ETHICAL ISSUES IN REPRODUCTIVE MEDICINE
“Medicine was, in its history, first of all curative, then preventive and finally predictive, whereas today the order is reversed: initially predictive, then preventive and finally, only in desperation, curative”
-Jean Dausset

Outline

- PGD - why it is unique
- History
- What may be diagnosed
- Scientific principles of PGD
- Ethics of PGD - spectrum of cases
  - what has been done
  - what could be done
- Conclusions

PGD - Increasing Reproductive Options

- Disease diagnosis prior to implantation
- Disease diagnosis prior to fertilization

History of PGD

- 1990 Handyside
  - embryo biopsy
  - x-linked disorders
  - sexing by Y-specific DNA amplification
- 1990 Verlinsky
  - oocyte polar body analysis
  - autosomal recessive disease

PGD - What may be diagnosed?

- Any disease whose mutation is known
  - Autosomal dominant
  - Autosomal recessive
  - X-linked
- Aneuploidies in oocytes and embryos
- Translocations
- Disease predispositions
- Cancer syndromes
- Traits???
Technologies Enabling PGD

- IVF
- ICSI
- Embryo Biopsy/Polar Body Biopsy
- Blast Culture
- PCR
- FISH

Methods of PGD

- Embryo biopsy of blastomeres
- Polar body analysis

Methods of Analysis

- PCR
- FISH
- Microarray Chips

Challenges

- Requires IVF
- Cost
- Minimum oocyte/embryo requirement
- Must know genetics of diseases
- Education/awareness of technology
- Very few centers offer technology

The Ethics of PGD

A spectrum of cases

Nondisclosure PGD

A 26 y/o male’s mother died of Huntington’s disease, giving him a 50% risk of developing HD. He does not want to know his HD status, but desires an unaffected child. He and his wife have chosen to undergo IVF and PGD to select only non-HD embryos for transfer. (Unnecessary IVF)
Lethal Diseases in Childhood
■ A couple, both of Ashkenazi Jewish descent, are heterozygous for Tay Sachs. They are opposed to termination of pregnancy on moral grounds, but would like to build a family.
(Avoiding termination)

Potentially Lethal Diseases
■ A couple has one child with a mild form of CF. They would like to have more children, but are religiously opposed to abortion.
(Pre-fertilization testing)

Late Onset Diseases
■ A 32 y/o woman has a rare form of autosomal dominant Alzheimer’s. Her sister died at age 39 of this, and her brother is affected. She would like to have a child free of this disease. In the case that she dies or is disabled, her husband and parents will care for the child.
(Future well being of the child)

Aneuploidy Detection
■ A 40 year old woman is infertile. She is undergoing IVF with PGD for detection of chromosomal anomalies to decrease the rate of SAs and trisomies, and to increase her IVF success.
(Bias favoring the infertile - access to technology)

Cancer Predispositions
■ A woman carries the BRCA1 mutation. While not infertile, she would like to undergo IVF in order to ensure that only unaffected embryos are transferred.
(Prevention of potential diseases)

HLA Genotyping
■ A couple has a 6 year old daughter who is very ill from beta thalassemia. Her only real hope of cure is from an HLA-matched bone marrow transplant. They elect to undergo IVF and PGD in an attempt to conceive a match, whose cord blood would be collected at birth for the BMT.
(Commodification of children)

Multifactorial Diseases
■ An infertile couple needs IVF for conception. The male partner’s father died at age 50 of an MI, and the female partner’s parents both suffered multiple complications from DM. They would like to choose embryos free of the predisposition for these diseases.
(Prevention of potential diseases)
“Positive” Trait Selection
A single woman would like to conceive a child. She has gone to a sperm bank in California which receives donations exclusively from Nobel laureates. She asks that only those embryos of greatest cognitive abilities be transferred.
(Designer children)

“Negative” Trait Selection
A deaf couple want to select only deaf embryos to gestate.
(Designer children)

All Trait Selection
It is now possible to genotype an entire embryo. Boutique IVF clinics are marketing to wealthy couples in the hopes that they will elect to undergo IVF and PGD to choose to gestate only the best possible of their created embryos.
(Designer children)

Sex selection
A couple has three sons. They would like to undergo PGD and IVF so that only female embryos are transferred.

Medical Tourism
An American couple wants only tall, blue-eyed children. Such trait selection by PGD has been banned in the U.S. They travel to a South American country, where such technology is available to those willing to pay.
(Global regulation)

Ethical Issues
■ Would it be acceptable to use PGD for applications for which prenatal testing and termination are not considered ethical?
■ Is the fact that the selection is occurring pre-fertilization, or pre-implantation, critical?

Ethical Issues - cont.
■ Will infertile couples have improved access to new technologies by virtue of their infertility?
■ Who should benefit from the technology?
■ Who should pay?
■ How should it be regulated?
■ Where should the limits be drawn?
   – Boutique medicine vs. medical necessity
Conclusions

- Now is the time to consider the ethical implications of this emerging technology
- Guidelines should be drafted prior to the widespread availability of PGD.