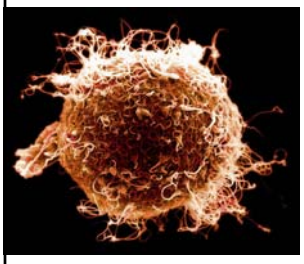
Lifespan Psychology



Chapter 3
Biology of Development

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Outline

- Infertility/Reproductive technologies
  - Probabilities
  - Fertility problems and treatments
    - Legal and ethical issues
  - Adoption
- Heredity/DNA/Genes

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Infertility

- probabilities of fertilization - birth
- affects many American couples
- 1 in 10 to about 1 in 6 (10-17%)
- women - most commonly blockage or abnormality of fallopian tubes
- men - low sperm count or low sperm motility

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Medical technologies

- test tube baby (in vitro fertilization)
- common procedure now
- in use for over three decades
- US first in 1981, now 4 million world wide, 58,000 yearly in US
- no guarantee of success, overall about 29%/egg retrieval

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Other medical options

- Fertility drugs
  - stimulate maturation/release of eggs
  - stimulate "normal" ovulation
  - drugs can develop/maintain the uterine lining
- fertility drugs = increased p(multiple births)
- artificial insemination
- surrogate mothers

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Issues with reproductive technologies

- advantages and disadvantages?
- ethical issues?
- law
- ownership of embryos?
- rights/obligations of "other parent?"
- very expensive
- who pays?
- adoption trends

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Heredity & DNA

The human body contains about 100 trillion cells.

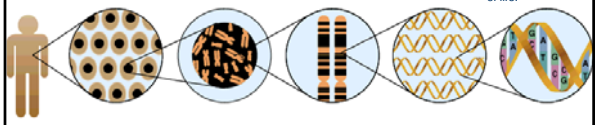
There is a **nucleus** inside each human cell (except red blood cells).

Each nucleus contains 46 **chromosomes**, arranged in 23 pairs.

One **chromosome** of every pair is from each parent.

The chromosomes are filled with tightly coiled strands of **DNA**.

Genes are segments of DNA that contain instructions to make proteins— the building blocks of life.



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Genes

- 20-25,000 different genes
- same in every cell in each person
- no exact number yet
- all have complete set of genes
- few at work in any one cell

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Functions of genes

- direct "housekeeping" chores
- metabolic functions
- few hundred carry codes for proteins only for that type of cell
- Twins
  - monozygotic
  - dizygotic
  - genetic relatedness of MZ and DZ twins?

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Genetic Inheritance

- Gregor Mendel (1822-1884)
- discovery in the 1860's
- ignored until "rediscovered" around 1900
- Heredity transmitted in discrete units
  - not via "blending" mom and dad's traits
  - children resemble their parents
  - attributed to "blending of bloods"
  - origin of "bloodlines" & "in the blood"

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Mendel's work

- pea plants
- traits that came in pairs of allelles
- simple pairs of traits.
- tall vs. short; purple vs. white flowers; wrinkled vs. smooth peas
- offspring always one or the other

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Cross breeding

- a short and a tall plant, where:
- both parents the same as their parents
- 100% tall plants
- two of these tall offspring
- 75% tall and 25% short plants (roughly)

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Mendel concluded (correctly)

- each parent carries 2 units of heredity governing each trait
- sex cells only carry one unit of heredity each; sperm and egg each contribute one unit to pair
- when combined in offspring, one may dominate the other

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In the pea plant

- "tall" genes dominate "short"
- 1 tall and 1 short gene = no blending
- the plant grows tall
- short or second gene doesn't matter

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Genetics continued

- Recessive genes
  - can emerge to take control in subsequent generations
  - dominant - recessive status of human characteristics
- Genotype and Phenotype
  - Genotype: Set of genes a person inherits
  - Phenotype: Set of traits a person actually displays

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Pea plant third generation

- Remember, both of the parents are tall plants that were the offspring of a tall and a short plant that were the same as their parents.
- So they came from parents that were TT and tt

Parent #1 Tall

Parent #2 Short	T	T
t	tT Tall	tT Tall
t	tT Tall	tT Tall

Parent #1

Parent #2	T	t
T	TT Tall	Tt Tall
t	tT Tall	tt Short

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Risk of Selected Genetic Disorders

Chromosomal	
Down Syndrome	**1/800**
Klinefelter syndrome (XXY)	**1/800 men**
Fragile X syndrome	**1/1,200 male births** **1/2,000 female births**
Turner syndrome (XO)	**1/3,000 women**
Dominant Gene	
Polydactyly	**1/300 - 1/100**
Achondroplasia	**1/2,300**
Huntington disease	**1/15,000 - 1/5,000**
Recessive Gene	
Cystic fibrosis	**1/2,500 white persons (risk of being a carrier is 1/25)**
Sickle-cell disease	**1/625 African Americans (risk of being a carrier is 1/10)**
Tay-Sachs disease	**1/3,600 Eastern European Jews(risk of being a carrier is 1/30 - 1/300)**
X Linked	
Hemophilia	**1/2,500 male babies**
Multifactorial	
Congenital heart disease	**1/125**
Neural tube defect	**1 - 2/1,000**
Cleft lip/cleft palate	**1/1,000 - 1/5,000**

Sources: ACOG (1990); Blatt (1988); Diamond (1989); Hagerman (1996); Selekman (1993); Stratford (1994).

Inheritance of a Dominant Gene Disorder

Affected Parent (Has the Disorder)

Normal Father	D	r
r	Dr Affected (25%)	rr normal (25%)
r	Dr Affected (25%)	rr normal (25%)
	(50%)	(50%)

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Inheritance of a Recessive Gene Disorder

Carrier Father \ Carrier Mother	D	r
D	DD Normal (25%)	Dr Normal (25%)
r	Dr Normal (25%)	rr Affected (25%)

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Inheritance of Hemophilia, a Sex-Linked Disorder

Normal Father \ Carrier Mother	X	X
X	XX Normal Daughter (25%)	XX Carrier Daughter (25%)
Y	XY Normal Son (25%)	XY Hemophilic Son (25%)

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