PARIS

In vitro fertilization (IVF), the pioneering technique that won Robert Edwards the 2010 Nobel Prize for medicine, opened up a wealth of scientific options and a Pandora's box of ethical dilemmas.

Edwards's success in fertilizing a human egg outside of the womb led not only to "test tube babies" but also to innovations such as embryonic stem cell research and surrogate motherhood.

Amid the applause for these medical breakthroughs, ethicists from some Christian churches oppose IVF and techniques related to it because they involve the destruction of human embryos.

The bewildering array of options due to the IVF revolution -- from the morality of making "designer babies" to exploitation of poor women as surrogate mothers -- has created much concern and many debates among secular ethicists as well.

The Roman Catholic Church ranks as probably the most vocal opponent of IVF and the once unimaginable options it has spawned. Its top official for life issues slammed the award to Edwards as "completely misplaced."

"Without Edwards there would be no market for human eggs; without Edwards there would not be freezers full of embryos waiting to be transferred to a uterus, or, more likely, used for research or left to die, abandoned and forgotten by all," said Ignazio Carrasco de Paula, President of the Pontifical Academy for Life, in what the Vatican described as personal statement.

The director of a Catholic bioethics institute in Britain said IVF "has led directly to the deliberate destruction of millions of human embryos."

"It has made possible the manipulation of the human embryo on a scale never possible before," Professor David Albert Jones of the Anscombe Bioethics Center in Oxford told Reuters.

VARIED RELIGIOUS RESPONSES

Many evangelical Protestants and Orthodox Christians agree with Catholics that destroying embryos amounts to killing because human life, dignity and rights start at fertilization.

"To argue that one human being is more developed and therefore in greater need in no way justifies the cannibalizing of another to benefit him," Richard Land, top ethics
official for the Southern Baptist Convention (SBC), has said. The SBC is the largest Protestant church in the United States.

The Vatican restated its teaching on IVF and related techniques in 2009, saying that humans are persons from the moment of conception "and therefore from the same moment, his or her rights as a person must be recognized" and the first of these is "the inviolable right of every innocent being to life."

The document Dignitas Personae (The Dignity of the Person) said that more than 80 percent of IVF embryos are not implanted but discarded or stored in freezers. It added that procreation "has its authentic context in marriage and in the family."

While not all individual Catholics or evangelicals reject IVF or related techniques, opposition from their churches influenced a 1996 United States ban on using federal funds for stem cell research that created or destroyed human embryos.

More liberal Christians view the beginning of life less strictly and have fewer qualms about embryo manipulation.

Most Islamic scholars say a fetus only acquires rights at about four months of gestation, so embryonic manipulation is permissible, but IVF must be limited to married couples who use the husband's sperm and wife's egg to produce the embryo.

Judaism's strong emphasis on procreation means most Jewish authorities allow IVF. In fact, Israel has one of the highest rates of IVF treatments per capita in the world.

MORAL AND LEGAL DILEMMAS

India is a leading center for a treatment derived from IVF, surrogate motherhood, partly due to Hinduism's acceptance of the concept. The world's second test tube baby was born in Kolkata only two months after Louise Brown in 1978.

Rising demand from abroad for Indian surrogate mothers has turned "surrogacy tourism" there into a four billion dollar industry, according to a report by the Law Commission of India.

It expressed concern about "the exploitation of poor women in underdeveloped countries who sell their bodies for money."

Several European countries have warned IVF centers in Mumbai that the procedure is illegal in their countries and children born from rented mothers might not get citizenship.

IVF techniques are used to clone animals. Human cloning is widely condemned but some countries, including Britain, allow research on therapeutic cloning, which can be used to create new organs to replace damaged or defective ones.
The combination of IVF and surrogacy has led to previously unimaginable legal and moral complications. Many countries outlaw commercial surrogacy and laws vary on whether the surrogate or the intended mother is the legal parent.

In one baffling case in 1997, an infertile California couple hired a surrogate to bear a child from anonymous sperm and egg donations. But the intended parents divorced before the birth, so the surrogate and her husband filed a claim for custody.

When it saw the child potentially had six parents, a state court ruled it had been born with no legal parents at all.

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