A Forgotten Genius*
Dr. Subhas Mukhopadhyay: Creator of India’s First Test-tube Baby

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An unsung scientist of his time, Dr. Subhas Mukhopadhyay, the architect of India’s first test-tube baby, is now regarded as the pioneer in the field of in vitro fertilization (IVF) and is credited with developing the cryopreservation technique of human embryos for subsequent use in the birth of a normal, healthy baby.

1. Introduction

Although the world is currently beleaguered with population overgrowth, it is essential to address the issue of male and female infertility as it is a highly agonizing medical problem among couples failing to conceive with ‘child wish’. In 2004, the Demographic and Health Surveys in collaboration with World Health Organisation [1] reported that one in every four couples in the developing countries are affected by infertility related problem [2]. Researchers across the globe have been working on medically assisted reproductive technologies (ARTs) such as intrauterine insemination (IUI) and in vitro fertilization (IVF), thus enabling millions of infertile couples to have a biological child. The IVF procedure basically takes place outside the female body (in culture dishes/tubes), and subsequently, the mature embryo is implanted into the mother’s womb.

During the 1960s at the University of Cambridge, Professor Robert G. Edwards and his collaborator, surgeon Dr. Patrick Steptoe were working on the development of the IVF technique. On 25 July 1978, Prof. Edwards and his team announced the birth of the

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first IVF baby Miss. Louise Brown in Britain, born through this path-breaking technique. Subsequent studies further suggested that IVF babies are as healthy as normally conceived children. Prof. Robert G. Edwards received the Nobel Prize in Physiology or Medicine in 2010 for the ‘development of in vitro fertilization’ [3].

On the other hand, in India, Dr. Subhas Mukhopadhyay, a Professor of Physiology at Bankura Sammilani Medical College, West Bengal along with his colleagues Dr. Sunit Mukharjee (Dept. of Food Technology, Jadavpur University, Kolkata) and Dr. Saroj Kanti Bhattacharya (Gynaecologist and Obstetrics at Calcutta Medical College, Kolkata) were working on a method for induced ovulation and cryopreservation of human embryos. On 03 October 1978, Dr. Mukhopadhyay and his team in Kolkata announced the birth of the world’s second test-tube baby conceived by in vitro procedure, a baby girl (pseudonym ‘Durga’, whose actual name is Kanupriya Agarwal), weighing 3.35 kg by lower segment Cesarean section. This announcement came only 67 days after the birth of the first test-tube baby in England.
after the birth of the first test-tube baby in England. The news was broadcasted on Calcutta Doordarshan on Tuesday, 03 October 1978 at 11:44 AM and widely reported in the leading dailies of Kolkata, India [4].

2. Academic Track Record

Subhas Mukhopadhyay (*Figure 1*) was born on 16 January 1931, in Hazaribagh district of present-day Jharkhand, and was the son of a doctor. He was a medical graduate from the National Medical College in Kolkata. He did his D.Phil. under the supervision of Prof. Sachidananda Banerjee from the prestigious Dept. of Physiology, Rajabazar Science College, Calcutta University (Kolkata, India). His area of research involved understanding biochemical changes in normal and abnormal pregnancy [4]. Later, he earned his second D.Phil. from the Clinical Endocrinology Research Unit (Medical Research Council), the University of Edinburgh (under the guidance of eminent reproductive physiologist Prof. John A. Loraine and Prof. W. L. M. Perry). His thesis was titled *Some Observations On the Biological Assay of Gonadotropic Hormones* (1963). In 2017, the University of Edinburgh (Edinburgh Medical School, United Kingdom) digitized the entire 280-page PhD thesis of Dr. Subhas Mukhopadhyay [5].

3. Research Career

During the late 1960s, Dr. Mukhopadhyay was conducting research on reproductive endocrinology with gonadotropins for inducing ovulation and spermatogenesis in human subjects, along with innovative gynecological surgery and experimental animal models for understanding the factor(s) contributing to infertility and other reproductive disorders. The term ‘ovulation’ refers to the process of release of an egg from the ovaries, while ‘spermatogenesis’ refers to the developmental process by which the haploid spermatozoa is generated in the seminiferous tubules of the male testis.

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Dr. Mukhopadhyay was a pioneer in reproductive biology clinical research and revolutionized the field by innovating and applying novel assisted reproductive techniques such as (a) using human menopausal gonadotrophin (hMG) hormone to stimulate the ovaries to produce extra eggs; (b) employing the trans-vaginal method (route) to extract mature eggs from the ovaries guided by the ultra-sonographic system; (c) successfully cryopreserving (freeze) human embryos (an 8-cell embryo) using dimethyl sulfoxide (DMSO) reagent, storing and thawing them; and (d) effectively reviving the cryopreserved embryos to implant them to the uterus of a patient. These techniques are currently being followed in most of the IVF clinics across the globe [4, 6]. He developed a novel procedure of in vitro fertilization on a patient (Mrs. Bela Agarwal, aged 31)—a case of primary infertility due to damaged fallopian tubes preventing conception even after 16 years of her marriage. Dr. Mukhopadhyay formulated an IVF protocol different from that developed by British researchers Dr. Steptoe and Dr. Edwards [7].

Dr. Mukhopadhyay presented his research findings in many national/international scientific meetings/conferences, e.g., the symposium held at the Institute for Research in Reproduction (Bombay, 1971), the International Congress on Hormonal Steroids (New Delhi, 1978), and the Indian Science Congress (Hyderabad, 1979).

4. Reaction of the Indian Medical Fraternity

The Indian scientific establishment and medical fraternity during that time, however, failed to appreciate his triumphant achievements and instead opposed his claims. His research work was repeatedly scrutinized to humiliate him purposefully. Most of Dr. Subhas Mukhopadhyay’s splendid work remained unpublished because he was not given medicolegal/ethical clearance and a platform to complete it by the competent authorities. On 19 October 1978, an empowered committee was appointed by the Government of West Bengal under the Indian Medical Association West Bengal Chapter and Bengal Obstetrics and Gynaecol-
ogy Association without adequate technical/subject expertise to examine the claim(s) of Dr. Subhas Mukhopadhyay and his colleagues.

This committee deliberately overlooked the report submitted by Dr. Mukhopadhyay and finally denounced and debunked his claims on 18 November 1978. Furthermore, Dr. Mukhopadhyay was discouraged from continuing his work and denied permission to present his research in international conferences or scientific meetings. Finally, he was forcefully transferred to the Regional Institute of Ophthalmology on 05 June 1981. Dr. Mukhopadhyay was devastated. Unable to bear such targeted vindictiveness and bureaucratic arrogance, he committed suicide on 19 July 1981 [8].

5. Posthumous Recognition

In 1982, the Indian Council of Medical Research (ICMR) initiated a similar project (led by Dr. T. C. Anand Kumar and Dr. Indira Hinduja) at the Institute for Research in Reproduction (presently named the ICMR-National Institute for Research in Reproductive Health), Mumbai. On 06 August 1986, they reported the birth of India’s first ‘fully scientifically documented’ test-tube baby, named ‘Harsha’. In 1986, Dr. T. C. Anand Kumar participated at the National Science Congress held in Kolkata. He was unaware of Dr. Mukhopadhyay’s contribution 8 years prior to his work [4]. He read the original handwritten laboratory notes of Dr. Mukhopadhyay on IVF discovery during this visit. Dr. T. C. Anand Kumar subsequently realized that India’s first IVF baby was created by Dr. Mukhopadhyay and his team in 1978. Dr. T. C. Anand Kumar at the 3rd National Congress on Assisted Reproductive Technology (08 February 1997, at Kolkata) delivered a speech and appealed to the scientific fraternity to recognize Dr. Subhas Mukhopadhyay posthumously for creating the world’s second and India’s first test-tube baby. Later on, Dr. T. C. Anand Kumar, former Director of Institute for Research in Reproduction (Mumbai) and Dr. Sunit Mukherjee collectively played a significant role in giving due credit to the true IVF inventor of
On 09 December 2018, a life-sized memorial statue of the IVF pioneer Dr. Subhas Mukhopadhyay was unveiled at Hazaribagh Sadar Hospital, Jharkhand.

India [4].

The Indian scientific community now realizes that they lost an opportunity to recognize Dr. Subhas Mukhopadhyay’s groundbreaking research on in vitro fertilization (IVF) technique. Lately, several accolades have been accorded to perpetuate his memory and honor his landmark achievements. In 1985, Jadavpur University, Calcutta established an institute named ‘Dr. Subhas Mukherjee Memorial Reproductive Biology and Research Institute’. In 2002, the Indian Council of Medical Research (ICMR) recorded the contributions of Dr. Subhas Mukhopadhyay in its document *National Guidelines for Accreditation, Supervision, and Recognition of ART clinics in India*. In 2007, Dr. Subhas Mukhopadhyay’s scientific work was documented in the *Dictionary of Medical Biography* published by the prestigious Wellcome Trust Centre for History of Medicine, UCL, London (England).

Recently, on 09 December 2018, a life-sized memorial statue of the IVF pioneer Dr. Subhas Mukhopadhyay was unveiled at his
birthplace Hazaribagh Sadar Hospital, Jharkhand (Figure 2). Mr. Pravat Agarwal, father of the first Indian test-tube baby Durga (now Kanupriya Agarwal), and Prof. Sunit Mukherjee were present at this unveiling function. Many generations to come will certainly recognize his work on developing an efficient technique for the birth of test-tube babies and honor him for his incredible achievements.

Suggested Reading


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