Genetics and IVF Institute, GIVF [1]

By: Blight, Alysse Keywords: in vitro fertilization [2] infertility [3] GIVF [4]

In 1984, human genetics and reproduction researcher and physician Joseph D. Schulman founded the Genetics and IVF Institute, an international organization [5] that provides infertility [6] treatment and genetic services to patients. IVF stands for in vitro fertilization [7], an infertility [6] treatment in which a female egg [8] is fertilized by male sperm [9] outside of the female body. GIVF is headquartered in Fairfax, Virginia, in association with Inova Health System, formerly called the Fairfax Hospital Association, one of the largest regional hospital systems in the United States. GIVF offers multiple infertility [6] and genetic services including IVF, donor egg [8] and donor sperm [9] programs, prenatal genetic diagnostic testing, and sex selection technology. GIVF was one of the first medical facilities in the United States to offer IVF and has innovated other infertility [6] treatments and genetic services.

Schulman's early research on genetics and IVF led him to establish GIVF. Schulman graduated from Harvard Medical School [10] in Boston, Massachusetts, in 1966, and completed a genetics fellowship with the National Institutes of Health [11] in 1970. During his fellowship, Schulman studied human genetics and reproduction at the New York Hospital-Cornell Medical Center in New York City, New York, and trained in obstetrics and gynecology, medical specialties that focus on childbirth, pregnancy [12], and the female reproductive system. In 1973, Schulman received fellowships that allowed him to study IVF in England with physicians Patrick Steptoe [13] and Robert G. Edwards. While working in England, Schulman helped develop early IVF methods. In 2010, Edwards won the Nobel Prize in Physiology or Medicine [14] for the development of IVF. After his return to the United States in 1974, Schulman became the head of the Section on Human Biochemical Genetics at the National Institutes of Child Health and Human Development at the National Institutes of Health [11], where he conducted research on human genetic diseases.

In 1978 in England, Steptoe and Roberts achieved the first successful birth of a child conceived using IVF, the process of fertilizing egg [8] and sperm [9] cells outside of the human body in a laboratory. IVF begins with egg [8] retrieval. During egg [8] retrieval, a physician collects mature eggs from a woman by using sonogram imaging and guiding a small needle through the woman's vaginal wall and into the woman's ovaries to extract her eggs. A physician then places the eggs in a petri dish and fertilizes them with donor sperm [9]. Once the eggs are successfully fertilized and divide into eight cells, a physician uses a catheter to place the developing eggs in the woman's uterus [15]. In a successful IVF treatment, at least one egg [8] will implant in the woman's uterus [15]. Steptoe and Roberts provided IVF treatments to Lesley and John Brown for two years before their daughter, Louise Brown, was born on 25 July 1978. Since then, IVF has helped many infertile couples conceive children worldwide.

Shortly after the birth of Louise Brown, Schulman left the National Institutes of Health [11] and created GIVF. In 1983, Schulman became a professor at George Washington University [16] in Washington, DC. There, he met Andrew Dorfmann, a graduate student studying reproductive genetics. In 1984, Schulman and Dorfmann officially established GIVF in Fairfax, Virginia, as a joint venture with the Fairfax Hospital Association, now called Inova Health System. As of 2018, Dorfmann is GIVF's senior IVF embryologist.

According to the company's website, GIVF provides non-surgical, ultrasound [17]-guided egg [8] retrieval on an outpatient basis. Prior to the development of that method, women using IVF would undergo a surgical procedure called laparoscopy. During laparoscopy, a physician makes a small incision in the woman's lower abdomen and inserts a fiber optic instrument to retrieve eggs from her ovaries. In 1985, Schulman published a letter in the *New England Journal of Medicine* titled "Laparoscopy for in Vitro Fertilization: End of an Era," in which he advocated for the use of non-invasive, ultrasound [17]-guided egg [8] retrieval in the United States after he observed physicians perform the method successfully in France. Shortly after, GIVF became the first fertility clinic in the United States to use that egg [8] retrieval technique for IVF. For the first time, women undergoing IVF treatments did not require anesthesia, a surgical procedure, or hospitalization to extract their mature eggs.

GIVF also offers genetic services and infertility [6] treatments, a combination that the company claims is unique to GIVF. According to the company's website, that combination has improved efficiency and quality of patient care. For genetic services, GIVF used chorionic villus sampling as an alternative to other prenatal genetic testing methods available at the time. Chorionic villus sampling is a prenatal genetic testing process in which a physician removes and tests a small sample of placenta [18] tissue, or tissues that anchors the fetus [19] to the wall of the mother's uterus [15] and provides nutrients. Physicians use the results of those tests to identify genetic traits that may cause the fetus [19] to develop abnormally. According to their website, GIVF has the most research and clinical experience with chorionic villus sampling in the United States as of 2018. A 1988 study claimed that over 1,000 patients were referred to GIVF for chorionic villus sampling and that the results of that sampling demonstrated the safety and accuracy of that prenatal genetic test. According to their website, GIVF also developed new laboratory techniques

that decreased the time it took for physicians to get results from six weeks to eight or ten days, which increased patient satisfaction and the number of physician referrals.

In the mid-1980s, GIVF started two donor programs for human malesperm [9] and female eggs. The first program, called the Fairfax Cryobank, sold frozen sperm [9] after testing the sperm [9] for genetic and infectious diseases. At the time, most facilities used only fresh sperm [9] for donor insemination, the process in which a physician injects donorsperm [9] into a female's uterus [15] for fertilization [20]. The Fairfax Cryobank revived sperm [9] samples that had been frozen so those samples could be used for artificial insemination [21]. GIVF also introduced the first donoregg [8] IVF program in the United States, which allowed women to donate their eggs for future use in IVF treatments for other couples. Before becoming a donor for the program, women must go through extensive health and psychological screenings to see if they meet the company's standards for egg [8] donations. As of 2018, GIVF is the only infertility [6] facility to have its own donorsperm [9] and donor egg [8] programs.

In the 1990s, GIVF established the firstpreimplantation genetic diagnosis [22], or PGD, laboratory in the United States. PGD allows physicians to diagnose the genetic traits of IVF embryos and prevents patients from passing on genetic diseases to their offspring. As of 2018, GIVF remains one of the few infertility [6] facilities in the United States to have an internal PGD division with a laboratory. According to a report published by *PRWeb Newswire*, GIVF's PGD laboratory has tested thousands of embryos for their patients and for patients from other fertility clinics that do not provide that service.

GIVF also improved services for people experiencing infertility [6] in the 1990s. During that decade, GIVF became the first facility in the United States to use and report successful pregnancy [12] with intracytoplasmic sperm injection [23], or ICSI. ICSI is a method in which a physician selects a single desired human male sperm [9] and microinjects it into a human female egg [8], in conjunction with IVF. This process ensures that the egg [8] is fertilized with a healthy sperm [9] cell, which is important if male infertility [6] affects the couple attempting to have a child. Another maleinfertility [6] treatment GIVF developed is called non-surgical sperm [9] aspiration, or NSA, which involves the insertion of a small needle into thetestes [24] to extract sperm [9]. Physicians at GIVF use NSA in combination with ICSI as a male infertility [6] treatment, and the practice has been replicated in other infertility [6] labs. GIVF also createdinfertility [6] treatments for male and female cancer patients by cryopreserving, or freezing, egg [8] and sperm [9]. According to a report published by*India Pharma News*, that was the first cryopreservation [25] program designed for cancer patients in the world.

For sex selection services, GIVF created MicroSort laboratories in 1990, anorganization [5] that offers sperm [9] separation technology to couples who want to choose the sex of their child. Schulman adapted a technique called flow cytometry for use in human sex selection. In flow cytometry, cells pass through an electronic detection apparatus that sorts them based on their chromosomes. Schulman combined flow cytometry with the genetic testing method called fluorescence in situ hybridization, which allows physicians to identify specific features in chromosomes. That combination led to the development of a method for separating human male sperm [9] cells based on which sex chromosome they carry. Schulman named the technology that performed the sperm [9] separation technique MicroSort and created laboratories worldwide that offersperm [9] sorting as a method for preconception sex selection to patients.

As of 2018, the programs and services that GIVF has developed since 1984 are available to patients worldwide. GIVF explains all of their programs and services on their website which organized into four categories, including fertility, donor egg [8] IVF, family balancing, and genetic services. The website connects patients to resources, information, and means of participation based on the types of reproductive services they want. GIVF also offers financial programs and discount options for services such as artificial insemination [21], IVF, donor egg [8] IVF, and MicroSort. According to their website, GIVF has increased financial and geographical accessibility by offering those financial programs and adding satellite facilitates in five other countries.

GIVF claims that as of 2010, they have helped over 20,000 infertile couples worldwide conceive a child.

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Fertilization in vitro [32] Fertilization in vitro [32] Infertility, Female [33] Fertilization in vitro, Human" [34] Test tube babies [35] Fertilization in vitro, Human--Law and legislation [36] Sperm donors [37] Children of sperm donors [38] Sperm banks [39] Sperm [40] Luteinizing hormone releasing hormone [41] Sex Preselection [42] Fertilization [43]

Topic

Organizations [44] Reproduction [45]

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[3] https://embryo.asu.edu/keywords/infertility
[4] https://embryo.asu.edu/keywords/givf
[5] https://embryo.asu.edu/search?text=organization
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[7] https://embryo.asu.edu/search?text=in%20vitro%20fertilization

[8] https://embryo.asu.edu/search?text=egg
[9] https://embryo.asu.edu/search?text=sperm
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