

IS THERE A CASE FOR REPRODUCTIVE CLONING?

- **ISSUES, DISTINCTIONS, AND
POLICY OPTIONS**
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ASSISTED REPRODUCTION CONTEXT FOR CLONING

- **IVF A MATURING TECHNOLOGY**
 - **IMPROVING SUCCESS RATES**
 - **DONOR EGG, ICSI, AND OTHER EXTENSIONS**

- **EMERGING CONSENSUS ABOUT ETHICAL AND LEGAL ISSUES**
 - **EMBRYO STATUS (IN PRACTICE)**
 - **REARING RIGHTS AND DUTIES**
 - **CONSUMER PROTECTION ISSUES**

CHALLENGES FOR FUTURE

- **STEM CELLS FOR REPLACEMENT THERAPY**
- **PREIMPLANTATION GENETIC DIAGNOSIS**
- **GENE TRANSFER OR ALTERATION**
- **REPRODUCTIVE CLONING**

HUMAN CLONING

- THERAPEUTIC CLONING
- REPRODUCTIVE CLONING

THERAPEUTIC CLONING

- **IF ES CELL THERAPY REQUIRES HISTOCOMPATIBLE REPLACEMENT TISSUE**
 - **CREATING EMBRYOS FOR ES CELLS**
 - **OOCYTE SUPPLY ISSUES (LIVE, CADAVERIC, FETAL, BOVINE SOURCES)**
- **RAISES DISTINCT ISSUES FROM REPRODUCTIVE CLONING AND SHOULD BE KEPT DISTINCT**

REPRODUCTIVE CLONING

- **LARGELY NEGATIVE PUBLIC REACTION CONFLATES MANY ISSUES**
- **POPULAR ASSUMPTION IS DNA IDENTITY IDENTITY THAT WOULD CREATE EXACT “COPY” OF ANOTHER PERSON (SPECTOR, DASHCLE)**
- **REFLECTS CRUDE GENETIC REDUCTIONISM: GENES TOTALLY CONTROL PHENOTYPE (PROS AND CON)**
- **DIFFICULTY IN SEEING VALID USES**

THE CASE FOR FUTURE REPRODUCTIVE CLONING

- ONLY IF SAFE AND EFFECTIVE (CLONING NOW PREMATURE AND IRRESPONSIBLE)
- MODEL I: TO ESTABLISH GENETIC CONNECTION IN LIEU OF DONOR GAMETES
- MODEL II: BY FERTILE COUPLES/INDIV. TO SELECT NUCLEAR GENOME

REPRODUCTIVE CLONING-- MODEL I

- **USE BY GAMETICALLY INFERTILE COUPLES IN LIEU OF DONOR GAMETES**
- **AZOOSPERMIC HUSBAND PROVIDES NUCLEAR DNA, WIFE PROVIDES OOCYTE AND GESTATES, OR IN LIEU OF DONOR EGGS**
- **CARRIERS FOR AUTOSOMAL OR X-LINKED DISEASE WHO REJECT DONOR GAMETES AND OTHER ALTERNATIVES**

DOES PROCREATIVE LIBERTY PROTECT MODEL I CLONING?

- LOGIC OF PROCREATIVE LIBERTY SHOULD EXTEND TO ART BUT NOT YET FIRMLY ESTABLISHED LEGALLY
- PL INCLUDES STRONG PRESUMPTIVE RIGHT RIGHT TO HAVE GENETICALLY RELATED CHILDREN NONCOITALLY
- IF CANNOT REPRODUCE SEXUALLY, CLONING MAY PROVIDE USEFUL ALTERNATIVE, UNLESS HARMFUL

DOES SAFE MODEL I CLONING HARM CHILD?

- IF PHYSICAL SAFETY SHOWN IN ANIMAL MODELS AND HUMAN EMBRYOS
- UNIQUE IDENTITY? GENOTYPE DOES NOT CONTROL PHENOTYPIC IDENTITY
 - DIFFERENT UTERINE AND REARING ENVIRONMENT
 - mtDNA NOT CLONED
- AUTONOMY AND “THE RIGHT TO AN OPEN FUTURE”
 - CHILD SOUGHT FOR KINSHIP
 - NOT EXPECTED TO BE A “COPY”

DOES SAFE MODEL I CLONING HARM CHILD?

- DNA SOURCE, THOUGH AN EARLIER BORN NUCLEAR DNA “TWIN,” WILL REAR AND PARENT
- CHILD AS COMMODITY TO SERVE PARENTAL INTERESTS?

WOULD MODEL I CLONING HARM OFFSPRING?

- **SIMILAR CONCERNS ARISE WITH CURRENT ART PRACTICES AND PRENATAL GENETIC SCREENING**
- **NONE OF ALLEGED HARMS SO GREAT TO JUSTIFY DENYING INFERTILE COUPLES ONLY CHANCE FOR CHILD FROM THEIR GENES**
- **RECOGNIZES DRIVE OR INTEREST IN DNA TRANSMISSION/ REPLICATION**

WOULD MODEL I CLONING HARM SPECIES?

- NONSEXUAL REPRODUCTION WOULD LOSE NATURAL SELECTION BENEFITS OF MEIOTIC RECOMBINATION
- BUT THAT ASSUMES LIKELY CHOICE FOR CLONING BY MAJORITY
- SEXUAL REPRODUCTION WILL REMAIN POPULAR, WITH LITTLE DEMAND FOR CLONING
- IF SOUGHT ONLY BY THE GAMETICALLY INFERTILE, NOT A SPECIES THREAT

REPRODUCTIVE CLONING-- MODEL II

- **BY FERTILE PERSONS IN ORDER TO CHOOSE NUCLEAR GENOTYPE**
- **NOT ESSENTIAL TO GENETIC REPRODUCTION SINCE SEXUAL REPRODUCTION POSSIBLE**
- **GREATER RISKS (?) TO OFFSPRING BECAUSE OF FIXATION ON GENOME**

REASONS FOR MODEL II CLONING ARE WEAKER

- **OBTAIN CELLS OR ORGANS FOR TRANSPLANT: ES CELLS PREFERABLE**
- **REPLACE A DEAD CHILD: PRODUCT OF GRIEVING**
- **REPLICATE ONE'S OWN NUCLEAR DNA: OR DARWINIAN WISDOM?**
- **REPLICATE DNA OF FAMILY OR NON-FAMILY MEMBER**

DOES PROCREATIVE LIBERTY PROTECT MODEL II CLONING?

- DISTINCT SITUATIONS THAT SHOULD BE DIFFERENTLY
- MAY NOT EVEN BE “REPRODUCTIVE” FOR REARERS
- RIGHT TO MODEL II CLONING RESTS ON CLAIM OF RIGHT TO SELECT GENOME OF CHILD OR TO TRANSMIT ALL OF ONE’S DNA
- SUCH A CLAIM IS NOVEL AND PREMATURE AND DOES NOT FOLLOW FROM A RIGHT TO SEX. REPRODUCE

GENETIC SELECTION IN FUTURE

- **IN FUTURE SCOPE OF CHOICE OVER CHILD'S GENES COULD INCREASE**
- **MUCH GENE SELECTION BY EXCLUSION NOW ACCEPTED**
 - **CARRIER SCREENING**
 - **PRENATAL DIAGNOSIS**
 - **PREIMPLANTATION GENETIC DIAGNOSIS**
 - **SOME CASES OF GENDER SELECTION**

A RIGHT TO NEGATIVELY SELECT OFFSPRING GENES?

- KEY PART OF FUTURE CONVERGENCE OF GENETICS AND ARTS
- REFLECTS INTEREST IN NOT REPRODUCING IN CERTAIN CASES BECAUSE OF EXPECTED EXPERIENCES AND REPRODUCTIVE FITNESS OF CHILD

A RIGHT TO POSITIVELY SELECT OFFSPRING GENES?

- DEMAND FOR POSITIVE SELECTION WILL WILL GROW AS SCIENCE DEVELOPS
- MOST USES WILL BE HIGHLY CONTROVERSIAL
- MUCH MORE ANALYSIS AND DEBATE NEEDED THAN HAS YET OCCURRED

A RIGHT TO POSITIVELY SELECT OFFSPRING GENES?

- STRONGEST CLAIMS WILL BE FOR THERAPEUTIC USES
 - SOMATIC GENE TRANSFER TO TREAT DISEASE
 - GERMLINE GENE TRANSFERS
- NONTHERAPEUTIC USES WILL BE MOST CONTESTED
 - MODEL II CLONING
 - ENHANCEMENT OF DESIRABLE TRAITS
 - DIMINISHMENT

PROCREATIVE LIBERTY AND POSITIVE SELECTION

- **IS SELECTION ESSENTIAL TO DECISION TO REPRODUCE?**
 - **EXPECTED PACKAGE OF REARING EXPERIENCES MAY DETERMINE WHETHER PERSON REPRODUCES**
 - **ULTIMATELY A SOCIAL CHOICE ABOUT IMPORTANCE OF DIFFERENT REARING EXPERIENCES**
- **WHAT IS IMPACT ON OFFSPRING?**
 - **IS THE CHILD HEALTHY AND NORMAL?**
 - **STABLE REARING ENVIRONMENT?**
 - **EXCESSIVE PARENTAL EXPECTATIONS?**
- **HOW CLOSE IS RESULT TO POSTBIRTH REARING CHOICES?**

ESTABLISHING SAFETY OF REPRODUCTIVE CLONING

- **RESEARCH PROTOCOLS ONLY**
 - **SKILL IN CLONING EMBRYOS TO BLASTOCYST STAGE**
 - **GOOD UNDERSTANDING OF EFFECTS OF EMBRYO TRANSFER IN MAMMALS**
 - **ACCEPTABLE INDICATION FOR FIRST TRANSFERS, E.G., MODEL I USES**
 - **IRB AND ETHICS REVIEW**
- **FDA OR OTHER REGULATORY APPROVAL TO CERTIFY SAFETY**
- **SUCH RESEARCH NOW PREMATURE**

REGULATION AFTER SAFETY ESTABLISHED

- LEGISLATIVE OR REGULATORY
- MODEL I VS. MODEL II USES ONLY
- PERSONS PROVIDING DNA/OOCYTE MUST REAR
- COUNSELLING AND INFORMED CONSENT
- CONSENT OF DNA SOURCE ?
- LIMITS ON NUMBER OF CLONES
- NO CLONING OF ONE'S PARENTS

A MORATORIUM ON REPRODUCTIVE CLONING?

- MORATORIUM NOW JUSTIFIED ON SAFETY GROUNDS
- REVISIT WHEN SAFETY BETTER ESTABLISHED IN LARGE MAMMALS
- IF CLONING SAFE, MODEL I USES SHOULD THEN BE PERMITTED
- MODEL II USES SHOULD AWAIT SOCIETAL ASSESSMENT OF SCOPE OF RIGHT TO SELECT/ALTER CHILD'S GENOME

SHOULD THE LAW CRIMINALIZE CLONING?

- **THREAT OF IMMEDIATE OR FUTURE USE
HIGHLY EXAGGERATED**
- **FEW PARENTS WILL RISK A CHILD WITH
SERIOUS MEDICAL PROBLEMS FOR
MODEL I OR II PURPOSES**
- **THREAT OF REPRODUCTIVE CLONING
DOES NOT JUSTIFY BAN ON
THERAPEUTIC CLONING**