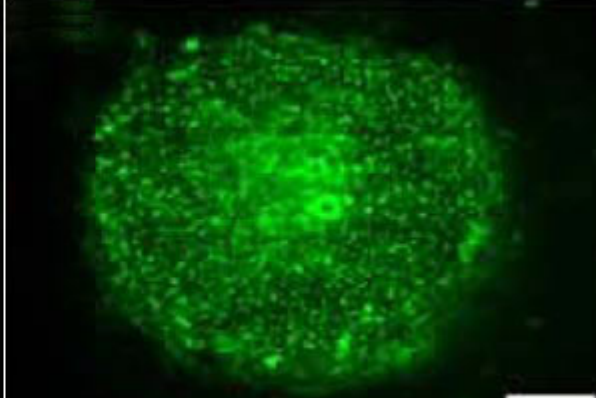
Verdict

The Seoul National University investigating committee delivers its verdict: both Hwang's 2004 and 2005 *Science* papers are based on fraudulent data. But the Afghan dog Snuppy is a real clone.

[사진1]

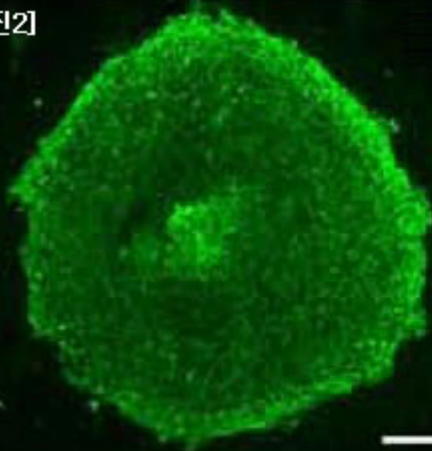


NT-hESC-9/SSEA-4

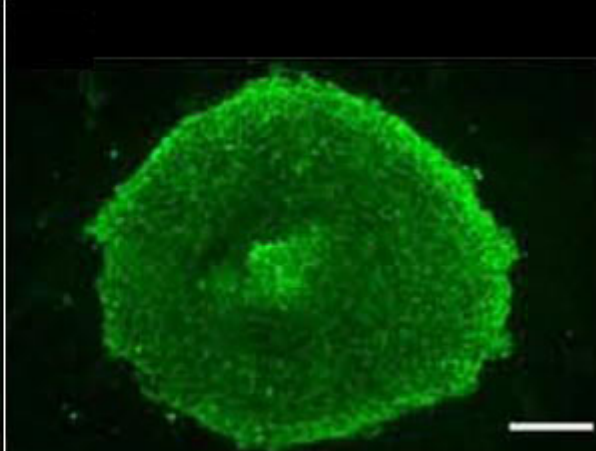


NT-hESC-11/TRA-1-60

[사진2]

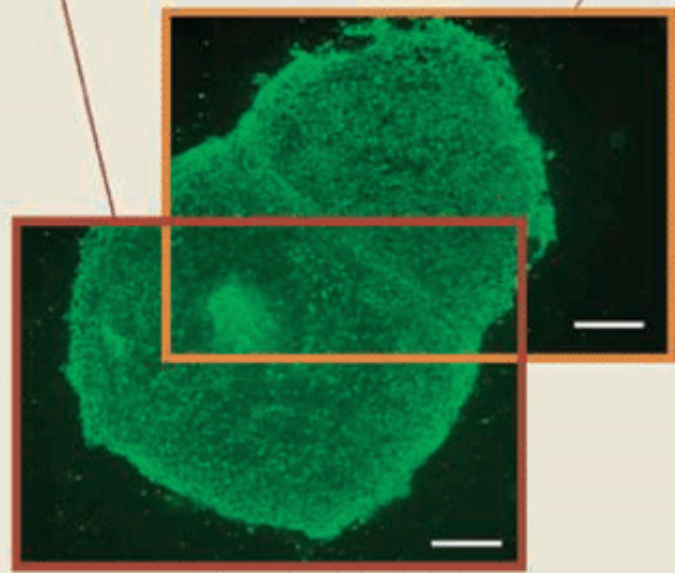
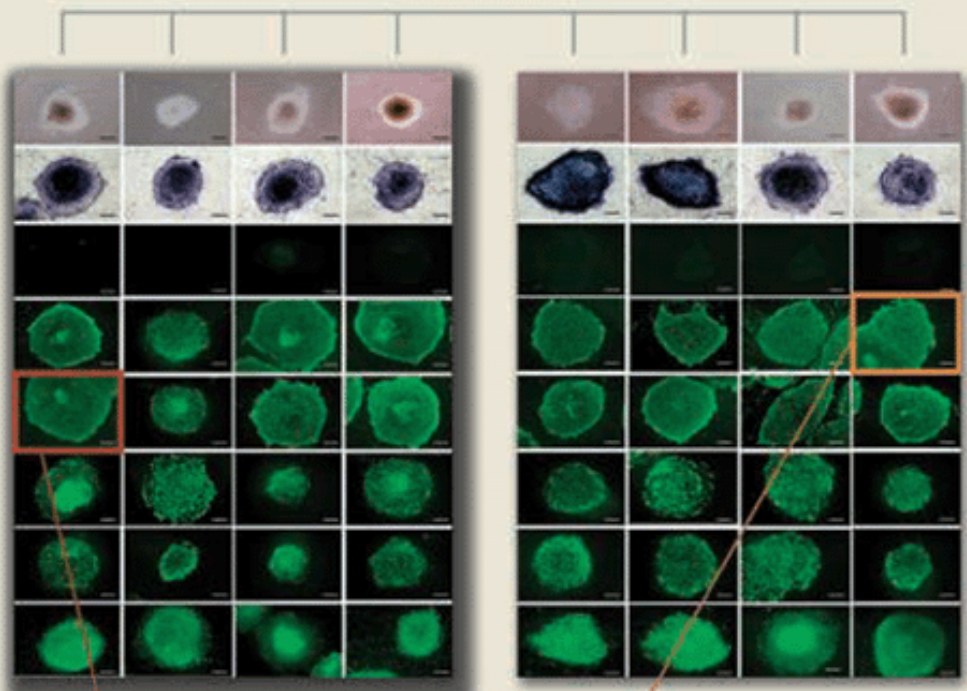


NT-hESC-3/SSEA-3

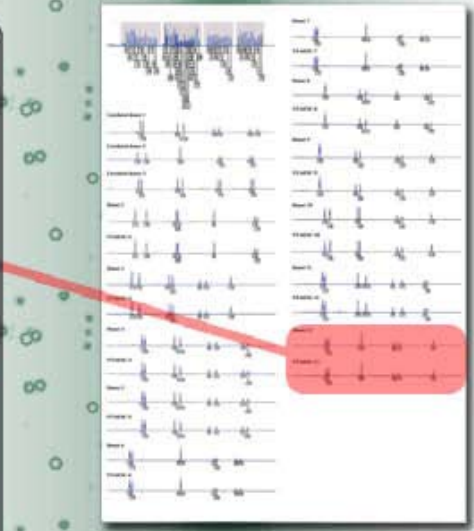
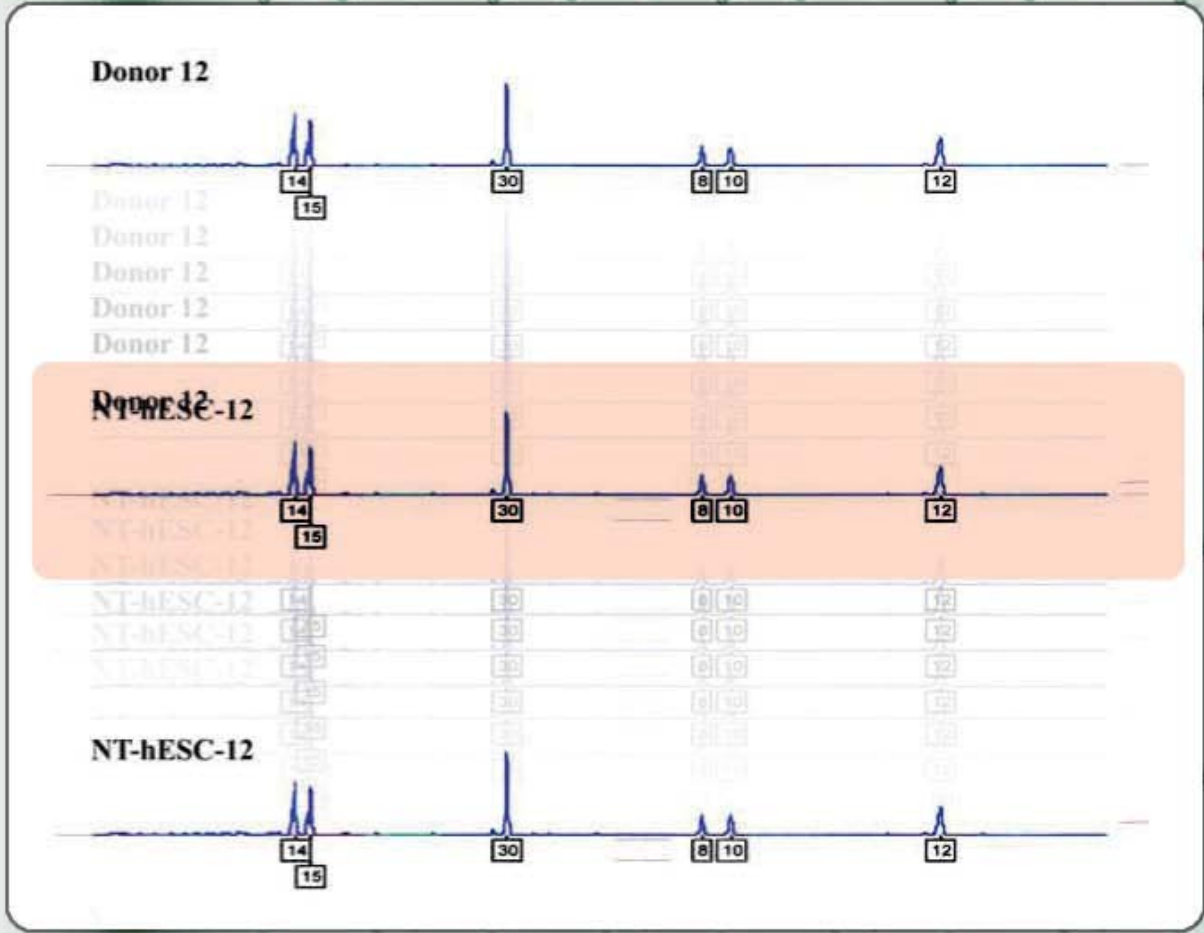


NT-hESC-8/SSEA-3

Stem cell lines



Science 6 January 2006:
Vol. 311. no. 5757, pp. 23 - 24





Lessons for Research Integrity Governance from “Hwang Gate”

- ▶ Hying science can lead to fraudulent science (1)



Biotechnology Governance and the Developmentalist State —

- ▶ Biotechnology industry in Korea is highly fragile.
- ▶ Most Korean start-ups remain small: it is often public support that keeps them alive.
- ▶ Total investments in biomedicine in the public sector is well below the average of most OECD countries
- ▶ Hwang Woo-Suk's rise: in this climate of often unrealistic ambitions, paired with a relatively narrow basis in basic science.
- ▶ **Hwang offers the scientific solution for the state's political program of industrial transformation through biotechnology**

The Rise of Hwang

► Mid-1990's–1999

Woo-Suk Hwang becomes “Younglongi”, the cloning expert.

Hwang appointed as a member of the National Science and Technology Committee, the central organization for science and technology funding.



Biotechnology Governance in South Korea



19. 02. 1999
Hwang and Young-longi

► **2004 to the year 2005**

Hwang turns into “King of Cloning” (*Science* publications) An alliance between government, politicians, and the media further strengthened. Global network is being build up in a hurry. Cheong Wa Dae, Office of the President, and government start to invest large sums of money in Professor Hwang’s project.

► **Science 2004:** First ever production of embryonic stem cells from cloned human balstocyst

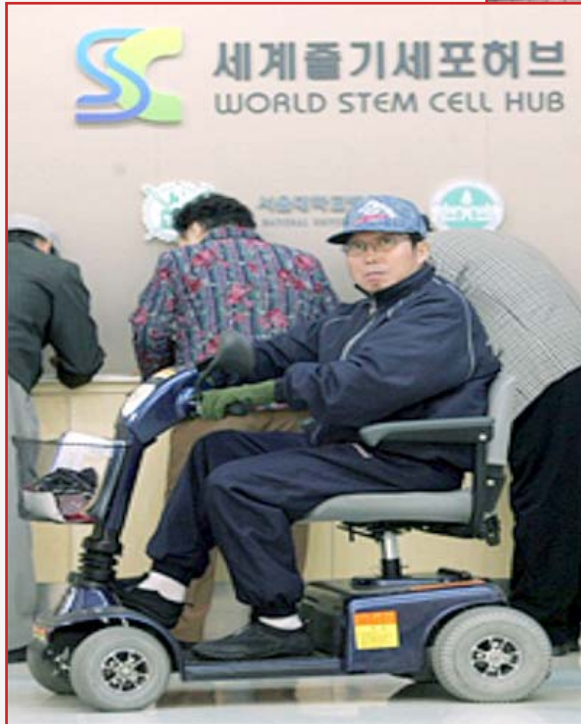
► **Science 2005:** 11 ES cell lines from embryos cloned from patients



© Kim Kyung-Hoon/Reuters



Commemorative stamp





Lessons for Research Integrity Governance from “Hwang Gate”

Peer-review is no substitute for good science governance (2)
(respecting rule of law, transparency, accountability, respect for human rights, absence of corruption)



The Politics of Pride: South Korea

- ▶ Stem cell research is the pride of Korea
- ▶ Prof Hwang Woo-Suk is the pride of Korea
- ▶ Stem cell research will soon help to heal some of the worst diseases and impairments, such as Parkinson's' disease and spinal cord injury
- ▶ Stem cell research will be key for the way of Korea to become a biotechnology world leader
- ▶ Nothing should be in the way of Prof. Hwang and his research



The Politics of Bioethics

- ▶ Bioethics and Biosafety Act comes into force on January 1, 2005.
- ▶ Hwang registered his research team as SCNT institute on January 3rd, 2005 and it was authorized immediately afterwards.
- ▶ On January 25th, 2005, he was granted authorization by Minister of Health and Welfare to continue with his SCNT research
- ▶ Clause in the law: those who had been making progress in their research on SCNT up to 3 years before January 1, 2005, and those who had previously published their results were allowed to continue their research upon authorization by Minister of Health and Welfare.
- ▶ **Only one person in Korea falls under this clause:** Hwang Woo-Suk

Biotechnology Governance in South Korea

Period: 1993-2005 <i>Unit=USD</i>		Determined Funding	Used Funding
Government	Ministry of Science and Technology	38,544,336	13,674,013
	Ministry of Information and Communication	4,407,996	4,407,996
	Ministry of Education & Human Resources Development	622,245	622,245
	Ministry of Agriculture and Forestry	450,026	450,026
		44,024,603	19,154,280
Private	Woo-Suk Hwang Professor Sponsorship	3,419,785	1,824,705
	New Industry Strategy Institute	6,253,203	4,100,461
	Gwanak-gu Supports Association	295,233	139,416
		9,968,221	6,064,582
	53,992,824	25,218,862	

U.S. Dollars (1 USD = 975.5 KRW)

Source: The Board of Audit and Inspection (BAI), 2006 Mid-Announcement of R&D Management Audit Result, page 2

The Hwang System I

Political circles

Geun-hye Park
(Chairwoman, The Grand National Party)
Hwang Supporter's Association
(42 member, the National Assembly)

Economic circles

Jae-cheol Kim
(Chairman, DongWon Enterprise
& Hwang Professor Sponsorship)

Academic II (Science)

Sung-il Rho (MiziMedi Hospital)
Shin-young Moon (Seoul National University)
Gerald Schatten (University of Pittsburgh)
Ian Wilmut (Edinburgh University)

Government

Moo-hyun Roh (President)
Ky-young Park (Secretary, Information and Science Policy)
Byoung-Jun Kim (Chief Secretary, President for National Policy)
Dae-je Jin (Minister, the Ministry of Information and Communication)
Hae-chan Lee (Prime Minister)
Dong-yeong Jung (Minister, the Ministry of Unification)

Media

Eun-jeong Lee (The Kyunghyang Shinmun)
Bang-ju Park (The JoongAng Ilbo)
Yeong-wan Lee (The Chosun Ilbo)
Hun-gi Kim (The Donga Ilbo)
Sa-hun Hong
(The Korean Broadcasting System)

Informal Member

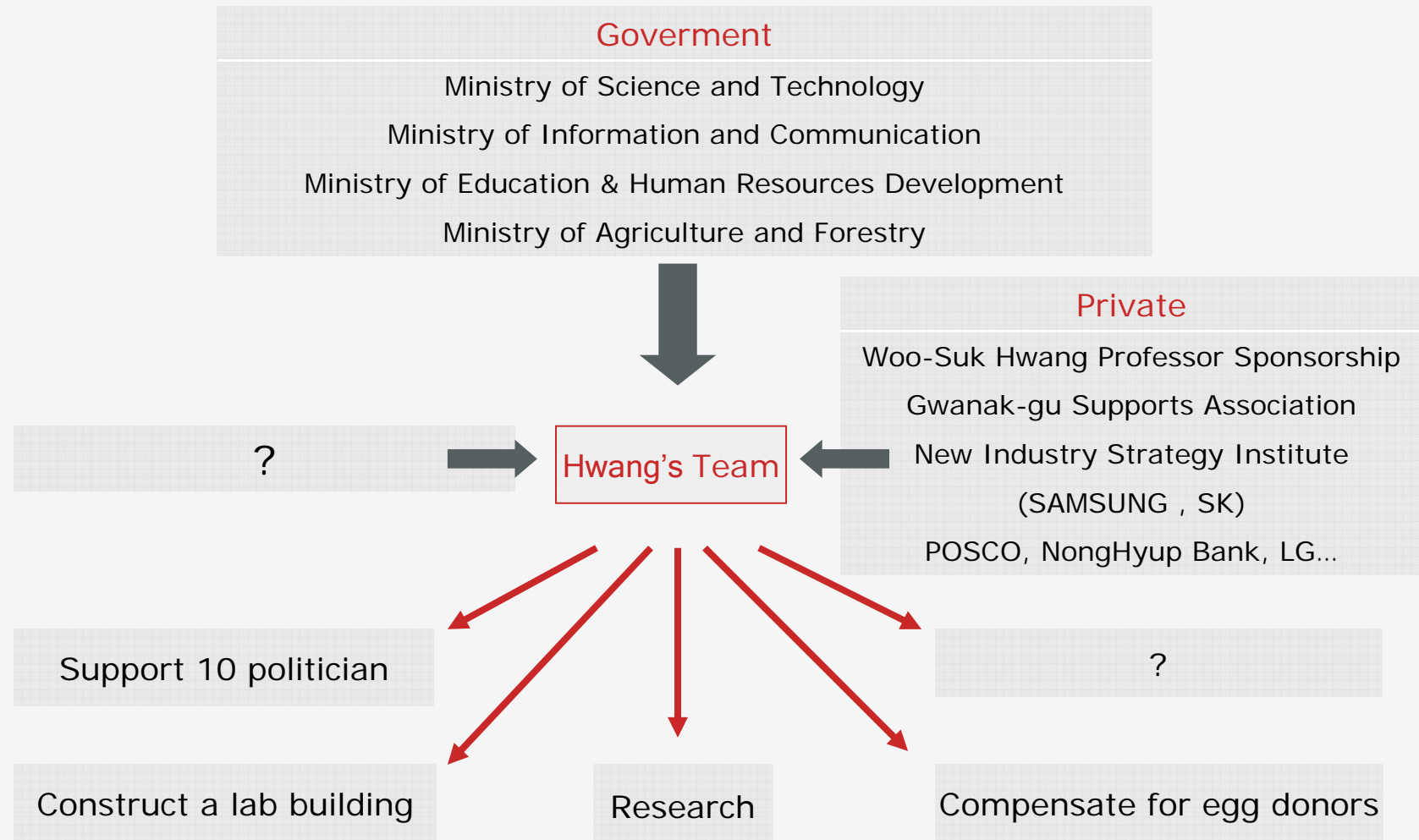
Tae-II Yun
(Sysop, 'I love Hwang' Internet café)
Hee-won Han
(The National Human Rights Commission)

Academic I (lawyer, Bioethicist)

Kyu-won Jung
(professor, Hanyang University
Member, National Bioethics Committee)
Sam-Seung Yang
(Chairman, National Bioethics Committee)



The Hwang System II Money Flows





Lessons for Research Integrity Governance from “Hwang Gate”

- ▶ Research Integrity is increasingly a matter of network integrity
(3)

The Hwang System III: The Fraud Network

IRB Boards

- College of Veterinary Medicine IRB , SNU
- College of Medicine IRB , Hanyang University

Hospitals Involved in Stem Cell Research

MiziMedi Hospital

- Youn, Hyunsoo
- Kim, Sunjong
- Park, Jonghyeok

International Relations: Collaborators

- **Gerald Schatten** (University of Pittsburgh)
- Ian Wilmut (Edinburgh University)

The Hwang Lab

- Prof. Hwang
- **Prof. Kang**
- Students & Researchers

Fertility/IVF Clinics: Access to Oocytes

- MiziMedi Hospital
- Hannah Hospital
- HangYang Uni. Hospital
- Jeil Hospital

International Relations II: Received pseudo-SCNT stem cell

- Roger Pedersen (University of Cambridge, UK)
- Lorenz Studer (Sloan-Kettering Cancer Center, USA)

DNA fingerprinting

National Investigation of Scientific Investigation (NISI)

* Prof. Lee and his students who created the cloned dog were not involved in stem cell fraud.

Fabricated data

	2004 paper	2005 paper
Stem cell	NT-1 parthenogenesis	NT-2 to NT-12 IVF-ES cells
Fabricated data	DNA fingerprinting imprinting analysis HLA typing Teratoma DNA & photos	DNA fingerprinting HLA typing Karyotyping Stem cell staining photos Embryo body photos Teratoma Data

2005 Science paper (NT-2 ~ NT-12)

4 IVF Clinics

2,221 eggs
(2004, 2005 paper)

The Hwang Lab

Hwang's students

Nuclear Transfer
Blastocyst formation

Kim, Sunjong

Establishment of
Stem cell

Took IVF-ES cells

MiziMedi Hospital


Miz 1-15 (IVF-ES cell)

NT-2 (Miz-4)
NT-3 (Miz-8)
NT-4,5 (Miz-4)
NT-6,7 (Miz-6)
NT-8 (Miz-7)
NT-9 (-)
NT10 (Miz-10)
NT11 (Miz-2)
NT12 (-)



Lessons for Research Integrity Governance from “Hwang Gate”

- ▶ The globalization of science leads to the globalization of the idea of research integrity (4)



U-turn in Stem Cell Governance from December 2005 on: Moving back from “Korean strategy” to an “internationally acceptable” approach.”


Causes:

- ▶ Imposition: coercive isomorphism from formal and informal pressures: *Nature, Science, etc..*
- ▶ International harmonization: regulatory and ethical standards: *ova trading practices*
- ▶ Transnational communication: Korean BRIC (Biological Research Information Center) starts to give evidence (also in English) that Hwang is fraudster. These news are pick up world-wide



Lessons for Research Integrity Governance from “Hwang Gate”

- ▶ When dealing with cases of the scientific fraud: act quickly and decisively – and have the right institutions in place (5)



**Final Report on
Professor Woo-Suk Hwang's
Research Allegations**
January 10, 2006.
**Seoul National University
Investigation Committee**

Chairperson: Professor Myung-Hee Chung (College of Medicine, SNU)

Secretary: Professor Uhtaek Oh (College of Pharmacy, SNU)

Member:

Professor Hong-Hee Kim (College of Dentistry, SNU)

Professor Un-Jong Pak (College of Law, SNU)

Professor Yong-Sung Lee (College of Medicine, Hanyang University)

Professor In-Won Lee (College of Agriculture & Life Sciences, SNU)

Professor In-Kwon Chung (College of Science, Yonsei University)

Professor Jin-Ho Chung (Associate Dean of Research Office, SNU)



Summary: Lessons for Research Integrity

Governance from “Hwang Gate”

- ▶ Hying science can lead to fraudulent science
- ▶ Peer-review is no substitute for good science governance
- ▶ Research integrity is increasingly a matter of network integrity: science culture matters!
- ▶ The globalization of science leads to a globalization of the idea of research integrity
- ▶ When dealing with cases of the scientific fraud: act quickly and decisively – and have the right institutions in place