

“BRAVE NEW BABY DOCTORS”



HEROES OF SCIENCE AND TECHNOLOGY

Course: ALA Biological Sciences

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INTRODUCTION

This report has been requested by Mark Hetherington and John O'Neill. The report is based on my chosen "Scientific Heroes"; namely Patrick Steptoe and Robert Edwards and will detail both their individual early pioneering research and the work they carried out together with little or no moral or financial backing in order to provide I.V.F (in vitro fertilisation) as an option to many childless couples. The report will also refer to a number of the obstacles overcome by Edwards and Steptoe and detail the ultimate success of I.V.F, namely the birth of Louise Joy Brown on 25th July, 1978. This report is to be submitted by 25th May, 2009.

1. RESEARCH METHODS/PLAN

For this report a variety of resources were consulted, primarily, the Internet, journals' and bibliographies. The use of timelines were also utilised in order to facilitate the compilation of the report; the timelines I set myself in this instance being as follows:

- Topic and hero identified by 30/09/2009
- Brief plan on this chosen subject outlined by 28/10/2009
- Summary completed for publishing on the net by 17/02/2009
- A power point production produced and presented to the class: 30/03/2009
- Final report submitted for assessment by 25/05/2009

3.1 WHO ARE EDWARDS AND STEPTOE?

ROBERT EDWARDS: BORN 27/09/1925 (LEEDS)

Following his first degree achieved in 1951 in Wales and a Diploma in Animal Genetics, Edwards achieved a PhD in the same field at Edinburgh University in 1955 where his fascination for biology and reproduction was already apparent. It was during this time that Edwards began using mouse embryos for his research into fertility and reproduction and saw him develop a hormone which caused the mice to “superovulate” (produce many eggs); incredibly this would be the same hormone given to women undergoing I.V.F years later for the same purpose.

PATRICK STEPTOE: BORN 09/06/1913 (OXFORDSHIRE)

Patrick Steptoe decided at a young age to study medicine. Having completed his studies at the University of London’s St George Hospital/ Medical School, Steptoe became licensed in 1939 and thereafter became a member of the Royal College of Surgeons. Despite his medical career being interrupted by World War 2 where Steptoe volunteered as a Naval Surgeon , his drive to pursue a career in medicine continued. Following the war, Steptoe undertook further studies in the specialised areas of “obstetrics and gynaecology”. After a spell in private practice, Steptoe began working at Oldham General and District Hospital in 1951 where he began to pursue his interest in fertility problems.

3.2 INVESTIGATION OF THEIR RESEARCH WORK

ROBERT EDWARDS

Edwards was a self confessed “**Biologist with a fascination about how life began**”

This fascination is what led him to study the fertility of mice during his PhD at Edinburgh in 1955. An invaluable step as it led to the development of the hormone given to women undergoing I.V.F which caused them to superovulate (producing approximately 5 – 12 mature follicles).

Through his many years of study in the area of animal fertility, Edwards understood that each species had its own “quirks”, especially humans. Having long since moved on from the stage of animal reproduction, Edwards was now undertaking pioneering work, laying the foundations for what we now know as I.V.F (in vitro fertilisation). In order to progress further however would take many failed attempts. Unfortunately

for Edwards egg removal from women at this time was a deeply invasive and dangerous procedure rendering such resources scarce. Furthermore, these eggs were not forthcoming from his colleagues in the medical world, who, on learning of their purpose were reluctant to get involved. Edwards was forced to source eggs from wherever he could, many of them coming from bits of discarded ovaries from women who had undergone hysterectomies.

The eggs although essential were only a part of the intricate jigsaw; it was equally as important that the perfect mix of salts, food, acidity and hormones were present in the “culture medium” which would provide the ideal conditions necessary for the egg to fertilise outwith the body (in vitro).

1968 saw a momentous breakthrough for Edwards whilst working in his capacity as a Scientist at Cambridge University; Edwards and a student added some of their own sperm to 9 donated eggs and witnessed them moving into eggs. Although enough progress to generate shock headlines such as

“Life created in test tube”

It was not a complete success for Edwards as the fertilised eggs failed to divide into cells (as they would have in vivo). In a desperate bid to progress Edwards even attempted, unsuccessfully, to grow the embryo’s inside “rabbits”, which only served to increase the media concern regarding the work being carried out.

Following numerous failures, Edwards then looked to the “culture medium” into which the egg and sperm were placed. Finally, on altering the nutrients contained within, he witnessed the fertilised egg split into 2,4 and 8 cells, resulting after 5 days in the creation of hollow balls or “blastocysts” . Edwards was now even closer to achieving the revolutionary medical breakthrough that had dominated his research for many years.



Blastocysts

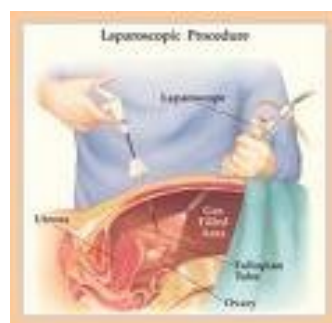
PATRICK STEPTOE

Step toe, a gynaecologist who shared Edwards deep rooted interest in fertility, was the final piece of the jigsaw for Edwards.

Step toe whilst working in Oldham General & District Hospital; specialised in obstetrics and gynaecology, he studied methods of sterilisation and the problems of

infertility. In so doing, Steptoe perfected and pioneered a little known technique called “Laparoscopy”. Steptoe utilised this technique in order to retrieve eggs from a woman’s ovary, the use of the laparoscope meant that what had previously been an extremely risky procedure fraught with danger for the patient was now minimally invasive.

The procedure, generally carried out whilst the patient is under general anaesthetic, involves the cleansing of the skin over the abdomen before a small incision is made; at this juncture some gas is injected through the incision, inflating the abdominal wall slightly and facilitating the view of the internal organs with the laparoscope. By making more than one incision in the abdominal skin allows the insertion of other required instruments to locate and retrieve sought after eggs, as per diagram below.



Although by combining the knowledge and expertise of Steptoe and Edwards, the possibility of creating life outwith the human body became ever more plausible, this was not viewed positively by the majority of their medical colleagues. The men found themselves ostracised by their peers and vilified by the media for what was seen as “tampering with nature”. As the ripples of disapproval grew amongst the medical world, the little funding which had been afforded to them was quickly withdrawn; ironically much of the funding to “create” life came from the legal abortions performed by Steptoe.

Both Edwards and Steptoe persevered, for over a decade Edwards drove between his lab in Cambridge and the clinic in Oldham, clocking up over 250,000 miles. On occasions whilst he drove, Edwards had fresh eggs strapped to his side to keep them warm until his arrival. Unorthodox by anyone’s standards but these men were not following rules and procedures but instead creating exciting new ones where they were willing to do whatever it took to make their concept a reality.

3.3 THE IMPACT OF THEIR WORK ON SOCIETY

Nowadays the option of I.V.F for childless couples is taken for granted as a viable option. Back in the late 1960's, early 1970's however the concept was regarded largely as 'unnatural'. Edwards himself once said:

“I've always been amazed at scientists'attitudes, they can be scientists Monday to Saturday and totally different on a Sunday”.

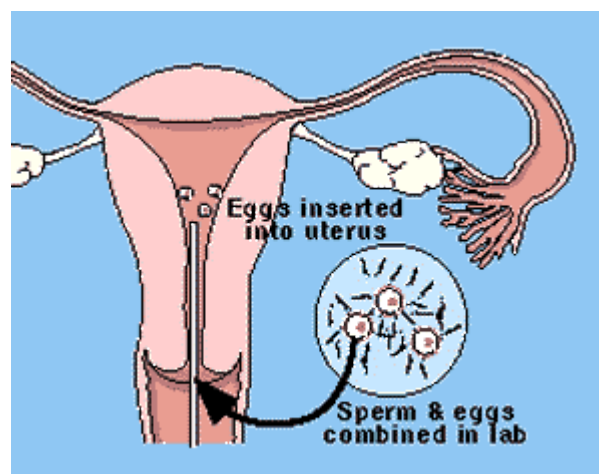
Although the majority of both the medical world and general public were against their research, condemning it as a step too far, there was another section of the population who followed their progress religiously and, dutifully, made their way to the clinic in Oldham to give blood, donate eggs and do whatever else was requested of them for a small chance of conceiving a child. That minority were a constant stream of childless couples, who saw this innovative work, as a glimmer of hope.

Despite the intolerable long hours and numerous failed attempts in the face of criticism and condemnation, this steady increasing stream of childless couples confirmed the validity and indeed the necessity of their research.

On November 10, 1977, Lesley Brown, having tried for several years to conceive and having finally been referred to Dr Steptoe, underwent the “experimental” I.V.F procedure in the hands of Steptoe and Edwards.

As per the procedure, using the long slender, self lit laparoscope, Dr Steptoe removed the eggs from Lesley Brown's ovaries and passed them to Edwards, who, mixed them with the sperm of Lesley's husband and placed it into the perfected culture medium in order to nurture the egg as division took place. Unlike previous attempts where the egg was replaced into the uterus after 5 days (having divided into approximately 64 cells), on this occasion the fertilised egg was placed back into the uterus after just 2 and a half days.

The pregnancy was monitored closely, ensuring initially that the egg had embedded successfully into the endometrium.



Implantation

As the weeks turned into months, this I.V.F pregnancy differed from all previous attempts as it continued with no apparent problems.

Although undeniably a breakthrough, there were concerns as to what the results of this unconventional pregnancy would be; would having been out of the womb temporarily have harmed the egg? Would the baby, if surviving the pregnancy have any resulting health implications? If so, did the medics and the parents have the right to tamper with nature and bring such a baby into the world?

All valid questions and had the end result of this pregnancy been different we may not have had the option of I.V.F. today.

However, 25th July, 1978, saw the birth of a healthy baby girl. Louise Joy Brown delivered by caesarean section by Dr Steptoe, became the worlds' first I.V.F baby and the interest worldwide exploded.

Thousands of childless couples took great hope from what was hailed as a "miracle birth" and applauded the medical breakthrough, whilst others remained sceptical and concerned regarding future implications.

4 CONCLUSION

The introduction of I.V.F into the medical arena has undeniably provided a positive outcome for many thousands of childless couples, with over 3,000,000 I.V.F babies born worldwide since the momentous arrival of Louise Brown on 25/07/1978. Confirmation indeed of the great work carried out by both Steptoe and Edwards and its benefit to today's society.

However, although the basis of I.V.F is to be applauded, now that it is "out there", there can be no guarantee that this procedure will not be abused in the future.

Already we have seen cases re: posthumous children to dead partners and controversial screening of embryos in order to select one which does not carry the genetic defect or illness of its parents. The questions and concerns raised by its critics decades ago such as:

- Human cloning
- Sex selection
- Saviour siblings
- When does human life begin?

still echo today. The frightening truth being they are all possibilities which may one day, in the wrong hands, become a reality.

5. EVALUATION

I enjoyed researching this subject, which, in many aspects made it easier. I was however amazed by the vast information available which in some aspects made it harder to select the essential facts and not deviate into another debate.

The progression from researching to presentation and final report writing was facilitated by combining this topic with the “Communications” module, allowing a structure to be followed. I also found that having time lines were beneficial ensuring steady progress. I did find however, having 2 science heroes involved in my chosen subject made staying within the 1500 word count extremely difficult.

6.

7. BIBLIOGRAPHY

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