
Cloning-dilemmas-third millennium-where to go on in the future?

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Prologue

"We think that science has already explained all when explained movement of the Moon around the Earth. But the real world is not universe like a simple pendulum clock."

Jim York, a physicist from the University of Maryland who coined the name "chaos"

We are assured that the field of "Human Cloning" comprise the most crucial scientific questions of present time. It seems that all exaltation of its progress and fascinating results have vanished while being replaced with the cogitative concern that Immanuel Kant expressed in three fundamental questions:

What can I know?

What should I do?

What may I hope?

While considering all these questions famous philosopher thought about any human being.

Today, these queries consideration is based on the experience of illuminator "ingress" in all that exist, as well as in the human being itself. Experience of the "illumination" triumph seduces science beyond its achievements and freedoms. We would say that science wants even beyond its real wants. Nowadays, global scientific impact appears as general opinions correlated to the universe of technological utilisation, professionalism in knowledge and biological science influence on the behavioural inducements.

The basic thinking principles established by modern science are inseparable from the statements of philosopher Descartes: "World of mind and world of body are separated as individual substances that exist separately without any needful co-existence". In that way, a new authoritative scientific relation towards the world has been created, out of which, the field of values "Heavens are devoid of the glory of God" (A.N. Whitehead, "Science and the modern world") has been completely excluded or eliminated.

It is obvious that the crucial postulations of nature are created throughout gathering of the sufficient data and simplification of the numerous correlative causes and

consequences in order to elucidate "the anarchy of systems" and accomplish the exact predictions of their attitudes. Amazing technological progress in 20th century made many people believe that some day science would find out all ignorance of nature and improve the control over it. According to that assumption, the attitude of very complex dynamic systems would finally conform to the scientific formulations and calculations.

A fascinating thoughtful help of chaosologists, particularly in their theory of fractals that revealed an apprehension of the reality as made from worlds within self-similar worlds i.e. worlds within dimensions, is necessary for the proper quantification of defect associated with the progress in knowledge of life. That knowledge has been previously neglected to the simple scientific facts and responsibilities (especially in medicine) that naturally appear from inside when life is recognised as a holistic system.

About cloning

During the last 5 years, human cloning has become a field of particular public interests, attentions and serious moral discussions. From February 1997, when the news about the first successful mammal cloning (sheep Dolly) was resounded, till present time several mammal species have been cloned (Dolly, the world's first cloned sheep, has been euthanized after being diagnosed with progressive lung disease) (Table 1).

Although human child cloning is still being uncertain and animal experiments are demonstrating low success rate, the production of the functional mammal clones is indicating real possibilities of the human cloning process. In November 2001, American researchers announced that they produced the first cloned human embryos despite the fact that study had been carried out on only six cells and embryos did not survive. Additionally, a few specialists in fertilisation proclaimed their intention to perform cloning of human beings.

Correct and reliable terminology

Today, it is recognized that there is no agreement about the terms used to discuss human cloning, regarding both the activities involved and the entities that result. The terminology ever used should image descriptive reality of

Table 1 Comparative data on born-alive cloned animals
(NAS Report on Scientific and Medical Aspects of Human Cloning)

ANIMAL SPECIES	DONOR CELL	NUMBER OF TRANSFERRED CLONED EMBRYOS	NUMBER OF BORN-ALIVE INDIVIDUALS	PERCENTAGE OF BORN-ALIVE INDIVIDUALS PER TRANSFERRED EMBRYOS	REFERENCES
Sheep	Frozen Udder Cells	29	1	3.4%	1
Bovine	Foetal Fibroblasts, Cumulus and Tuba Uterina Epithelial Cells	496	24-30#	4.8-6%	2a
		10	4-8*	40-80%	2b
Mouse	Cumulus Cells	2468	31**	1.3%	3
Goat	Transgenic	97	5	5.2%	4a
	Foetal Fibroblasts	85	3	3.5%	4b
	Fibroblasts	184	5	2.7%	4c
Pig	Foetal Fibroblasts	110	1	0.9%	5a
		335	5	1.5%	5b
Cat	Cumulus Cells	87	1	1.1%	6
Rabbit	Cumulus Cells	371	6	1.6%	7
References:					
1. Wilmut, I., et al., Nature, 385: 264-267 (1997) 2a. Cibelli, J.B., Science, 280: 1256-1258 (1998) 2b. Kato, Y., et al., Science 282: 2095-2098 (1998) 3. Wakayama, T., et al., Nature, 394: 369-374 (1998) 4a. Baguisi, A., Nature Biotechnology, 17: 456-461 (1999) 4b. Keefer, C.L., Biol. Reprod, 64: 864-856 (2001) 4c. Reggio, B.C., et al., Biol Reprod, 65: 1528-33 (2001) 5a. Onishi, A., et al., Science, 289: 1188-90 (2000) 5b. Polejaeva, I.A., et al., Nature, 407: 86-90 (2000) 6. Shin, T., et al., Nature, 415: 859 (2002) 7. Chesne, P., et al., Nature Biotechnology, 20: 366-369 (2002) # 6 animals died soon after their birth; * 4 animals died soon after their birth; ** 20 animals died in their early age (Ogoniki, N.K., Nature Genetics, 30: 253-4 (2002)).					

the substance in the most reliable manner in order to submit the moral arguments to the relevant authorities. The proper terminology should overcome artificial remodeling in moral question resolving or denying of the crucial moral elements in the terms with obvious facing the moral enquiries.

According to the studious analysis of cloning activity and its correlations to the accomplished meanings and purposes, as well as according to the extensive critical analysis of the alternative terminology, the following definitions might be adopted as core terms when discussing the subject of human cloning:

- Cloning: A form of reproduction in which offspring result not from the chance union of egg and sperm (sexual reproduction) but from the deliberate replication of the genetic makeup of another single individual (asexual reproduction).
- Human cloning: The asexual production of a new

human organism that is, at all stages of development, genetically virtually identical to a current existing or previously existing human being. It would be accomplished by introducing the nuclear material of a human somatic cell (donor) into an oocyte (egg) whose own nucleus has been removed or inactivated, yielding a product that has a human genetic constitution virtually identical to the donor of the somatic cell (this procedure is known as "somatic cell nuclear transfer").

Instead of use the terms "reproductive cloning" and "therapeutic cloning" the following designations should be used:

- Cloning to produce children: Production of a cloned human embryo, formed for the proximate purpose of initiating a pregnancy, with the ultimate goal of producing a child who will be genetically virtually identical to a currently existing or previously existing individual.

- Cloning for biomedical research: Production of a cloned human embryo, formed for the proximate purpose of using it in research or for extracting its stem cells, with the ultimate goal of gaining scientific knowledge of normal and abnormal development and of developing cures for human diseases.
- Cloned human embryo: A human embryo resulting from the nuclear transfer process (as contrasted with a human embryo arising from the union of egg and sperm), the immediate (and developing) product of the initial act of cloning, accomplished by successful somatic cell nuclear transfer, whether used subsequently in attempts to produce children or in biomedical research.

Ethical and legal consideration of the merits of cloning-to-produce-children

Ethics of cloning-to-produce-children

The prospect of cloning-to-produce children raises a host of moral questions, among them following are the most important:

1. Could the first attempts to clone a human child be made without violating accepted moral norms governing experimentation on human subjects?
2. What harms might be inflicted on the cloned child as a consequence of having been made a clone?
3. Is it significant that the cloned child would inherit a genetic identity lived in advance by another and, in some cases, the genetic identity of the cloned child's rearing parent?
4. How might cloning-to-produce-children affect relationships within the cloning families? More generally, how might it affect the relationship between the generations?
5. How might it affect the way society comes to view children?
6. Other questions

A broad ethical evaluation of all above mentioned problems regarding the value of cloning-to-produce children is an obligation. Two reports by the National Bioethics Advisory Commission of the United States of America, 1997 and 2002, concluded that attempts to clone a human being would be unethical "at this time" due to safety concerns and the likelihood of harm to those involved.

National Academy of Sciences of the United States of America alleges:

"Our present opposition to human reproductive cloning is based on science and medicine, irrespective of broader considerations. We stress, however, that a broad ethical debate must be encouraged so that the public can be prepared to make decisions if human reproductive cloning is some day considered medically safe for mothers and offspring".

Purposes

In recent years, in anticipation of cloning-to-produce-children, proponents have harmonised a variety of possible uses of this technology. The desire to control or select the genomes has been observed in more than a few prospective users around the world.

Although we appreciate that a perfected technology, once introduced for one purpose, might then be used for any other purpose, we shall state only purposes that seem to us to merit serious consideration.

1. Production of Biologically Related Children

Human cloning would allow individuals or couples with fertility problems to have biologically related children. In addition, it would allow married couples with fertility problems to avoid using donor gametes, and therefore avoid raising children with genetic inheritances from outside the marriage.

2. Avoidance of Genetic Diseases

Human cloning could allow couples at risk of generating children with genetic disease to have healthy children (for example, if both parents carry one copy of a recessive gene for the same hereditary disorder).

3. Production of "Rejection-Proof" Transplants

Human cloning could produce ideal transplant donors for people who are sick or dying. Cloning could potentially serve the human goods of beginning a new life and saving an existing one.

4. "Replication" of a Loved One

Human cloning would allow parents to "replicate" a dead or dying child or relative.

5. Reproduction of Individuals of Great Genius, Talent, or Beauty

Human cloning would allow families or society to reproduce individuals of great genius, talent, or beauty, where these traits are presumed to be based on the individuals' desirable or superior genetic make-ups.

Arguments for cloning-to-produce children

The purposes or reasons for cloning-to-produce-children are clearly intelligible and stated. When challenged, the defenders of these purposes often appeal to the larger moral and political goods. These typically fall within the following three categories: human freedom, existence, and well-being.

1. The Goodness of Human Freedom

Strictly speaking, the appeal to human freedom is not so much a defence of cloning itself as it is of the right to practice it, asserted against those who seek to prohibit it. In *Eisenstadt v. Baird* (1972), the United States Supreme Court enunciated the principles of reproductive freedom: "If the right to privacy means anything, it is the right of the individual, married or single, to be free from unwarranted intrusion and interference into matters so affecting a person as a decision whether to bear or beget a child."

2. The Goodness of Existence

Like the appeal to freedom, the appeal to the goodness of existence is not an argument for cloning, but an argument against opponents who speak up in the name of protecting the cloned child against the harms connected with its risky and strange origins as a clone.

3. The Goodness of Well-Being

The third moral argument for cloning-to-produce-children is that it would contribute in certain cases to the fulfilment of human goods that are widely honoured and deeply rooted in modern democratic societies.

Arguments against cloning-to-produce children

The Ethics of Human Experimentation

We may begin with concerns regarding the safety of the cloning procedure and the health of the participants. If carefully considered, these concerns begin to image the important ethical principles that must guide our broader assessment of cloning-to-produce-children. It is obvious that human beings, unlike inanimate matter or even animals, are in some way inviolable, and therefore challenge us to reflect on what it is about human beings that makes them inviolable, and whether cloning-to-produce-children threatens these distinctly human goods.

1. Problems of Safety

Cloning-to-produce-children is not now safe. Even most proponents of cloning-to-produce-children generally

qualify their support with a caveat about the safety of the procedure. Safety concerns revolve around potential dangers to the cloned child, as well as to the egg donor and the woman who would carry the cloned child to birth.

2. Risks to the child

Risks to the cloned child-to-be must be taken especially seriously, both because they are most numerous and most serious and because, unlike the risks to the egg donor and birth mother, they cannot be accepted knowingly and freely by the person who will bear them.

3. Risks to egg donor and birth mother

These include risks to the future reproductive health caused by the hormonal treatments required for egg retrieval and general health risks resulting from the necessary superovulation.

Animal studies suggest the health risks to the woman who carries the cloned foetus to term. The late-term foetal losses and spontaneous abortions occur substantially more often with cloned foetuses than in natural pregnancies. In humans, such late-term foetal losses may lead to substantially increased maternal morbidity and mortality. In addition, many pregnancies involving cloned foetuses result in serious complications.

Reflecting on the mentioned dangers the National Academy of Sciences of the United States of America concluded:

"Results of animal studies suggest that reproductive cloning of humans would similarly pose a high risk to the health of both foetus or infant and mother and lead to associated psychological risks for the mother as a consequence of late spontaneous abortions or the birth of a stillborn child or a child with severe health problems".

Moral concern

Because of these risks, there is widespread agreement that, at least for now, attempts at cloning-to-produce-children constitute unethical experimentations on human individuals and are therefore impermissible. National Academy of Sciences, in January 2002, recommended that the United States should ban such cloning for at least five years.

These questions of the ethics of research, particularly the issue of physical safety, point clearly to the conclusion that cloning-to-produce-children is unacceptable and should not be attempted.

The Ethics of Cloning-for-Biomedical-Research

The Manner and Spirit of This Inquiry

The question of whether or not to proceed with human cloning-for-biomedical-research is a morally serious and difficult one. On the one hand, there is the promise that such research could lead to important knowledge of human embryological development and gene action, especially in cases in which there are genetic abnormalities that lead to disease.

There is also the promise that such research could contribute to producing transplantable tissues and organs that could be effective in curing or reversing many dreaded illnesses and injuries. On the other hand, there are the morally relevant facts that this research involves the deliberate production, use, and ultimate destruction of cloned human embryos, and that the cloned embryos produced for research are no different from cloned embryos that could be used in attempts to produce cloned children.

The Nuremberg Code, the Helsinki Declaration, and the Belmont Report are all efforts to set moral limits on biomedical research and to ensure that science serves human beings rather than the other way around. Among other things, these ethical caudexes embody the recognition that those who do research about human beings can never escape, nor should they, their status as human beings. Those who investigate human biology are always both the knower and the subject that is known, both the potential healers and the potentially afflicted. And therefore they must never treat that which is their equal, their fellow human beings, as something less than human.

Arguments for Cloning-for-Biomedical-Research

The moral arguments for cloning-for-biomedical-research can be stated in the following straightforward way: Modern and human communities in general have an obligation to try to heal the sick and relieve their suffering. This obligation, deeply rooted in the moral teaching of "love of neighbour," lies heaviest on physicians and health-care professionals who attend to individual patients. But it guides also the activities of biomedical scientists and biotechnologists whose pioneering research and discoveries provide new and better means of healing and relieving those who suffer. Research on cloned human embryos is one more path to discovering such means.

The Medical Promise of Cloning-for-Biomedical-Research

Many people suffer from chronic debilitating diseases and disabilities. These terrible diseases shorten life, limit

activity (often severely), and cause great suffering both for the afflicted and their families. Cloning-for-biomedical-research may offer unique ways of investigating and possibly treating several of these diseases. It is here that the potentially most valuable and unique benefits of research on cloned human embryos may lie.

1. Cloning to Improve Understanding of Human Disease

The creation of cloned embryos using nuclei from individuals carrying genetic mutations, specifically genes that predispose them to particular diseases, might be used to better understand and treat those diseases.

2. Cloning to Devise New Treatments for Human Diseases

The same cellular model systems used to study disease processes are also potentially useful for assessing and developing chemical or pharmaceutical treatments for some diseases.

3. Cloning to Produce Immune-Compatible Tissues for Transplantation

Some animal studies suggest that tissues derived from embryonic stem cells can, if injected under certain conditions, populate disease-stricken areas and differentiate so as to compensate for the loss of function caused by the diseased tissue. Cloning-for-biomedical-research offers the possibility to generate individualized, "rejection-proof" replacement cells and tissues to help patients fight disease.

4. Cloning to Assist in Gene Therapy

Cloning techniques could also be combined with precise genetic manipulation to devise genetic treatments for genetic diseases. For example, a cloned embryo produced from a patient with severe combined immunodeficiency could be genetically modified to correct the disease-causing mutation.

Possible Moral Dilemmas of Proceeding

Yet the moral dilemmas of proceeding, still to be considered, are the subject of some debate among us. There are two different positions these are principal moral aspects for cloning for biomedical research.

Position Number One

Moral controversy is that it involves the production, use, and intentional destruction of cloned human embryos. To determine whether or not the science should proceed, or

if it does, what limits should be placed on this research, it must be asked what is owed this nascent form of human life.

Position Number Two

Where to set the boundary for the embryo utilisation is a matter for prudent judgment. For the foreseeable future, the moral line might be safely drawn at fourteen days of development, when no nervous system has developed and when a distinct identity as a single individual has not yet been preordained.

Arguments against Cloning-for-Biomedical-Research

The case for treating the early-stage embryo, as simply the moral equivalent of all other human cells, is entirely unconvincing: it denies the continuous history of human individuals from zygote to foetus to infant to child. It misunderstands the meaning of potentiality and, specifically, the difference between a "being-on-the-way" (such as a developing human embryo) and a "pile of raw materials," which has no definite potential and which might become anything at all; and it ignores the hazardous moral precedent that the routinized creation, use, and destruction of nascent human life would establish for other areas of scientific research and social life.

It is not possible to be persuaded by the argument that fourteen days marks a significant difference in moral status. Embryo's human and individual genetic identity is present from the start; nothing that happens later during the continuous development that follows, at fourteen days or any other time, is responsible for appearance of a novel human individuality or identity.

1. Asexual Reproduction and the Genetic Manipulation of Embryos

Cloning-for-biomedical-research and cloning-to-produce-children both begin with the same act of cloning: the production of a human embryo that is genetically virtually identical to its progenitor. But we should not forget the agreement at the start to clone: saying yes to cloned embryos in laboratories means saying yes in principle to genetic masteries of one generation over the next.

2. The Complete Instrumentalization of Nascent Human Life

By approving the production of cloned embryos for the sole purpose of research, society would meet yet another moral boundary: separating the different ways in which embryos might become available for human experimentation. In the eyes of those who create in vitro fertilisa-

tion embryos to produce a child, every embryo, at the moment of its creation, is a potential child.

3. Opening the Door to Other Moral Hazards

This leads directly to our third concern-that the cloning of human embryos for research will open the door to additional, maybe even greater, moral hazards. Human suffering from horrible diseases never comes to an end, and likewise, our willingness to use embryonic life in the cause of research, once permitted, and is also unlikely to find any natural stopping point.

In addition, the reasons justifying production of cloned embryos for research can be predicted to expand. Today, the demand is for stem cells; tomorrow it may be for embryonic and foetal organs.

Epilogue

Simplifying of nature to the several measurable "principles" is an opinion ambient of contemporary science in which medicine finds its own place. It seems that such position has been seriously unsettled by the theory of chaosologists (scientists preoccupied with the chaos theory) about chaotic dynamic system. That system is extremely sensitive because it is always in motion, it is ever changeable, and it never entirely returns to its primary state.

We cite:

"It is like a variable time river", according to Heraclites who said: "All things go and nothing stays and you could not step twice into the same river". It is moreover correct for the real river and crucial for the chaos. It is obvious that, when even more complex dynamic system act regularly at some level, a "sensitive" principle of chaos might affect it by subtle process of sequestering and fracturing.

For example, even identical twins sharing the same DNA will often turn out quite differently because the DNA molecule will take a slightly different course in the development of each child. Development of embryo is dynamic system and its extreme susceptibility to the primary conditions creates innate chaos to ensure that 'identical' twins are never perfectly identical. But we it should become opened for the different abundance of knowledge arising from the culture of the world control: "This century science reveals a desire of nature to remain hidden and out of our comprehension" (Fractals, John Briggs)

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