Can the Concept of Reproductive Cloning Become a Reality within the Realm of Halacha?

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In the 21st century, technology is constantly advancing. The concept of reproductive cloning was an intangible concept, until Dolly, a female sheep, was cloned. Dolly was cloned from an adult somatic, or body cell, by way of nucleus transfer via cell fusion. Reproductive cloning involves the removal of the nucleus from an egg of an individual (i.e., enucleated cell donor) and fusion of this with a terminally differentiated donor somatic cell (i.e., the nucleus donor). The fusion of these cells gives rise to a single cell which functions as a zygote. The dividing zygote is maintained in a Petri dish producing an early embryo, which is implanted in a surrogate to carry to term. The resultant clone has the identical nuclear DNA as that of the donor nucleus cell. When Dolly was born, her DNA was identical to that of the donor sheep, proving that cloning was now a reality [1].

Three components that are needed for a clone to be viable: the enucleated egg cell, a terminally differentiated somatic cell, and a surrogate to carry the embryo to term. These two fused cells behave as a "zygote" and eventually divide to produce an embryo, which is implanted into a woman's uterus until the clone is ready to be born. This process has a maximum of three participants, one for each component. A minimum of one participant is possible, if a woman clones herself, and uses her own enucleated egg cell, her own somatic donor cell, can carry the fetus to term. Or, reproductive cloning can involve two participants, a female who supplies her enucleated egg and her donor somatic cell, with another female serving as the surrogate. A combination of individuals is possible with reproductive cloning of a female; a woman can conceive without any donors or have one or two donors. If a man wanted to clone himself, he would use his somatic cell and an enucleated egg from a female; the surrogate may be the donor of the enucleated egg or another female.

Since reproductive cloning is a modern technological advancement, there are many halachic issues that arise and that must be addressed. For example, despite ethical concerns, can a human be cloned in order to be a donor for organ transplant? Who is the clone's mother and father when more than one person is involved in the process? While the answers to these questions are not black and white, this paper will analyze the possible answers and reasons behind how halacha interprets cloning.

There are those who may think that creating a clone is creating a human being, which seems G-dly. However, only Hashem can create something from nothing, and creating a clone is not a new creation since it requires previously created cells [3].

At the moment, many countries have banned experimenting human cloning since it is highly problematic due to issues regarding immortality, the psychological health of the clone, the lack of genetic diversity, and the high rates of error and human suffering [2]. Another reason why human cloning may not be ethical is because it would allow people to "gene shop" or choose genes, features, and characteristics they want in their child. Human cloning would also allow groups of people to clone themselves, which would remove the concept of individuality and uniqueness [3].

One reason that cloning is beneficial is to supplement organs for organ transplants, but there are still ethical considerations on this topic . Tissue, organ, and cell cloning for therapeutically purposes is beneficial to society, but human cloning is not [4]. Because clones have identical DNA to that of the donor, such clones could serve as a reservoir for organ transplants if needed by the nucleus donor. Essentially, the clone would not be treated as a normal human being, rather as an organ source, possibly leading to mistreatment of the clone. An alternative would be cloning tissue and organs alone that are genetically identical for transplantation rather than a full human [5].

In Leviticus (19:15) it states "*lo ta'amod al dam re'echa*" which translates as "Do not stand idle when your fel-

lowman is in danger." This teaches that we must do whatever is necessary to save the life of those who are in danger. Everyone has the obligation to save those who are ill - the Torah even teaches that one can violate Shabbat if someone's life is in danger. Allowing the option to clone tissues and organs to be used in a transplant for those who cannot find a genetically identical match, would allow individuals to partake in the mitzvah of saving one's life. Perhaps, this would obligate society to clone for the sake of saving one's life since the donor would be a genetic match, negating any complications.

Another reason why human cloning might be considered in the case where a family is experiencing issues of infertility, such as if the man's sperm is not viable. Human cloning could use the male's somatic cell as the nucleus donor and the female enucleated egg cell with her mitochondrial DNA, thereby letting both be part of the process, rather than using a sperm donor [2]. The Gemara (*Kiddushin* 30b; *Niddah* 31a) states that there are three partners in creation of a human being: Hashem, a man, and a woman. Reproductive human cloning to produce offspring could result in the father's role in creation to be negated [5]. While the above is true, human cloning to produce offspring may be halachically more suitable than IVF, because there would be no need to collect sperm, which some opinions hold as a violation from the Torah of *hotza'at zera levatalah* [3].

As is known, multiple people can be involved in the creation of the clone, resulting in the question of who the clone's family is according to halacha. As stated in *Kiddushin* (69a), the gestational mother who birthed the baby would be the clone's halachic mother, yet few argue that the halachic mother would be the one who supplied her DNA. There is a minor opinion that says that it is possible for a child to have two or three mothers and no father according to halacha, the surrogate mother, the mother who gave her the enucleated egg, and the mother who supplied her the somatic donor cell [6].

When it comes to who the father is, if there was no man involved in the cloning process, there is an option that either there is no halachic father, similar to the case when the genetic father is not Jewish. Or, perhaps, there is a female halachic father - the donor of the terminally differentiated female somatic cell. The halachic father is the person whom the DNA has been taken from (i.e., the somatic cell donor) whether this person was a female or male [7].

Although the concept of cloning still may appear strange and foreign, the Maharal noted that human creativity is a natural part of this world. In addition, we have the mitzvah of , or conquering the world, to make it better for humanity, which reproductive cloning can allow. Technology is always evolving and advancing, which introduces ethical and halachic questions and concerns. Hopefully, when the time is right, society will have all the answers to these questions and be able to provide medical care and successful organ transplants and donations.

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