

Prenatal and Postnatal Outcomes for IVF Single and Multiple Gestational Pregnancies

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PGDIS 2024

Single Embryo Transfer (SET) is the Universal Consensus: IVF in the United States

	<u>2022</u>	<u>2021</u>
<u>Cycles</u>	389,993 (6% increase)	368,502
<u>Babies</u>	91,771 (2.5% all births)	89,208
<u>Singleton Babies</u>	96%	95%
<u>Single Embryo Transfer</u>	73.9%	70.7%
<u>Egg Freezing Cycles</u>	29,803	24,560

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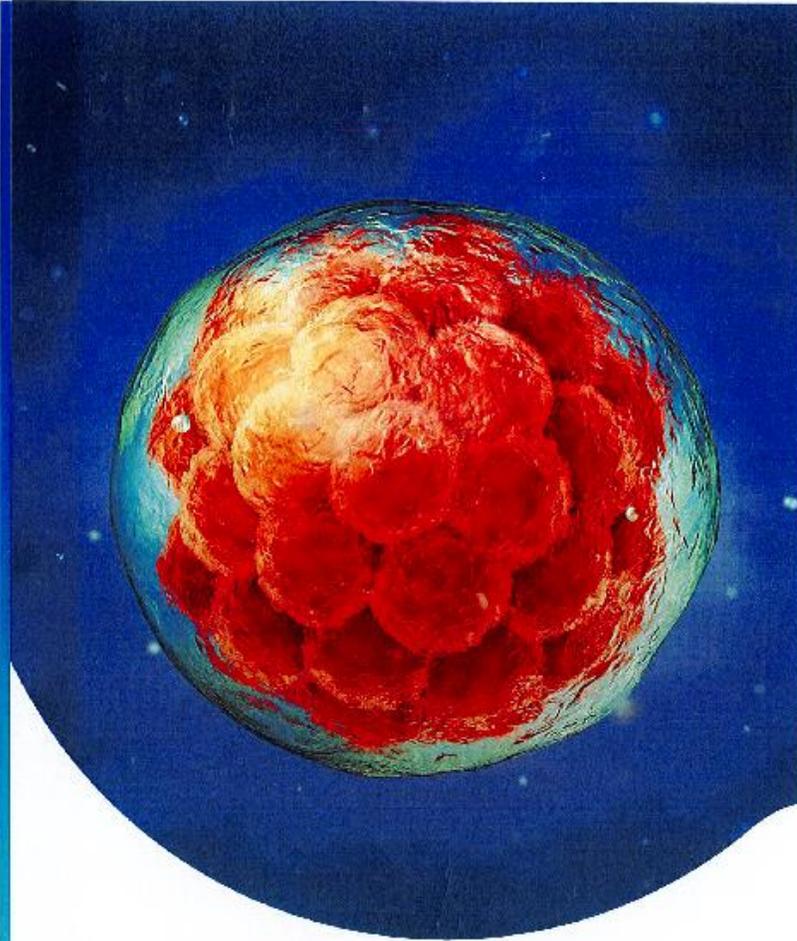


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Number of embryos to transfer during IVF/ICSI

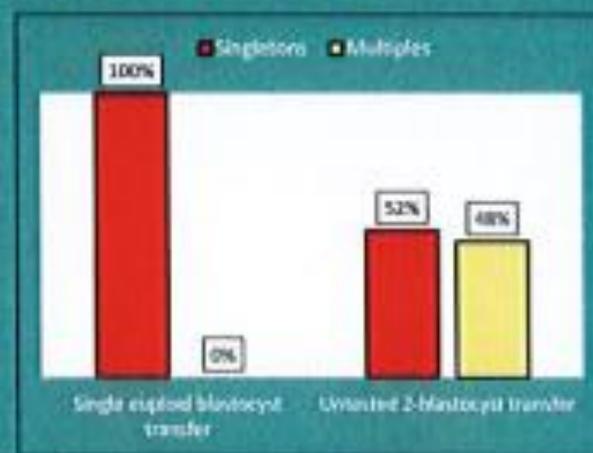
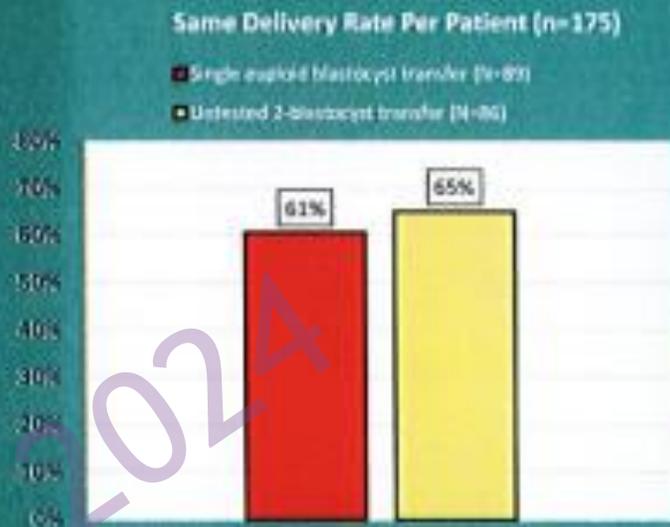
Guideline of European Society of Human
Reproduction and Embryology

2023

The ESHRE guideline development group on the number of embryos to transfer during IVF/ICSI

PGT-A: Transfer of Single Euploid Embryo results in almost no Twins

CDC: Transfer of Two Untested Embryos results in 27% Twin Pregnancies



Proven Risks with Multiple Embryos

- **Preterm Birth (<37 weeks)**

	<u>Weight</u>	<u>Gestation</u>
• Singleton	3296g	38.7 weeks
• Twins	2336g	35.3 weeks
• Triplets	1660g	31.9 weeks

- **Increased Neonatal Intensive Care Admissions**
- **Increased maternal complications: preeclampsia, postpartum hemorrhage, hypertension, anemia, hyperemesis, others.**

Monozygotic Twins at increased risks compared to Dizygotic Twins

- Fetal demise of one twin
- 70-75% Diamniotic Monochorionic Placentation in MZ twins
- Twin Twin Transfusion Syndrome – 10-15% of monochorionic diamniotic pregnancies. Imbalance of fetal blood flow given communication between vessels in shared placenta
 - Monitor weight for each fetus
 - Delivery usually 32 weeks gestation
 - Selective termination option
 - Laser photocoagulation <26 weeks

Are risks increased for IVF singleton pregnancies?

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Increased Adverse Outcome in Singleton Pregnancies

- IVF alone is a risk factor for preterm birth (PTB) after multivariate adjustment (e.g. maternal age, prior surgical procedures, infertility)
- Singleton IVF pregnancies show increased PTB rate compared to full term comparison (Qin et al. 2017: Arch Gynecol Obstet)
- Infertility without IVF treatment (ovulation induction; intrauterine insemination) not associated with adverse outcome.

Potential Explanations for Adverse Outcomes in IVF Single Embryo Transfer

- Embryo culture media
- Embryo manipulation
- Embryo transfer
- Vitrification (fresh vs. frozen)

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Biological confounders explaining PTB in Low Income Countries not likely explanations for increased PTB in singleton IVF

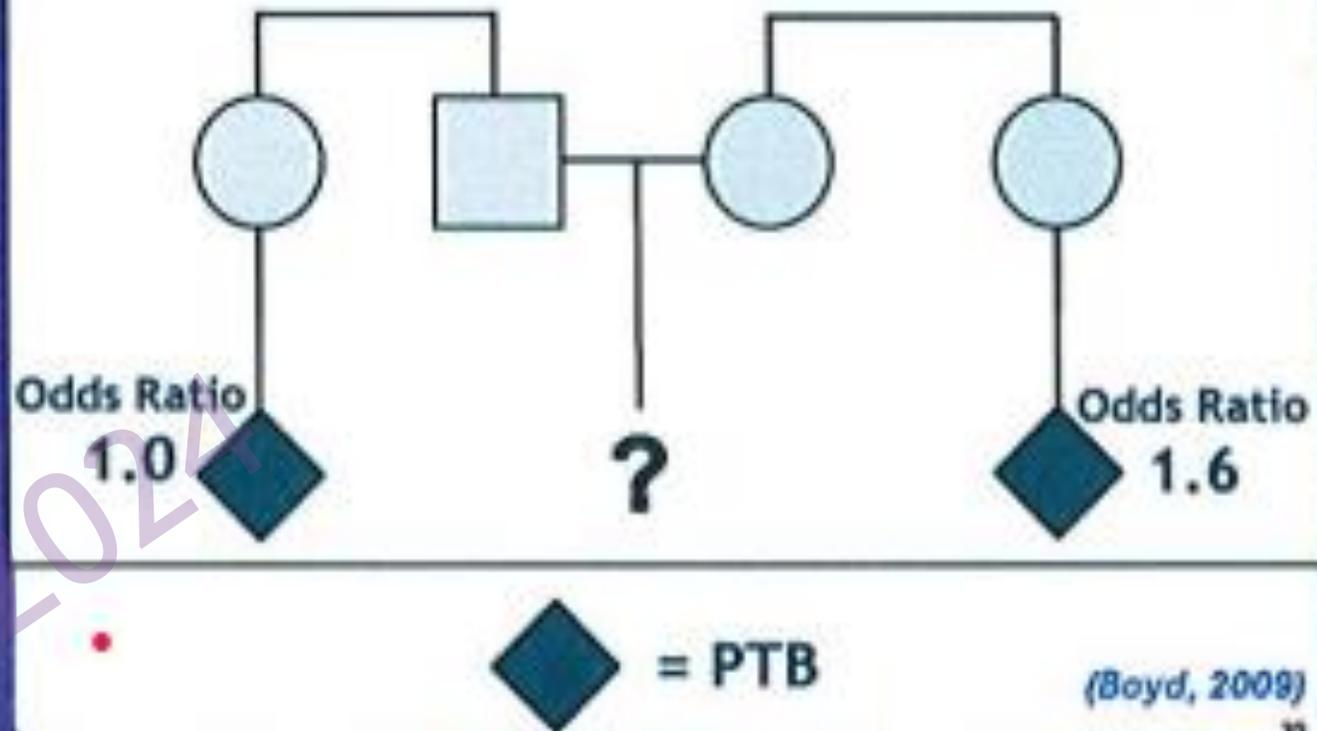
1. Typical associations with PTB in Low Income Countries (LIC) less applicable in High Income Countries (HIC)
 - Infection, smoking, nutrition, multiparity
2. Potential clinical correlations in only 1/3 PTB cases. None plausible in 2/3 cases
3. Unclear why PTB birth rates differ among HIC (Sweden much less than Germany)

Genetic Basis?

Matrilineal = Mitochondrial?

- More likely to have a preterm birth if mothers were themselves preterm
- More likely to have a preterm birth if sister had a preterm baby
- No increased risk if sister-in-law had a preterm baby

Matrilineal PTB Recurrence



Conclusions

- 1. Proven risks of preterm birth exist for twins, triplets and other multiple gestations.**
- 2. Single Embryo Transfer (SET) obviates this risk and is increasingly adapted globally; U.S. 96% of 2.5% IVF babies are singletons, reflecting 73.9% Single Embryo Transfer**
- 3. PGT-A makes SET feasible with high pregnancy rates.**

Conclusions

4. **Monozygotic twins are at greatest risk given 70-75% Diamniotic Monochorionic and at risk for Twin-Twin Transfer Syndrome**
5. **Adverse Outcomes also occur in singleton pregnancies without clear explanation (embryo culture and manipulation).**

Thank you !

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