Sir Robert Geoffrey Edwards

Father of Engineered Babies Passes Away

The pleasure of holding a new-born baby is a self-experiencing gratification that every married couple looks forward to. In fact, the joy is experienced ever since the time the baby starts growing and developing within the mother’s womb. But what about married couples who remain childless for years, sometimes forever? When tests after tests and treatments after treatments yield no results, the frustration and sadness they feel cannot be explained in words.

There was no hope for such parents till some time back. Until Sir Robert Geoffrey Edwards co-pioneered the “in-vitro fertilisation (IVF) technology” with his colleague Dr. Patrick Steptoe in the year 1978. The new technique brought hope to the lives of millions of couples unable to conceive naturally. It paved the way for infertile couples to bear children of their own. And the man who made it possible for such parents to continue their family is Sir Geoffrey Edwards.

In 1955, he received his PhD degree and in 1963 joined the University of Cambridge, where he studied human fertilization that laid the groundwork for his later success. By 1960, researchers had shown that egg cells from rabbits could be fertilised in test tubes when sperm was added. A flamboyant physiologist, Edwards got the cue and wanted to apply the same technique for developing embryos outside human body. Successfully, in 1968, he first created life outside the womb in the form of a human blastocyst.

All human beings develop from a single diploid cell called zygote. The zygote is formed by the fusion of two reproductive cells such as an ovum and a spermatozoon. The two-celled zygote then undergoes cleavage, increasing the number of cells to the eight-cell stage after which the embryo undergoes compaction, where cells bind tightly to each other and form a compact sphere. After compaction, the embryo further divides into a solid ball of cells (16-32 cells) attaining the morula stage. The solid morula develops into a hollow, fluid-filled blastula when the number of cells reaches 40 to 150.

At this stage, the embryo develops from the inner cell mass, or embryonic disc and continues until implantation in the uterus. Further, early embryo forms three tissue layers known as Gastrula. At this stage, although all cells have the same DNA, different cells begin to differentiate into different organs. For instance, the “Ectoderm” gives rise to skin and nervous system; “Endoderm” gives rise to the lining of the gut and internal organs and “Mesoderm” to muscles, bones and heart. Eventually all the tissues differentiate and mature to form a fully developed baby.

In case of in vitro fertilisation, the female egg (oocyte) is fertilised outside the body, usually in a petridish, that forms a zygote. The fertilised egg (zygote) after attaining the right stage is then transferred to the patient’s womb with the intention of establishing a successful pregnancy which will lead to full-term development of an infant.

After being able to achieve fertilisation of a human egg in the laboratory condition, Dr. Edwards started collaboration with Dr. Patrick Steptoe, a gynaecologist from Oldham. While Dr. Steptoe used laparoscopy to obtain oocytes from childless patients, Edwards used the isolated oocytes in human culture media to allow fertilisation and early embryo development. However, their initial attempts met significant hostility and opposition that led to the refusal of the British government to fund their research. They also had to court many media controversies since the idea of a “test-tube baby” was widely held as morally repugnant.

However, despite hostility from the Vatican, refusal of funds from the British government and criticism from within the scientific fraternity, Sir Edwards decided to continue his research. Having been...
deprived of government’s financial support, they decided to resort to private financing. Slowly and eventually, they changed the rules of how people can come into the world because they made conception possible outside the body in a petri dish and this technique is now known as in vitro fertilisation.

They accomplished this work in a tiny, windowless laboratory at a small English hospital outside Manchester. It was there that the world’s first IVF baby, Louise Brown, was delivered on 25 July 1978 by way of a planned Caesarean section. This heralded a new era of fertility treatment as Lesley Brown, mother of the first test-tube baby, had a complication of blocked fallopian tubes and had been trying to have a baby for almost nine years. According to the International Committee Monitoring Assisted Reproductive Technologies, by 2010, the technique had resulted in births of five million babies.

The birth of Louise Brown, arguably the most publicized medical event of the century, silenced many critics who thought creating babies through IVF would result in birth defects. It heralded an era of technology-driven reproductive interventions that includes gamete intra-fallopian transfer (GIFT) and zygote intra-fallopian transfer (ZIFT) procedures, jointly referred to as assisted reproductive technologies (ART). Although many are sceptical about ART, numerous long-term studies have shown that children born through IVF are as healthy as those born through the natural process. Sir Edwards was awarded the Nobel Prize in Physiology or Medicine in 2010 for this accomplishment of IVF.

Sir Edwards had a long illustrious career before being decorated with the Nobel Prize. He was elected as a Fellow of the Royal Society of London, Britain’s foremost science institution, in 1984. In 2007, he was ranked 26th in The Daily Telegraph’s list of 100 greatest living geniuses.

On 4 October 2010, the 2010 Nobel Prize in Physiology or Medicine was announced. The Nobel Committee praised Edward for advancing treatment of infertility and noted that IVF babies have similar health statuses to ordinary babies. Subsequently, he was knighted by the Queen of Britain in 2011 for services to human reproductive biology.

Dr. Robert G. Edwards, who opened a new era in medicine, breathed his last on 10 April 2013 after a long lung illness at his home near Cambridge, England. He was 87 and survived by his wife Ruth Fowler Edwards, the granddaughter of physicist Ernest Rutherford, and five daughters and 12 grandchildren.

Edwards was known to have dementia and was said to have been unable to appreciate the tribute when he was awarded the Nobel Prize in 2010. The University of Cambridge, where he worked for many years while announcing his demise said: “He will be greatly missed by family, friends and colleagues.”

Despite all the criticism, IVF has been considered a milestone in modern science that has brought hope to those unable to conceive naturally. Refinements and innovations in technology such as intra-cytoplasmatic sperm injection (ICSI), embryo biopsy and stem cell research have increased pregnancy rates and more and more children have been born by IVF with donated oocyte and embryos.

Although IVF and other ARTs provide the only means to have a biologically linked child for couples, these procedures and their obstetrical, perinatal and potential long-term sequelae are always associated with high costs. However, it is almost certain that use of IVF will continue to increase because of increase in the incidence of infertility and advances in scientific knowledge and technical sophistication.

Dr Prasanta K. Dash (prasanta01@yahoo.com) is fellow of Howard Hughes Medical Institute and scientist at NRCBP, Pusa Campus, New Delhi-110012. Ms. Payal Gupta is a Senior Research Fellow and Dr Rhitu Rai is working as a scientist at NRCBP.