

Reflections

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Reproductive Science: Questions We Must Answer

In 2017, attempting to grow human organs for medical transplant, researchers at Salk Institute injected pig embryos with human stem cells, achieving a human-to-pig cell count of about one in one hundred thousand. This year, researchers at the University of California, Davis reported that using sheep embryos they had boosted the human cell count to one in ten thousand – a ten-fold increase in one year.

Science and technology are advancing at a prodigious rate, providing man with ever increasing capabilities to change virtually every aspect of the world in which he lives, including life itself. It is now possible to perform curative surgery in the womb, correct abnormalities in a woman's egg, predict developmental issues in utero, decipher the human genome, and alter the building blocks of life.

Once more fiction than science, he has also brought forth children with three genetically-related parents, created human-animal chimeras, and developed tests for embryonic disorders that could lead to the virtual eradication of scores of diseases – but presently requiring eugenic selection, that is, termination of the unwanted. “Defective” children may never be born. Down syndrome births already have been reduced by over 90% through genetic identification and abortion.

Disorders in a mother's mitochondria, the cellular component that generates more than 90% of the body's energy, are passed on to her children, who in turn can suffer catastrophic organ failure. The pre-conception treatment is to remove the nucleus from the mother's egg and place it in an enucleated healthy egg from a donor. The reconstructed egg is fertilized with the father's sperm and implanted in the mother's womb to develop “naturally.” The resulting child will be free of the mitochondrial disease, but will have three genetic parents, which raises significant moral concerns.

In 2016, Congress banned federal support for genetic modification techniques that affect the next generation. But the genie was out of the bottle. It was reported in September 2016 that a child was born earlier that year as a result of mitochondria replacement therapy. The procedure was done by a New York fertility clinician in a clinic in Mexico. In August 2017, the FDA sent him a letter to desist, stating that “such human subject research cannot legally be performed in the United States. Nor is exportation permitted.”

In the Ukraine, where the procedure is not illegal, physicians at the Nadiya Clinic have created four children, each possessing DNA from three different parents. Three more of their patients are pregnant by this method.

Experimenting with genetic modifications puts society on a slippery slope. Once initial sanction is given, a growing approval creep is hard to stop. If a child can have three genetically-related parents, why not four? Or more? Why can't both same-sex partners be genetically related to a child, rather than only one? As pluripotent stem cell research progresses, will an individual be allowed to “self-breed” with an egg and sperm created from cells of his own body?

An even more haunting, yet exciting development for the benefits it promises, is genome-editing. This technology can change the nature of any cell and modify every life form by adding, removing, or altering genetic material at particular locations in the genome. The technique is currently being used to treat disease, but could allow human enhancement through introducing specific genes for certain desirable characteristics. By modifying traits that pass from one generation to the next, it has the potential to shape the future of humanity. Could the next step be to design babies with parent-selected characteristics, such

as intelligence, beauty, strength and height? This may not be possible today, but will not be beyond future advances.

The technical capabilities of reproductive science have outstripped moral development. In mitochondria replacement therapy, for example, two embryonic children are destroyed to create a third. In vitro fertilization, multiple eggs are fertilized, but only one allowed to develop; the rest are destroyed or warehoused. Genetic screening is not about altering imperfect embryos, but about recognizing and abolishing them to produce a “perfect” child. Abortion in America has killed over 60 million children in the womb since 1973. Are we prepared to continue selecting out the imperfect, as well as the unwanted, among us?

Children are beginning to be treated as commodities and their creation as services. A couple desiring a child, but not wanting the “inconvenience” of child bearing, can have her eggs and his sperm united in a laboratory and then hire a surrogate woman to carry the child through term. Gametes from young college-educated men and women are sought after by fertility centers for resale to infertile couples. Embryos are frozen and stored to meet a couple’s possible future desire for a child. Are components of conception items to be bought and sold? Are children consumer objects to be acquired or discarded? Will the traditional means of having children be reduced to an option?

In experimenting with chimeras, researchers restrict where human cells reside, to ensure that they do not invade an animal’s brain or reproductive organs. But what if they fail in their targeting? Could an animal-hybrid develop that has a partial human nature, say the capacity for rationality, and can pass on its new traits to its offspring? That would be a societal nightmare.

Genetic engineering, female egg manipulation, laboratory-produced sperm, designer babies, human/animal hybrids, cloning -- with each mal-applied advance, man is creating a society where human beings are worth having only when they are wanted and only if they are perfect. How long will it be before the capability exists to create genetically-designed, factory-produced children? The human “hatchery and conditioning center” of Huxley’s *Brave New World* may have been the fantasy of a fertile imagination, but present reality already surpasses yesterday’s fiction.

Science has the promise to eliminate much human suffering, but every new discovery is not necessarily an advance for mankind. In a society unrestrained by a belief in the inherent dignity of every human being at every stage of life, so-called progress can create a dystopian future. Science and technology have no moral direction in themselves; their development and use must be guided by external principles to assure their compatibility with man’s purpose on Earth. Without an understanding of why he exists, man’s conquest of nature leads him to mold his world and himself to his personal desires. What is needed are moral values to guide man’s genius. The fundamental questions that must be asked arise not from what we *can* do, but rather from what we *ought* to do.

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