ETHICAL ISSUES REGARDING HUMAN CLONING: A NURSING PERSPECTIVE

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Advances in cloning technology and successful cloning experiments in animals have raised concerns about the possibility of human cloning in recent years. Despite many objections, this is not only a possibility but also a reality. Human cloning is a scientific revolution. However, it also introduces the potential for physical and psychosocial harm to human beings. From this point of view, it raises profound ethical, social and health related concerns. Human cloning would have an impact on the practice of nursing because it could result in the creation of new physiological and psychosocial conditions that would require nursing care. The nursing profession must therefore evaluate the ethics of human cloning, in particular the potential role of nurses.

This article reviews the ethical considerations of reproductive human cloning, discusses the main reasons for concern, and reflects a nursing perspective regarding this issue.

Introduction

Advances in genetics and biotechnology have created previously unforeseen possibilities, one of which is cloning technology. With its development, successful cloning has been reported in sheep, calves, mice, monkeys, pigs and rabbits by using a variety of somatic cell nuclear donors. Animal cloning has raised concerns in recent years about the possibility of human cloning. Many organizations, such as the World Health Organization and the European Parliament have expressed the opinion that human cloning is ethically unacceptable and have called for a ban on such research. In the USA, the National Bioethics Advisory Commission recommended a moratorium on cloning children through somatic cell nuclear transfer. However, despite these objections, it is not only a possibility but also a reality now.

Scientists working in advanced cell technology have announced that they have cloned an early human embryo from an adult cumulus cell nucleus. According to a website accessed on 12 May 2002, the furthest that any cloned human embryo

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has developed is to ‘six cells’. This claim is controversial and has drawn criticism from many researchers. On the other hand, according to Gulf News on 3 April 2002, Dr Antinori claimed that he had successfully implanted a cloned embryo into a woman, and that she was eight weeks pregnant. These announcements have increased concerns and the world-wide public reaction against human cloning. It is likely that there will be more attempts to clone human beings.

Questions are raised in this article to help readers to relate the text to ethics. These questions are not necessarily answered, nor are there necessarily any answers (yet).

What is cloning?

Cloning is the production of one or more individual plants or animals that are genetically identical to an original individual. It has been used for centuries in plants and insects by using various techniques. However, mammalian cloning is a very recent development. For about 50 years, attempts were made to clone mammals; however Dolly the sheep was the first success.

In reproductive cloning, two methods have been used: embryo splitting and somatic cell nuclear transfer. In this article, the term ‘cloning’ refers to the production of genetically identical organisms via somatic cell nuclear transfer, a technique that involves removing the nucleus of an unfertilized egg cell, replacing it with material from the nucleus of a somatic cell (i.e. skin or cumulus cell) and stimulating this cell to begin to divide. The nucleus of the somatic cell provides the genetic information, while the oocyte provides the nutrients and mitochondria that are necessary for the development of an embryo.

There are two distinct types of human cloning using somatic cell nuclear transfer: reproductive and therapeutic. The objective of human reproductive cloning is to produce a child who would be genetically identical to another individual. The objective of therapeutic cloning is to provide compatible tissues and organs for replacement therapy. The distinction between the two types is that, in reproductive cloning the transnuclear egg or reconstituted zygote is implanted into a woman’s uterus, whereas, in cloning for therapeutic purposes the transnuclear egg will form an in-vitro culture from which stem cells can be extracted. The harvesting of stem cells includes the destruction of the embryo at the blastocyst stage. Reproductive cloning can be used to help sterile individuals who cannot have children in the natural way, and therapeutic cloning promises significant benefits because organ supply for transplantation is limited and recipients need to be given immunosuppressive drugs to avoid rejection of transplanted organs because of genetic differences. It also offers the possibility of learning more about renewed activity of damaged cells and the opportunity to cure diseases such as Alzheimer’s, Parkinson’s and degenerative neuromuscular and joint diseases. Although there are promising benefits of therapeutic cloning for the well-being of others, there is also the potential for intentional use of the embryos. Krauthammer has noted that cloning embryos only for research or therapeutic purposes could not prevent their reproductive use; one or more of these cloned embryos could be implanted in a woman.

From the viewpoint of science and technology, cloning can be regarded as a
revolution and an extraordinary achievement, but from the viewpoint of humanity and ethics, it raises profound ethical, social and health concerns.

- How could human cloning affect the cloned individual, the family, society and the future of human beings?
- What are the main concerns regarding human cloning?
- What are the moral costs of human cloning?
- Why should nurses be concerned about human cloning?

The aim here is to provide an overview of the ethical considerations of reproductive human cloning and to reflect a nursing perspective on this issue.

Ethical considerations of human cloning

Potential physical harms

The Council on Ethical and Judicial Affairs (CEJA) of the American Medical Association points out in its 1998 report that ‘somatic cell nuclear transfer has not yet been refined and its long-term safety has not yet been proven. The risk of producing individuals with developmental anomalies is serious’. The International Council of Nurses (ICN) also considers human cloning to be both useful and damaging for human health.

- Cloning can introduce potential physical harms for humans. Should we be worried?

Animal cloning experiments using somatic cell nuclear transfer demonstrated that the efficiency of reconstituted eggs developing to generate a single live birth is currently very low. In cloning Dolly the sheep, 277 eggs were used, 29 started to divide, nine induced pregnancy, but only one survived to term. In another study, 276 nuclear transfers were produced from fibroblasts and, out of 28 embryos transferred to 11 cows, three healthy calves were generated. Researchers concerned with other animal cloning experiments have reported similar findings. The highest efficiency rate was reported by Wakayama et al. (2.8%).

The possible reasons for inefficiencies are suggested by Polejaeva et al. to be: laboratory to laboratory variation, oocyte source and quality, methods of embryo culture, donor cell type, failure to reprogramme the transplanted nucleus adequately, and the failure of artificial methods of activation to emulate reproducibly the membrane-mediated events that accompany fertilization. Moorgate has argued that further elucidation of the molecular mechanisms involved during the processes of embryogenesis, and the careful tailoring of subsequently developed culture conditions and manipulation strategies, can improve the efficiency and success rate. However, at present, this inefficiency is a problem and large numbers of human eggs or many embryos would be needed to produce a child.

The second concern is the developmental abnormalities that have been observed in various mammals cloned by somatic nuclear transfer. The large offspring syndrome has been a common problem occurring in several live-birth animals. In this syndrome, the offspring is born oversized with disproportionally large internal organs, and often has respiratory, circulatory and other
problems. In the experiment reported by Cibelli et al., one of the cloned cows aborted at day 249, earlier than the normal gestation for a cow, which is about 280 days. The aborted fetus was oversized, the lung lobes were oedematous, and the right heart ventricle was enlarged. Jaenish and Wilmut have postulated that the most likely explanation for inefficiencies and developmental abnormalities may be the failure in the genomic reprogramming that occurs within minutes or hours of nuclear cloning, and which could lead in turn to dysregulation of gene expression. Some of the developmental abnormalities may be related to incompatibility between nuclear and cytoplasmic genes. In the great majority of sexual organisms, mitochondria are located in the cytoplasm and the mitochondrial genome is usually inherited through the maternal parent. Mitochondrial function is normally controlled by a combination of nuclear and mitochondrial genes. In general, this process is consistent, but sometimes conflict occurs. Such potential conflict is probably partly to blame for the poor rates of success in cloning animals by nuclear transfer.

There is concern that the same abnormalities would probably occur after human cloning. In contrast, Killian et al. reported that the large offspring syndrome appears to be correlated with an incorrect imprint of the IGF2R (insulin-like growth factor II receptor) gene, but this gene is not imprinted in humans, suggesting that fetal overgrowth would not be predicted to occur if humans were cloned. Rhesus monkeys that have been cloned by nuclear transfer of embryonic nuclei have shown no developmental or physiological abnormalities. This evidence supports the hypothesis of Killian et al. However, in order to accept that human clones would not be subject to developmental abnormalities, further scientific studies are needed to verify the hypothesis. At present, the indications from animal cloning experiments are that developmental abnormalities would probably occur in human cloning.

- What could be done if the fetus is identified as having a developmental abnormality when he or she comes close to term?

It could be argued, correctly, that as the cloned embryo would be genetically identical to the donor adult cell, then presumably the adult would have undergone genetic screening prior to the procedure. However, there are no methods available now or likely to be in the foreseeable future for examining the overall epigenetic state of the nuclear genome. On the other hand, because the mitochondrial genome of the clone would differ from that of the nuclear parent, the source of the oocyte cell should also undergo genetic screening. Over 30 different genetic loci have been found in mitochondrial DNA, mutations of which cause discrete human diseases in various tissues and organ systems, ranging in effect on a scale from bothersome to lethal in any given individual. Roberts recommends that the cloning procedure could be used as an alternative method to eliminate the possibility of recurrence of mitochondrial disease in affected families, by using egg donation from the paternal side of the family. He also points out that, even in apparently familial cases, no prenatal diagnostic tests can determine whether mitochondrial disease will occur postnatally; the prediction of a critical proportion of abnormal mitochondria in a given tissue is not possible. A recent editorial in the The Lancet drew attention to an important point that is relevant to this subject:
With somatic cell nuclear transfer, the donor nucleus has to be reprogrammed in a very short time and in a very different context from that of maturation of the sperm or ovum. This makes the process error prone. Current methods of preimplantation or prenatal genetic screening pick up chromosomal aberrations and single-gene defects but not epigenetic dysregulation. Nor can current methods of prenatal imaging pick up microscopic effects such as the thickened pulmonary arterioles that have been associated with respiratory distress.

The aim of this article is not to assess prenatal or preimplantation genetic tests, but the above statements indicate that there is still insufficient data on how genetic tests truly predict risk.

The possibility of creating animal/human hybrids through the use of cloning techniques has also the potential for physical harms. Researchers in Australia implanted a cell containing human DNA into a pig in 1999, but terminated the embryo after it had developed for 32 days. They did not explain why this was done. However, the possible reason may have been the ethical and political concerns they raised with this experiment. Recently, Chinese scientists removed the chromosomes from rabbit eggs and replaced them with the nuclei of skin cells from a seven-year-old boy. They revealed that they hope to use the resulting embryos to generate embryonic stem cells for research into regenerative medicine. The purpose of such research may be therapeutic for human health. However, combining human genetic material with that of other species has the potential to create a new life. If such a creation survives, it would probably be more human than animal, because of the nuclear genome. The creation of hybrid individuals that may survive violates respect for human life. It could also be dangerous to human health because of the potential risk for transmission of infectious agents from animals, or because of other unknown physical harms. Humans and chimpanzees are as closely related genetically as some species that can be crossed.

- Should crossing chimpanzees and humans proceed?
- What reasons could be foreseen why this should be done?
- How valid could such reasons be?
- Who would benefit most?
- What will be the problems with animal mitochondria being used in a human cloned being?
- What will be the new creation?
- Will this be a chimpanzee that is genetically superior or a genetically inferior human being?
- Do any human cloning benefits outweigh the risks?

I am deeply concerned about how far these experiments could go.

The potential for human cloning to cause physical harms contradicts the fundamental ethical principle of nonmaleficence. Nonmaleficence derives from one of the most traditional of medical guidelines that goes back to the time of Hippocrates: *primum non nocere* (i.e. first of all, do no harm). This principle expresses the concept that health care professionals have a duty to protect patients from harm. It also requires not harming any possible human beings. Often, the principle of nonmaleficence is combined with the principle of beneficence, described as ‘to do good’, or ‘the duty to care’. However, sometimes there may...
be tension between these two principles.\textsuperscript{27} For instance, chemotherapy has serious adverse effects. In such cases, the principle of nonmaleficence is not necessarily violated if a proper balance of benefits exists; the harm is not directly intended, but is rather an unfortunate side-effect of attempts to improve a person’s health. In accordance with this view, Savulescu has argued\textsuperscript{28} that, in the case of embryonic stem cell research, the enormous potential to save people’s lives and to improve their quality of life outweighs the wrong of the destruction of some embryos. In reproductive human cloning, the benefit of having a genetically identical child weighed against the ethical cost of potential developmental abnormalities and/or unknown physical harms must be carefully evaluated. In addition, even though it is not so problematic as in therapeutic cloning, the status of surplus embryos in reproductive cloning is also controversial, because this procedure creates the possibility of more embryos being produced than are needed for implantation. After implantation of one to four of these cloned embryos, the surplus may be considered for cryostorage for subsequent use or they may be used for research purposes. If they are not used at all, then they would be destroyed. Even if all embryos are implanted into a woman, embryo reduction may be performed for the sake of the healthy development of the others. The question arises: What is the moral status of a human embryo? This raises critical questions:

- When does life become human and have a moral value in the continuum between a single cell and an adult person?
- Can this early embryo be classified as an individual and worthy of respect?

The literature concerning the moral status of embryos reveals different viewpoints. The general agreement is that an embryo is radically different from a sperm or an egg, or any other cell in the body; it contains the DNA, the complete human genome. That is, its potential is to develop into a human being. Thus, the most widely agreed viewpoint holds that a human embryo is a potent symbol of human life that deserves profound respect.\textsuperscript{13,29–31} For some, individuality or personhood may be considered as a basis for determination of the moral status of a human embryo. On this account, a pre-implantation embryo does not have personhood until the process of restriction is completed; that is, until cells become committed to becoming a particular part of the body, the pre-implantation embryo is divisible into parts, each of which can become a whole. After three weeks, the embryo becomes indivisible and, consequently, an individual. In the meantime, at around day 14 the primitive streak (precursor of the brain and central nervous system) develops. Prior to this point in time, an embryo can undergo twinning.\textsuperscript{31} According to McMahon,\textsuperscript{32} entities do not begin to exist until around the seventh month of fetal gestation. Therefore, to kill a clone prior to that time would prevent only one of us from existing. Viewpoints about the moral status of a human embryo vary widely and there may be no precise consensus. What is clear is that the pre-implantation embryo is living; it possesses the human genome and has value.

The value attributed to a human embryo or fetus determines whether it should be respected as an individual or not. Respect for persons means treating individuals as persons with rights.\textsuperscript{27} If we consider a human embryo as a potential human being and worthy of respect, than we should recognize its right to life. In
the same way, a fetus has a right to life, and a right not to be harmed. From this perspective it is wrong to destroy human embryos and it is unethical to expose a fetus to potential abnormalities. On the other hand, respect for persons means further respecting the autonomy of individuals and honouring their rationality.\textsuperscript{27} To be autonomous, an individual must manifest decision making and rationality. However, neither a pre-implantation embryo nor a fetus has decision-making capacity and rationality; thus they are not autonomous beings.

- Does it mean that they are not worthy of respect?
- If so, what about our responsibilities and obligations toward other human beings who are incapable of exercising their rights (i.e. fetuses, people with severe learning difficulties, children who are disabled and/or people with severe mental illness)?
- What about hybrids?
- Can a hybrid be respected?
- Would it not simply have ‘exhibition status’?
- Could a human/animal hybrid respect itself?
- How would such a being function as the only one of its kind?
- What does this say about community?
- What do nurses have to contribute to this debate?
- Can a specific nursing voice be realistic?

**Potential psychological harms**

The CEJA notes in its report that human cloning has the potential to introduce psychosocial harms to individuals.\textsuperscript{9} The ICN also considers that human cloning violates the right to one’s unique genetic identity and dignity.\textsuperscript{17}

Human reproductive cloning would bring the genetic inheritance of some future children within present human control. Owing to the nature of cloning, the genetic predisposition and conditions of a cloned individual would be known, and knowledge of a child’s genetic predisposition could lead to misuse of his or her genetic information. Genetic information of a cloned individual can be obtained by physicians, researchers or other health care providers, and from the patient record systems of hospitals or private clinics where this procedure is performed. Inadvertent or malicious disclosure of genetic information by unqualified persons would not only violate confidentiality and privacy, it could also lead to discrimination in health care insurance or in the employment status of individuals.

Having insight into personal potential may cause pressures on and expectations from the cloned child, even more than those generally experienced by children.\textsuperscript{9} These pressures and expectations could limit that child’s freedom or autonomy. Some believe that human cloning would be likely to have important effects on people’s sense of self or identity: on their intrinsic value as persons, or on their sense of freedom or autonomy in constructing their life.\textsuperscript{9,33} When the child learns that he or she is a cloned individual, this information may lead to personal confusion. Knowledge of being cloned or being created in an ‘unnatural’ way could be perceived as stigmatizing, evoking strong emotions such as denial, a sense of not being himself or herself, and anger towards the parents. Such emotions could
lead to identity crises and low self-esteem. On the other hand, knowledge of being cloned, especially with a favourable genetic inheritance, could be perceived as superiority and could lead to over-esteem.

Brock has argued\(^3^3\) that cloning can undermine only our genetic uniqueness, not our full individuality, because the full identity, individuality or self of a person is determined by much more than the genome. He also noted that only a mistaken belief in genetic determinism supports the view that a clone’s freedom or autonomy to construct his or her own life would be undermined by cloning. Eisenberg stated\(^3^4\) that the clone would not be the same person as the cloned individual because an individual’s identity is constituted by both her or his genome and the interactions of genes over time with the environment, including personal choices made, and important relationships formed with other persons. The environment is not static; it is dynamic and it is altered by a variety of circumstances. Even if the environmental conditions for a cloned infant were identical to those of his or her progenitor, the future is not predestined.

- So far, clones have been envisaged for utilitarian purposes (to ‘replace’ a loved child or to use organs for specific individuals); if the environment influences the clone independently of the genetic make-up, is it still useful to create clones?

**The impact of human cloning on familial relationships and society**

The value of a human embryo influences decisions and actions about how to treat it. If we consider a human embryo only as a means for our purposes, then the consequences would be unpredictable, in particular for society. Embryos could be deliberately produced for spare organs and sold in commercial laboratories hidden from public view. The possible serial production of human embryos could lead to commercialization, thus opening the door to eugenic practices.\(^1^6\) Embryos could be selected on the basis of various characteristics, such as physical appearance, sex or other genetic factors. They could be used for research without the permission of donors. In the near future we could possibly see advertisements for prospective donors or cloning contract announcements by companies.

- Does it come as a surprise that some are looking forward to the possibility of creating banks of cloned human embryos, and cells and tissues derived from them, as a resource for people who can pay for bodily enhancement?\(^3^5\)

The choice of whom to clone also raises concerns. Individuals who are considered to possess desirable characteristics, such as genius, and media stars or athletes, could be selected for cloning with the aim of improving human beings. Owing to the cost of cloning, only those people who have the ability to pay or are members of favoured social groups will have access to this technology.\(^9, ^1^5\)

- What about people who are thought to possess undesirable characteristics (e.g. homosexuality, alcoholism, criminality) and diseased or disabled persons who are thought to be ‘genetically inferior’?
- Is there a danger of creating a ‘super-race’, with the Nazi experiments still in living memory?\(^3^6\)
Discrimination and violation of human rights would be inevitable and widespread. Supporters of human cloning could argue that all of these concerns are illogical, speculative or imaginary. However, these matters are disturbing and uneasy, and must be vigorously debated and investigated without prejudice.

Another concern is the potential harm to familial relationships. The family unit would become different with the introduction of cloning.9,14

- What would be the consequences for a family if a man cloned himself?
- Would the child be that man’s son or his twin brother?
- Suppose a family want to clone their deceased loved child.
- Will the new child replace his or her brother or sister?
- How?
- Would the clone not resent this?

The family is the smallest unit of a society, and there are always reciprocal and dynamic interactions between families and society. All factors that influence the family unit and its relationships will therefore also affect society. It has been claimed that, by intercultural marriage and coupling, certain culture-specific diseases (such as thalassaemia) are slowly being eliminated. Some believe that, with cloning, parental efforts at enhancing children’s capacities will intensify because of the available knowledge regarding the child’s genetic structure. The cloning of humans will thus not simply be about having children, but about having a unique opportunity to improve on a desired specimen by investing in enhanced genes and/or an enhanced environment.37

- Can human cloning offer a new method for human control and self-improvement, by allowing families or society to have children free of specific genetic diseases?
- Would cloning create new problems for societal health that may render life generally more difficult?

If we consider the implications of human cloning for the general population we can imagine other consequences. Cloning is not only a reproductive but also a regenerative technique. Cloning technology holds the potential for using people’s own cells to produce stem cells that can become replacement tissues or organs. With such a potential, and by combining the cloning technology with other advances in genetics such as gene therapy, the onset of diseases associated with ageing could be prevented; ageing could be delayed, and rejuvenation and/or an extended human life could become possible. As a result, although a small percentage of the world’s population, probably those who are thought to be favoured or who can pay, would enjoy a high-quality long life, but billions of people would continue to struggle to survive. The gap between poor and rich would continue to increase. We are living in a world where millions of people are dying because of hunger and poverty. According to the World Health Organization,38 about 20% of the world’s population, or 1300 million people, live in absolute poverty with an income of less than US$1 per day. Those living in absolute poverty are five times more likely to die before reaching the age of five years. Providing basic health services such as clean drinking water, adequate food, sanitation, essential drugs, immunization and family planning could prevent the vast majority of these deaths; there is no need for advanced and expensive tech-
nology to provide these basic services. On these terms, human cloning also has the potential to increase the social and economic inequities in the world, which contradicts the notion of justice for all.

- Is it right to invest vast sums of money in practices that at best benefit only very few people?\(^\text{36}\)
- What may be the claim of the poverty of the majority of people in the world on the minority that are well off?
- Does such a claim exist?
- How realistic would it be for poor people and countries to demand a share of the (seemingly unnecessary) wealth of the few?

**Potential harm to the gene pool**

Evolution relies on a continual mixing and matching of genes to keep the gene pool alive.\(^\text{15}\) Sexual reproduction promotes genetic variability through combining favourable mutations at different gene loci.\(^\text{39}\) A recent study by Rice and Chippindale of experimental populations of *Drosophila melanogaster* (fruit fly) demonstrated that the realized strength of selection on new mutations was markedly increased when sexual recombination was present.\(^\text{40}\) Over time the new genetic combinations enabled the species to respond to changing environmental conditions through the selective survival of adaptable genotypes. The lack of recombination could decrease genetic variability and impede adaptive evolution.\(^\text{41,42}\) Human cloning separates reproduction from recombination because there is no reshuffling of the genes. The cloned embryo contains DNA that is an asexual replication of a single genome rather than the combination of two parental genomes.\(^\text{37,39}\) If cloning became widespread, human genetic diversity would decrease, the natural process of selection of genes would be bypassed, and evolution would be impaired.\(^\text{9,15,41}\)

The CEJA stresses another serious point in its report\(^\text{9}\):

Since the somatic cell from which clones originate likely will have acquired mutations, serial cloning would compound the accumulation that occurs in somatic cells. Although these mutations might not be apparent at the time of cloning, genetic problems could become exacerbated in future generations.

Miller also touched on this point and noted:

Germ cells, or gametes, undergo one act of splitting, and then are ready for recombination with another germ cell. But somatic cells divide constantly throughout life, and each time their chromosomes split for replication and cell division, there is a high probability of mistakes in replication. They are not evolved for reproductive purposes. In human cloning, the somatic cells are combined with germ cells and most gametic genes’ deleterious mutations would be masked. Therefore we cannot know whether the adult somatic cells will be fit for several generations of reproduction.\(^\text{42}\)

In accordance with these statements, it is obvious that the long-term consequences of human cloning could be undesirable for the human gene pool and evolution.

It should be noted that there are as yet no data about the potential physical and psychosocial harm of human cloning for human health. At this time we do not know its impact on the human gene pool; we can only make estimations and
express our concerns. The concerns expressed here are, however, serious, and need to be evaluated further, even if they are speculative.

**Nursing implications**

Cloning as a reproductive procedural mechanism is not a nursing function *per se*; neither are nurses involved, as nurses, in this procedure. At this time it is an experimental genetic-biological procedure. Thus, as yet, individuals and families do not require nursing care and cloning is not a nurse’s primary responsibility. If we consider human cloning simply as an experimental procedure, nurses are not involved at all. However, human cloning would affect every aspect of human life, including the physiological and psychosocial dimensions, and the meaning and value of life. Nursing as a profession is centred on human well-being, and nurses deal directly with the life and health of individuals. Human cloning is therefore a matter for nursing because of its relationships with the humanistic values that are also the basis of nursing.

Humanism is a philosophical perspective centred upon the needs and interests of human beings. It stresses the uniqueness and dignity of the individual person. According to Antrobus, humanism includes: the nurturing response of one person to another in need; viewing the individual as a whole; an emphasis on the individual’s own perspective; developing human potential to its utmost; having as a goal the well-being of others; and the nurse–patient relationship at the heart of the helping situation. Antrobus describes the concept of caring as being inextricably bound up with humanistic values and the practice of nursing. Caring is the essence of the nursing profession; it includes recognizing individuals as human beings of value and worth, and having needs. A range of theories have been presented in the literature, which have caring as a central concept and are based on a human science perspective. McCance *et al.* explored and presented a comparison of four caring theories in their article on Leininger, Watson, Roach, and Boykin and Schoenhofer. They concluded that these theories are grounded in humanism and that the descriptions of caring and the definitions of nursing reflect the humanistic nature of nursing.

Humanistic values can be regarded as cornerstones of ethical principles because they are what we praise and hold in high esteem, what we feel deeply about what is right; they are just and good for human life and human welfare. Human cloning would bring the genetic inheritance of some people within human control, creating individuals not simply for their value as persons, but for their particular genetic make-up. Human cloning has a predictive and determinative nature because it has the potential to make genetic inheritance the criteria by which to determine the importance and value of human life. This feature violates the right to one’s unique genetic identity and dignity, and is therefore contrary to humanism and nursing humanistic values.

Humanistic values give meaning to life. The way in which we care for others depends largely on how we value (human) life and living. If we value life as good in itself, we will want to be sure that we are not killed and that others will not be killed. Likewise, we will want to ensure that no human beings will be harmed. Tschudin states that nurses are concerned with preserving and enhanc-
ing human life, not destroying it.\textsuperscript{36} Although Tschudin is writing about abortion, I think the same perspective is valid for the status of human embryos and fetuses in human cloning, and that enhancement of human life does not imply eugenics or using hybrids for xenotransplantation or for other purposes. With the line between human beings and animals confused by hybrids, and with living in a world where discriminations and inequalities would continue to increase by human cloning, we may have to reconsider our values and start to think about the answers to many questions.

- What is the worth of a human life?
- What are our ethical obligations toward potential human beings?
- What would be our responsibilities and duties toward a hybrid, a creature with a human or partially human dignity, but who is not fully capable of possessing human dignity?
- Does it have self-determination or decision-making capacity?
- What rights will it possess?
- How could this challenge the humanism and practice of nursing?

Human cloning would have an effect on nursing practice because it may result in the creation of new physiological and psychosocial conditions (for the cloned child, for the family and for society) that will require nursing care. In this respect, nurses will have to address the implications of human cloning for nursing practice and to consider the potential roles of nurses.

**Potential roles of nurses**

Nurses’ potential roles are hypothetical and probably insufficient because the future may be different and stranger than we can imagine. Nevertheless, the ethical and health related concerns of human cloning provide clues for the future, so we can indeed consider the potential roles and responsibilities of nurses.

*A protector and advocate role*

As an experimental procedure, the safety of human cloning is untested and the consequences of this procedure are unknown. There are potential physical and psychosocial harms for individuals, and there is the potential to increase the discriminations and inequalities of our world. As professionals, nurses must emphasize respect for persons, their dignity, individuality and worth, and they must enquire into any harm to human beings. Nurses must provide essential health care services regardless of genetic background, physical condition, or social or economic status, and they must ensure equitable access to scarce resources, in particular for economically poor people. However, justice for all in health care is not in our hands alone. It is well known that the economic and political conditions of a country and also international and regional disparities in the distribution of health services affect the rights and opportunities of people for access to health care. Protection of human rights and justice requires legal regulations based on ethical principles. Nurses are important members of the health care team. They have a power to influence health care politics and public debate. In my opinion, at this time, the most important role of nurses is as protector and client advocate. The humanistic nature of nursing provides the basis for this role. Patient advocacy
is also a requirement of beneficence and is included in many codes of ethics for nurses; it is therefore also a professional and an ethical duty. One ethical duty is to be politically aware and active. In the role of client advocate, individual nurses can protect human and legal rights by contributing to the discussions, politics and policies surrounding human cloning. In order to contribute to health care politics and to enhance their interest, they can also use the media to communicate with the public; they can write health columns for regional newspapers or publish in nursing and non-nursing journals. The vehicle for collective and effective action is usually a professional organization. International and national nursing associations should be involved in ethics and policy boards, and in committees that investigate the implications of human cloning for human health. They should speak out against the policies and politics that endanger human life and health. An important component of this role is to ensure that individuals and the whole of society have been given adequate information about cloning in a way that they can readily comprehend.

**A caregiver role**

Advanced diagnostic and therapeutic methods such as for genetic screening, gene therapies, *in-vitro* fertilization techniques, and the use of ventilators, are sometimes double-edged swords because they have both positive and negative consequences for individuals. Nurses are responsible for the care of people who are left with the health consequences of such developments, and they often confront situations that require ethical decision making. Recent animal cloning experiments have revealed developmental abnormalities in the clones. This indicates that similar abnormalities would probably occur if human cloning is used. There would probably be an increased risk of birth defects in children brought to term. Paediatric nurses may then be required to care for these children from the neonatal period through to adolescence. Providing care for them and their families can include meeting their physiological and psychological care needs. In order to provide high-quality care for these children, nurses would need a comprehensive understanding and knowledge of physiology, pathology, and, in particular, the genetic basis of developmental abnormalities. The birth of an infant with a developmental disorder can be a devastating experience for a family. The parents may feel guilty and responsible for the situation, and the resulting depression can affect their role as a mother or father. Even with a mild abnormality, such children can become so dependent on their parents that they do not have the opportunity to learn the skills necessary for adjustment to life. On the other hand, children who know that they are cloned individuals may experience an identity crisis. Nurses could help these children and their parents by establishing trusting relationships, conveying acceptance and respect. They can use effective communication to assess a child’s sense of self and also encourage discussion of the thoughts and feelings of the whole family.

**A counselling role**

The likely impact of human cloning on health is complex and, with scientific and technological developments, more sophisticated and advanced methods of diagnosis and treatments would become available. Professionals who are experts in different areas would provide health care. Nurses cannot make decisions in
isolation from other health team members, so they must recognize the importance of interprofessional collaboration. In community clinics, as well as in hospital settings, nurses will undoubtedly encounter couples or individuals who raise questions about cloning. They therefore need to be able to play an important role in helping these people through the decision-making process about cloning and its implications by co-ordinating and integrating services. They can help these individuals by referring them to the available resources and experts.

Nurses could also provide counselling for individuals or couples who seek information about cloning or who prefer to have a biological child by this procedure. Counselling skills are a specific type of communication that some people use with expertise. A study by Terzioglu demonstrated that the anxiety and depression levels of couples who applied for assisted reproduction techniques were decreased when effective counselling was provided. Counselling for individuals regarding human cloning could include the following: providing correct and up-to-date information about the cloning procedure, the time, cost and effort required for this process, and the potential benefits and harms; explaining the meaning of their potential child’s genetic condition; informing them about the genetic tests that can be performed to determine any developmental abnormality during a pregnancy; discussing the effects of cloning on a child’s psychological development and on familial relationships; and clarifying their personal values.

The most important component of counselling is to support the individuals regardless of their decisions. Nurses should be aware of their individual and professional values, but they should not rely on their own values or concerns about cloning and must be neutral in the counselling process. However, this may be very difficult because our values influence our attitudes and actions. In addition, nurses who have had no training and who have no supervision run the greatest risks of being ineffective or unconsciously incompetent. Therefore nurses would need to be well trained in counselling, well supervised in their practice, and also well motivated and always well informed of any developments in the fields of both counselling and genetics (V Tschudin, personal communication, 2002).

As nurse educators

The need for the preparation of nurses to be able to understand genetics and the implications of human cloning for the well-being of people is obvious and urgent. Human cloning is almost certainly impossible to stop and the scientific data will accumulate. This demonstrates the necessity of incorporating the relevant information into nursing education. Nurse educators should include the current information about genetics and human cloning into the curriculum in order to prepare nurses for this new challenge. The need for genetics to be an integral part of nursing educational programmes has been expressed by many authors. However, the nursing literature shows a lack of or limited incorporation of genetics as part of basic nursing education programmes. A study conducted in the USA demonstrated that, among the nursing programmes surveyed, the mean number of hours in the curriculum devoted to genetics topics was 6.2. Another study revealed that genetics is taught for 10 hours or less on most courses of diploma-level training programmes for nurses in the UK. In this study the majority of respondents (81%) agreed that genetics will have a major impact on health care, and will become an increasingly important issue in nurse education.
The nursing profession will also need to incorporate genetics into continuing education programmes. A survey of 68 nursing specialty organizations reported that only 30% of administrators were planning to offer genetics content in future programmes. These findings suggest that there is a need for the incorporation and dissemination of genetics in clinical practice and education. In the nursing literature no studies or surveys can be identified regarding the status of human cloning in educational programmes for nurses.

Consideration and guidance by international and national nursing organizations regarding human cloning are necessary to provide insight into this subject for nurse educators and clinical nurses. Professional nursing associations must assume the responsibility for offering educational programmes, workshops and seminars that focus on the implications of cloning for human health. These organizations need to provide help in clarifying nurses’ expanding roles.

As nurse researchers
There are no empirical data available about the impact of human cloning on individual health and on nursing. At this time we do not know how human cloning may affect nursing care. There will be many problems to be investigated by nurse researchers, including the impact of cloning on an individual’s life and health, the potential nursing roles and functions, and the viewpoints of nurses regarding this issue. Research on these topics will provide the knowledge base required to guide clinical practice and expand the scope of nursing practice. Nursing research will also strengthen the position of nurses as members of the health care team and will facilitate the contribution and development of policies on this subject.

Conclusion
In conclusion, nurses cannot say human cloning has nothing to do with nursing. They cannot close their eyes to its potential problems, because they are part of society and part of this world family. Furthermore, nurses are an important part of health care teams and they will be faced with the health consequences of human cloning for individuals, for families and the whole of society, for whom they are responsible. Nurses should therefore ask themselves several questions:

- Who will care for babies with developmental abnormalities and who will care for possible hybrid creatures?
- What are our professional values and ethical obligations towards individuals, society and toward the future of human beings?
- How can/could/should we deal with the consequences of human cloning?

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