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In Vitro Fertilization: The Human Cost

In vitro fertilization (IVF) is marketed as a safe and effective way to help couples have children. However, it is responsible for well-documented injuries to children before and after birth, as well as to the health of women and the well-being of families.

I. High Death Rates for Embryonic and Fetal Human Beings

IVF clinics usually report their “success rates” in terms of births or pregnancies per 100 reproductive cycles. They have sometimes boosted their reported rates, and obscured the high death rate of embryos, by transferring two or more embryos per cycle to attempt one live birth. Deliberate destruction of unborn human beings may also occur before any attempt to transfer embryos to the womb (discarding embryos that do not receive a high “grade”),¹ and after implantation in the womb through “selective reduction” (targeted abortion) if more embryos survive and develop than were wanted.

- Some public statements wrongly suggest that a recent court ruling in Alabama, allowing parents to sue an IVF clinic for causing the wrongful death of their frozen embryonic children, is unprecedented. But in 2021, a jury awarded \$15 million to families whose frozen eggs and embryos were destroyed due to the failure of a freezer that a California IVF clinic knew was defective. In 2018, at least 22 lawsuits were brought against an IVF clinic at University Hospitals in Cleveland for allowing over 4,000 frozen eggs and embryos to die because a remote alarm system to warn of temperature fluctuations had been turned off. “We understand that our patients are grieving and we grieve with them,” said the hospital system’s CEO. After five years of legal disputes, the lawsuits were settled for an undisclosed amount. Such cases are said to have led some clinics to improve their safety protocols.²
- The federal government’s annual report of IVF success rates for 2021 (the most recent year available) states that U.S. clinics attempted retrieval of eggs in 413,776 cycles. 12%

¹ American Fertility Services, “Embryo Grading and Success Rates” (2020), at <https://americanfertility.com/what-is-the-quality-grade-of-embryos/>. This IVF center admits: “Embryo grading results are not objective and reliable.”

² D. Hawkins, “Jury awards \$15 million in landmark case over embryos, eggs destroyed in fertility clinic tank failure,” *The Washington Post*, June 11, 2021, at <https://www.washingtonpost.com/health/2021/06/11/fertility-clinic-egg-embryo-verdict/>; L. Wamsley, “Ohio Fertility Clinic Says 4,000 Eggs And Embryos Destroyed When Freezer Failed,” *National Public Radio*, March 28, 2018, at <https://www.npr.org/sections/thetwo-way/2018/03/28/597569116/ohio-fertility-clinic-says-4-000-eggs-and-embryos-destroyed-when-freezer-failed>; M. Robins, “5 years since the University Hospitals fertility clinic failure: Looking back at the events leading up to and following the disaster,” *WKYC News* (NBC Cleveland), Nov. 15, 2023, at <https://www.wkyc.com/article/news/health/uh-failure/5-years-since-university-hospitals-fertility-clinic-failure/95-f28648c0-618b-4d1b-baeb-992a3b55324b>.

of successful egg retrievals resulted in no transfer of a live embryo to a womb or freezer. The percentage of embryo transfers resulting in a live birth ranged from 24% (for women over 40) to 49% (for women under 35). The average number of egg retrievals needed for one live birth was two for women under 35, and 13 for women over 40. Overall, out of 413,776 reproductive cycles, there were 91,907 live-birth deliveries (22% of cycles). Of all clinical pregnancies (detected by ultrasound), 77% resulted in the live birth of one child (including multiple pregnancies in which only one child survived) and 5% in the live birth of more than one child, with 21% of children lost to miscarriage or stillbirth.³

- The European Society of Human Reproduction and Embryology, reporting annually on IVF clinics across Europe that provide preimplantation genetic testing (PGT) to screen for genetically impaired embryos, concludes that in 2018, out of 5,191 embryos tested, there were 2,942 embryo transfers to a womb (57%), of which 1,673 produced a clinical pregnancy, and only 1,380 children were born alive (27% of those tested as embryos).⁴

II. Risk of Health Problems for Children Conceived by IVF

When IVF became available in 1978, critics warned that there had been inadequate animal testing and that risks to children were largely unknown. Enough children have now been conceived and born from the procedure to produce statistically significant data on the risk of birth defects and other health problems. The higher incidence of such problems was once attributed largely to the higher incidence of twins and triplets from IVF pregnancies due to transfer of multiple embryos (as carrying more than one child increases the risk of preterm birth); but recent studies find an independent effect from the procedure. In 2021 in the U.S., 18% of the live births from singleton IVF pregnancies and 88% of the births of triplets were preterm births; low birth weight infants ranged from 8% to 85%.⁵ Another factor is the common use today in IVF clinics of intracytoplasmic sperm injection (ICSI), the direct injection of a sperm into the egg to boost success rates; this bypasses natural safeguards that prevent damaged or defective sperm from reaching the egg in a woman's body. In the U.S., ICSI is used in 78% of embryo transfers.⁶

IVF advocates once thought that use of IVF would *reduce* birth defects, by allowing for the testing of embryos for a wide array of genetically based conditions. But experts now warn: "The selection of embryos on the basis of these predictions is not yet supported by science."⁷

- A 2020 study found: "The risk of congenital malformations is approximately one-third higher in children conceived with the aid of IVF technology than in other children." Included are malformations of the cardiac, musculo-skeletal, and genitourinary systems.

³ Centers for Disease Control and Prevention, *2021 Assisted Reproductive Technology Fertility Clinic and National Summary Report* (U.S. Dept. of Health and Human Services 2023), pp. 13, 15, 19, available at <https://www.cdc.gov/art/reports/2021/pdf/Report-ART-Fertility-Clinic-National-Summary-H.pdf>.

⁴F. Spinella et al., "ESHRE PGT Consortium data collection XXI: PGT analyses in 2018," *Human Reproduction Open*, Volume 2023 Issue 2 (2023), p. 6 (Table II), at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10121336/pdf/hoad010.pdf>.

⁵ Centers for Disease Control and Prevention, note 3 *supra*, p. 18.

⁶ *Id.*, p. 13.

⁷ Editorial, "The alarming rise of complex genetic testing in human embryo selection," *Nature*, Volume 603 (2022), pp. 549-50, at <https://www.nature.com/articles/d41586-022-00787-z#correction-0>.

The authors suggest that IVF techniques themselves, not only paternal and maternal factors, are partly responsible. Even IVF singleton pregnancies are 1.7 times more likely to result in preterm births, and 1.5 times more likely to result in low birth weight, than non-IVF pregnancies.⁸

- In 2017, physicians at the University of Pennsylvania reached similar conclusions: IVF is “associated with adverse obstetric and perinatal outcomes as well as congenital anomalies,” and even singleton IVF pregnancies have higher adverse outcomes than non-IVF pregnancies. Like the German researchers cited above, they suggested that epigenetic changes arising from IVF itself may be responsible.⁹
- A 2014 study of the long-term health of children conceived through IVF found the following: “Otherwise healthy children conceived by IVF may have higher blood pressure, adiposity, glucose levels, and more generalised vascular dysfunction than children conceived naturally. These effects seem to be related to the IVF procedure itself rather than to underlying subfertility.”¹⁰
- A 2013 study found no evidence of increased risk of some cancers such as leukemia, but children born through IVF had a 2 to 3 times higher risk for a type of muscle cancer and a type of liver cancer: “Significantly increased risks were found ... for hepatoblastoma and rhabdomyosarcoma.”¹¹
- A 2012 study found that children conceived through IVF are at higher risk of premature cardiovascular disease: “Healthy children conceived by ART [assisted reproductive technology] display generalized vascular dysfunction. This problem does not appear to be related to parental factors but to the ART procedure itself.” By contrast, “[v]ascular function was normal in children conceived naturally during hormonal stimulation of ovulation and in siblings of ART children who were conceived naturally.”¹²
- Dr. Rosanna Weksberg, a University of Toronto geneticist, warned colleagues in 2011 that children born through IVF are “up to 10 times more likely” to suffer from rare genetic disorders such as Beckwith-Wiedemann syndrome and Angelman syndrome, which can cause developmental delays, intellectual disabilities, and speech impairment.¹³

⁸ M. von Wolff and T. Haaf, “In Vitro Fertilization Technology and Child Health,” *Deutsches Ärzteblatt International*, Volume 117 (2020), pp. 23-30, p. 23, at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7026576/pdf/Dtsch_Arztebl_Int-117_0023.pdf.

⁹ C. Sullivan-Pyke et al., “In Vitro Fertilization and Adverse Obstetric and Perinatal Outcomes,” *Seminars in Perinatology*, Volume 41, Issue 6 (October 2017), pp. 345-53, p. 345, at <https://www.sciencedirect.com/science/article/abs/pii/S0146000517300733?via%3Dihub>.

¹⁰ E. Kamphuis et al., “Are we overusing IVF?”, *British Medical Journal* 348 (2014): g252, at <https://www.bmj.com/content/348/bmj.g252.full>.

¹¹ C. Williams et al., “Cancer Risk among Children Born after Assisted Conception,” *New England Journal of Medicine* 369 (2013), pp. 1819-27, at <https://www.nejm.org/doi/full/10.1056/NEJMoa1301675>.

¹² U. Scherrer et al., “Systemic and Pulmonary Vascular Dysfunction in Children Conceived by Assisted Reproductive Technologies,” *Circulation* 125 (2012), pp. 1890-96, p. 1890, at https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.111.071183?url_ver=Z39.88-2003&rft_id=ori:rid:crossref.org&rft_dat=cr_pub%20%20pubmed.

¹³ T. Blackwell, “In-vitro fertilization linked to rare genetic disorders,” *National Post* (Canada), September 25, 2011, at <https://nationalpost.com/news/in-vitro-fertilization-linked-to-rare-genetic-disorders>.

- In 2009, *The New York Times* reported on a finding by the Centers for Disease Control and Prevention “that babies conceived with IVF, or with a technique in which sperm are injected directly into eggs, have a slightly increased risk of several birth defects, including a hole between the two chambers of the heart, a cleft lip or palate, an improperly developed esophagus and a malformed rectum.”¹⁴
- A 2005 study following children up to the age of five who were conceived by IVF found the following: “A higher proportion of ICSI and IVF children required surgery (24% ICSI, 22% IVF, 14% natural conceptions; $P < 0.001$), particularly genitourinary surgery other than circumcision.” After adjusting for age and country, risks of major malformation were 2.8 times higher for ICSI children and 1.8 times higher for IVF children. Even in the neonatal period, minor malformations were more common in IVF and ICSI children (15%) than in naturally-conceived children (8%).¹⁵
- In a systematic review of 25 studies published by March 2003 on birth defects in infants conceived by IVF and/or ICSI compared with spontaneously-conceived infants, “two-thirds of these showed a 25% or greater increased risk of birth defects in [IVF/ICSI] infants. ... all twenty-five studies suggest a statistically significant 30-40% increased risk of birth defects” associated with these technologies.¹⁶

III. Health Risks to Women

Studies also indicate increased health risks to women who conceive by IVF, including risks from the use of superovulatory drugs to stimulate women’s ovaries to produce many eggs at one time for the IVF procedure. These drugs have been associated with an increased risk of some cancers and may lead to a condition known as ovarian hyperstimulation syndrome (OHSS), whose effects can include reproductive problems, kidney failure, and even death.

- A 2022 study published in the *Journal of the American Heart Association* found that women who conceived with “assisted reproductive technology” such as IVF were much more likely than other mothers with hospital deliveries to suffer from “adverse obstetric outcomes” including acute kidney injury, arrhythmia, and placental abruption, even after correcting for cardiovascular disease risk factors and multifetal pregnancy.¹⁷
- In 2017, University of Pennsylvania researchers who found increased health risks to children born following IVF also found increased risks to their mothers. These women

¹⁴ G. Kolata, “Picture Emerging on Genetic Risks of IVF,” *The New York Times*, Feb. 16, 2009, at <https://www.nytimes.com/2009/02/17/health/17ivf.html>.

¹⁵ M. Bonduelle et al., “A multi-centre cohort study of the physical health of 5-year-old children conceived after intracytoplasmic sperm injection, *in vitro* fertilization and natural conception,” *Human Reproduction* 20 (2005), pp. 413-9, pp.416, 417, at <https://academic.oup.com/humrep/article/20/2/413/603229>.

¹⁶ M. Hansen, “Assisted reproductive technologies and the risk of birth defects—a systematic review,” *Human Reproduction* 20 (2005), pp. 328-38, p. 328, at <https://academic.oup.com/humrep/article/20/2/328/603230>.

¹⁷ P. Wu et al., “In-Hospital Complications in Pregnancies Conceived by Assisted Reproductive Technology,” *Journal of the American Heart Association* 2022;11:e02.58, at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9075081/pdf/JAH3-11-e022658.pdf>.

had more hypertensive disorders of pregnancy (such as preeclampsia and eclampsia) and gestational diabetes.¹⁸

- A 2013 study found that “women having IVF had 2.5 times the risk of borderline [ovarian] tumours compared with women having infertility treatment but not IVF.”¹⁹
- In 2012, *The New York Times* reported that IVF clinics in the U.S. use high doses of fertility drugs, stimulating women’s bodies to produce many eggs at once, to boost their success rates, despite the risk of inducing ovarian hyperstimulation syndrome (OHSS). “According to the National Institutes of Health, high-dose stimulation leads to OHSS in 10 percent of IVF patients. The ovaries become swollen and ... can leak fluid into the chest and abdomen. Symptoms can range from mild to serious; in rare cases, OHSS can be life-threatening.”²⁰
- A 2008 study found that “women who were treated for ovulation induction experienced a significantly higher overall risk of cancer. This increased risk was especially evident for cancer of the uterus following treatment with clomiphene citrate. Furthermore, this study’s results suggest increased risks of breast cancer, malignant melanoma, and non-Hodgkin lymphoma following ovulation induction treatment that were more pronounced among women who waited more than 1 year to conceive, perhaps representing a dose-response relation.”²¹

IV. “Mix-ups” and Scandals Harming Families

By producing human embryos outside the womb, IVF clinics expose them to various forms of manipulation, including the risk that they will be “mixed up” between families without parents’ knowledge or consent. This has led to scandals, aggrieved parents, and lawsuits.

- In December 2023, the *New York Post* reported that an American couple of Asian descent reached a settlement with a California IVF clinic that in 2019 impregnated the wife with unrelated embryos from two other families. The couple reportedly had been told they were having twin girls, but the babies were male and not of Asian descent. The children ultimately were united with their genetic parents, but the Asian couple still did not know the fate of their own embryonic children. In 2022 the *Post* reported that “mix-ups” and other misconduct had been happening for years and may affect thousands of families. “The current state of regulation is the Wild West,” said an attorney working in this area.²²

¹⁸ C. Sullivan-Pyke et al., note 9 *supra*, p. 347.

¹⁹ L. Stewart et al., “In vitro fertilization is associated with an increased risk of borderline ovarian tumours,” *Gynecologic Oncology* 129 (2013), pp. 372-376, abstract at [https://www.gynecologiconcology-online.net/article/S0090-8258\(13\)00064-4/abstract](https://www.gynecologiconcology-online.net/article/S0090-8258(13)00064-4/abstract).

²⁰ J. Mroz, “High Doses of Hormones Faulted in Fertility Care,” July 16, 2012, at <https://www.nytimes.com/2012/07/17/health/research/high-doses-of-hormones-add-to-ivf-complications.html>.

²¹ R. Calderon-Margalit et al., “Cancer Risk After Exposure to Treatments for Ovulation Induction,” *American Journal of Epidemiology* 169 (2008), pp. 365-75, p. 370, at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2720715/pdf/kwn318.pdf>.

²² K. Boniello, “NYC couple in heartbreaking ‘twin’ embryo mix-up settles lawsuit against Calif. Clinic,” *New York Post*, Dec. 30, 2023, at <https://nypost.com/2023/12/30/metro/nyc-couple-in-twin-embryo-mix-up-settles->

- “IVF mix-ups are a regular occurrence at fertility clinics across the UK, an expert has said. Dr. Sammy Lee, a scientific consultant at the Portland Hospital in London, said the case of a white woman giving birth to black twins which hit the headlines earlier this month is probably not an isolated incident.... He said: ‘Every day, someone somewhere in the UK is inadvertently messing up.... I am aware of the wrong embryos being transferred to the wrong patients at several NHS [National Health Service] units during the past 10 years. I have also confidentially been told about a number of cases where the wrong sperm were used to inseminate eggs.’”²³
- “The [University of California] Board of Regents has quietly settled a dozen lawsuits stemming from fertility fraud uncovered nearly 15 years ago – drawing closer to an end a scandal that has dogged UC Irvine and left behind dozens of heartbroken couples.... In all, the University of California has paid out more than \$24 million for 137 separate incidents in which eggs or embryos were either unaccounted for or given to other women without consent. Three cases are still pending. The two doctors at the center of the malpractice ... fled the country and continue to evade criminal prosecution, leaving the university to deal with the civil lawsuits that followed.”²⁴
- “Within four days of finding out she was pregnant, Carolyn Savage went from the high of anticipating the child she had tried so hard to conceive to the unfathomable low of knowing the baby was not hers to keep. Carolyn Savage had had a history of miscarriages, and she and her husband, Sean Savage, turned to in vitro fertilization, hoping to have a fourth child. But on Feb. 16, 2009, the Sylvana, Ohio, couple learned that the frozen embryo of another couple had been mistakenly transferred into Carolyn's womb.... On Sept. 24, 2009, the Savages returned their newborn son, whom they'd held for 30 minutes, to his biological parents.”²⁵

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[suit-against-california-clinic/](#); A. Klein, “More baby mix ups will happen if IVF clinics don’t clean up their act,” *New York Post*, Feb. 13, 2022, at <https://nypost.com/2022/02/12/ivf-clinics-need-to-clean-up-their-act-to-end-baby-mix-ups/>.

²³ “IVF mix-ups ‘occur regularly’,” *BBC News: Health*, July 24, 2002, at <http://news.bbc.co.uk/2/hi/health/2148423.stm>.

²⁴ K. Yoshino, “UCI settles dozens of fertility suits,” *The Los Angeles Times*, September 11, 2009, at <https://www.latimes.com/archives/la-xpm-2009-sep-11-me-uci-fertility11-story.html>.

²⁵ S. James, “Embryo Mix-Up: Grieving a Baby Who Didn’t Die,” *ABC News*, Feb. 24, 2011, at <http://abcnews.go.com/Health/sean-carolyn-savage-describe-embryo-mix-giving-baby/story?id=12993374>.