Genetics 7

- Answer to iClicker 7A
- Common Misconceptions
  - ¼ Effect
  - Either affected or unaffected
  - Everything is genetic
  - Genes are your destiny
- Upcoming Chemistry sections
- Answer to iClicker 7B

- Due in Lab this week
  - Pre-Lab 3
  - LEGO Mitosis lab report

Please see me after class
– S. Islam
– A. Vassall

Genetics Misconceptions

allele	cont. to phenotype
D	normal (dom)
d	disease (rec)

Autsomal rec.

2 parents that are both carriers

Dd × Dd

	D	d
D	DD	Dd
d	Dd	dd

→ ¼ chance of having a child w/ the disease (dd)

Misconceptions

① if first kid is dd, next 3 will not have disease

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② if have 4 kids, only 1 will be dd

③ if have 4 kids, at least 1 will be dd

④ if one kid dd, next kid is at a lower risk

Genes = destiny?

genetic element, E,
it occurs in some people

chance of	with E (compared to without E)
being in prison	16x higher
being on death row	63x higher
hormone H	10x higher

levels H → correlated w/ increased aggression

Y chromosome

Questions for Chemistry / Biochemistry

① how does a dominant allele dominate?

② why is PKU rec.?

→ how does D allele → tolerance of phen...
d allele → intolerance

Chemistry

functions of living things —explain in terms of→ molecules — chemistry
proteins — biochemistry

Subatomic —form→ atoms —covalent bonds→ molecules —non-covalent bonds→ cell

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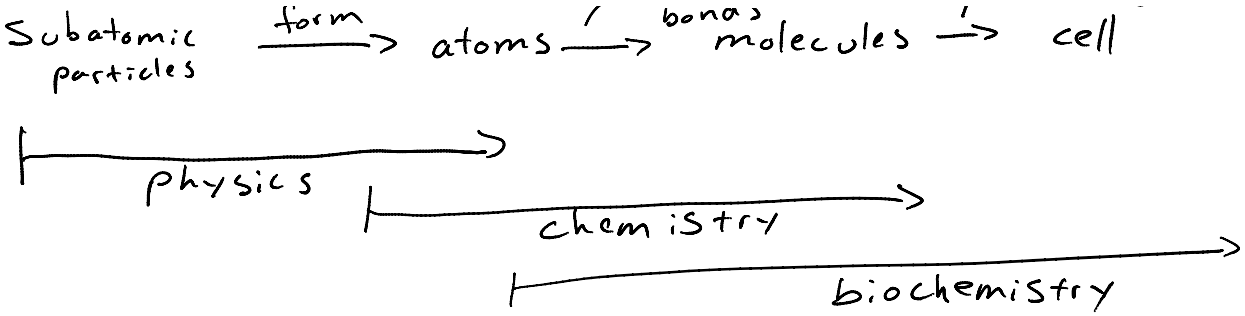

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Bio 111 Probability Simulation

Consider an autosomal recessive genetic disease. That is:
the disease is controlled by one gene on an autosome with two alleles:
D - normal (dominant)
d - diseased (recessive)

If the father is Dd, there is a 1/2 chance that he will give a d allele to his offspring.
If the mother is Dd, there is a 1/2 chance that she will give a d allele to her offspring.
If the child gets a d from both mom and from dad, he or she will have the disease.
So, overall, if two carrier (Dd) parents have children, each child has a 1/4 chance of having the disease.

	D	d
D	DD	Dd
d	Dd	dd

We will simulate a family with 4 children.
For each child:
(1) flip a coin once to choose the allele that the **father** will contribute.
If it is **heads**, the allele is **D**; write the allele in the appropriate box.
If it is **tails**, the allele is **d**; write the allele in the appropriate box.
(2) flip a coin once to choose the allele that the **mother** will contribute.
If it is **heads**, the allele is **D**; write the allele in the appropriate box.
If it is **tails**, the allele is **d**; write the allele in the appropriate box.

(you will flip the coin a total of 8 times)

	Genotype		
	Allele from Father	Allele from Mother	Phenotype
First Child	D	d	Normal
Second Child	D	D	normal
Third Child	d	d	disease
Fourth Child	d	D	normal

	Norm	Dis
A	4	0
B	3	1
C	2	2
D	1	3
E	0	4

	class count	predicted	
A	87	96	32%
B	148	126	42%
C	70	63	21%
D	5	14	4.7%
E	9	1	0.3%

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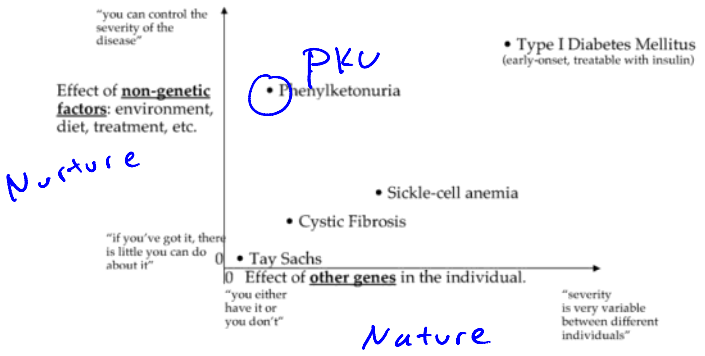
Bio 111 Misc. Facts about Genetic Diseases

1) Influence of other factors on severity of selected genetic diseases
(based on figure from "The Metabolic and Molecular Basis of Inherited Disease", Scrivner & al.)



2) Frequency of selected genetic diseases

X-linked	
Duchenne Muscular dystrophy	1 in 3000 males
Hemophilia	1 in 10,000 males
Autosomal Recessive	
Phenylketonuria	1 in 12,000 (average)
Tay-Sachs Disease	1 in 3,000 (Ashkenazi Jews)
	1 in 320,000 (American non-Jews)
Cystic Fibrosis	1 in 2000 (American Caucasian)
	1 in 17,000 (African-American)
Autosomal Dominant	
Marfan Syndrome	1 in 20,000
Achondroplaisic Dwarfism	1 in 50,000

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