
Sir Bob Edwards: Salute to a Giant

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The 2010 Nobel Prize in Physiology or Medicine was awarded to Dr. Robert Edwards for “the development of in vitro fertilization”. The Nobel Assembly stated that the vision Edwards had of discovering a treatment for infertility is now “a reality and brings joy to infertile people all over the world”. Indeed, looking back over my own familiarity with Edwards and with the treatment of infertility by *in vitro* fertilization (IVF), I can think of only very few – if any – disciplines in medicine that owe their origins and their progress so much to just one man. For Edwards it was his controversial experiments in oocyte maturation and fertilization that paved the way for IVF. With the gynaecologist Patrick Steptoe, he successfully pioneered the birth of the world’s first IVF baby in July 1978, and thereby, in that single event, opened the door to IVF for so many individuals and clinics around the world.

At the latest annual meeting of the European Society of Human Reproduction and Embryology (ESHRE), a Society which Edwards himself had founded in 1984, data reflecting the extent of worldwide IVF activity were presented which showed that around 1.5 million cycles are now performed each year, with an estimated 4.6 million babies born since the first in 1978. This represents a huge growth in what is fast becoming a boom industry in many parts of the world – including China and India; both the burgeoning activity and the babies all owe their origins to Robert Edwards.

That annual world report, presented at the ESHRE congress by Professor Karl Nygren on behalf of the International Committee for Monitoring Assisted Reproduction (ICMART), is derived from data submitted by individual country registries, which, according to Nygren, represent around 70% of the world’s actual IVF activity. The other 30% of the calculations are estimates and extrapolations. In Asia, for example, only Japan and Korea supply data to ICMART from a national register. However, it seems that Asia currently represents around 20% of global IVF activity – and that figure may well be an underestimate. India and China have both introduced many IVF programmes over the past few years, the former now clearly involved in providing services for overseas patients. However, neither country participates in the global report, and the exact extent of IVF services provided in China and India remains open to conjecture.

Yet it’s a fact that the practice of modern reproductive medicine – wherever in the world – requires specialist training, and for both these countries, India and China, to perform on the



world IVF stage implies a level of learning which was always one of Edward's ambitions. Indeed, when Edwards set up ESHRE in 1984 his two main priorities were the establishment of a journal (which would later become *Human Reproduction*) and the development of a training network which would encourage the worldwide uptake of IVF in the treatment of infertility.

And this too is what the Nobel Committee recognised in awarding Bob its 2010

Prize for Medicine, saying that in IVF a new field of medicine had now emerged, 'with Robert Edwards leading the process all the way from the fundamental discoveries to the current, successful IVF therapy'. The Assembly also noted that, following the birth of Louise Brown in July 1978, 'Edwards and his co-workers refined IVF technology and shared it with colleagues around the world'. It is in this spirit of sharing that Bob's influence has now stretched to all corners of the world, and his encouragement of young scientists – in the ESHRE training classes, in the journals he edited, and in his own laboratory in Cambridge – was always a feature of his professional life.

For me, a young PhD student who had never before left his homeland of India, Cambridge bus station on a wet night of October 1977 was a daunting place. All I had in my pocket was £27 and in my two red suitcases a stash of food supplied by my mother back home in Benares. I was hungry, cold and intimidated. Yet 24 hours later, once I'd set foot in the Marshall Laboratory and been welcomed by Bob in his third-floor office, every drop of trepidation left me. From that day on and for the next three decades, Bob Edwards became the most profound influence on my life and career. I was not alone.



Sir Robert Edwards and Patrick Steptoe with Kamal Ahuja in Cambridge in 1987.



Bob with members of the Marshall Laboratory in 1983, outside the Physiology Department building in Cambridge, (Kamal Ahuja 2nd from left).



The date of my arrival in Cambridge, just 10 months before the birth of Louise Brown – the first IVF baby – was of course a time of intense activity in the lab. For Bob himself, it was the culmination of nearly 30 years of past research in reproductive biology. That work had begun in the early 1960s trying to explain the maturation of oocytes in the *in vitro* mouse model. In order to pursue the same line of enquiry in human oocyte maturation, Bob needed human oocytes, but their supply was limited, and the ethical objections quite vocal. This early work was summarised in a seminal publication in *Lancet* in 1965 (R G Edwards, Maturation *in vitro* of human ovarian oocytes, *Lancet*, Vol.286, pp.926–929, 1965) in which he describes the meiotic chromosomal events which occur during egg maturation. The paper is also remarkable for its discussion section in which Bob set out with great clarity and foresight a programme of research in human developmental biology which would predict the course of reproductive science and medicine over the next 20 years. That programme included studies on the effect of maternal age on non-disjunction in relation to the origins of trisomy 21 (Down syndrome), the use of human eggs in IVF to study fertilisation, culture methods for human eggs fertilized *in vitro*, the use of ‘priming hormones’ to increase the number of eggs per woman available for study, and the use of IVF embryos to circumvent blocked tubes. That last research objective became a clinical reality with the birth of Louise Brown in 1978, for her mother Lesley had in fact been referred to the gynaecologist Patrick Steptoe with infertility resulting from tubal adhesions. Throughout this time, of course, Edwards had many collaborators – most notably Steptoe – but it was he alone who would pursue these priorities of research and thereby lay the foundation for what is safe and successful IVF today.

It is worth recording that this was not just achieved in the face of huge scientific challenges, but in the face of momentous ethical opposition too.



Kamal Ahuja with Sir Robert Edwards, Duck End Farm, 2008. Bob is holding a photograph of himself and Louise Brown, the world's first IVF baby.

By the early 1970s Bob had reported the successful fertilisation of *in vivo* mature eggs retrieved laparoscopically from female subjects stimulated with gonadotrophins. Their *in vitro* development through cleavage to the blastocyst stage was a march of scientific triumph for Bob, but one which the UK's medical establishment was uneasy about. For example, a grant application made by Bob was rejected by the Medical Research Council on the grounds that the work was “unethical”, and there was continuing unease about the press coverage his journal reports continued to



excite. Indeed, it was not until the birth of Louise Brown towards the end of the decade that Bob's work was recognised for the achievement it was, both as a triumph of science and, in the demonstration of IVF, a means at last of treating infertility in a notable number of women. Subsequent developments in assisted reproduction – such as the introduction of intracytoplasmic sperm injection (ICSI) in the early 1990s for the effective treatment of male infertility – were equally monumental events, but would never have happened without the lead and inspiration of Bob Edwards. The use of stem cells for regenerative medicine, preimplantation genetic diagnosis (to remove the risk of inherited diseases in the children of affected couples), and single embryo transfer for the avoidance of multiple pregnancy in IVF were all predicted throughout this remarkable decade.



Sir Bob Edwards

For me, coming from India to work in the laboratory of someone whose impact remains so emphatic was a salutary experience. Bob was as careful and encouraging in his supervision of my own PhD as he was in editing *Human Reproduction* or indeed in the stepwise progress of his own research. When he finally set up his own fertility clinic at Bourn Hall near Cambridge, I had the chance to join him, but chose an alternative route with Ian Craft in London. It was the only blip in our relationship, and in time, as my clinical work progressed through the Cromwell Hospital and now at the London Women's Clinic, Bob has remained a scientific inspiration (and indeed, for a while, one of our scientific directors!). I am not alone, and there must be countless individuals like myself – many I'm sure in India – who owe their work in the treatment of infertility to the model of Bob Edwards. And we should never forget that this scientific lead owes as much to Bob's geniality of character as to his achievements in reproductive biology research.

Suggested Reading

- [1] K Ahuja, F Bennett, J Cohen and R Edwards, 'Bob Edwards Nobel Laureate' *Reproductive BioMedicine Online Tribute Supplement*, Vol.23, special issue 1, July 2011. <http://www.rbmojournal.com/>
- [2] M Johnson, 'Robert Edwards: the path to IVF' *Reproductive BioMedicine Online*, Vol.23, No.2, pp.141–268, August 2011. <http://www.rbmojournal.com/>

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