

NOTES: Unit 5A (Mutations)

Topic 1: Sometimes genetic codes _____

- Changing the letter codes of a gene code = _____

A) Mutation _____: DNA blueprints can acquire mutations in various ways

1) During DNA _____

- Base pairing mistakes can happen but most are _____ but an army of repair enzymes (i.e., _____)

2) Exposure to powerful _____

- _____ smoke, smokeless tobacco, exhaust from burning petroleum fuels & coal, pesticides, herbicides, alcohol, gasoline, sawdust from CCA “outdoor” lumber, paints, asbestos

3) Exposure to powerful _____

- _____ (nuclear fuel and bombs)
- _____ (at hospitals and dental offices)
- _____ (from sunlight and tanning beds)

4) Exposure to _____

- Some viruses _____ their DNA into the middle of the host cell’s DNA

5) Exposure to _____ from metabolizing food and oxygen called reactive _____

B) Mutation _____

Original gene → **mutated** gene

1) _____ = add 1+ letters Ex. TAGACAT → TAGACCAT

2) _____ = lose 1+ letters Ex. TAGACAT → TGACAT

3) _____ = switch 1+ letters Ex. TAGACAT → TAGAGAT

C) Mutation _____: Did the mutation change any of the protein’s _____?

1) _____ effect = NO Amino Acids Changed → _____ shape

2) _____ effect = FEW Amino Acids Changed → _____ shape change

3) _____ effect = MANY Amino Acids Changed → _____ shape change

*** KEY IDEA: Any changes to the protein’s _____ usually results in

a _____ in the protein’s _____

Mutations Conclusions:

- Any protein _____ than the original probably will NOT fold into the same 3-D _____ = NOT FUNCTION = cause a _____ problem

- Most mutations have a _____ (-) effect that lowers an organism's chance for survival

EXAMPLES:

- Some mutations have a _____ (+) effect for an organism in a certain environment that helps them better survive the challenges of life

EXAMPLES:

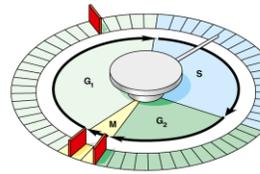
- Accumulating DNA mutations often leads to diseases like _____
- Only DNA mutations in _____ or _____ cells can be inherited
 - These inherited mutations often cause a variety of genetic _____
- Some viruses mutate in _____ because mistakes during _____ of their genetic material are NOT fixed by proofreading repair enzymes
- This leads to new _____ of disease-causing viruses that sometimes emerge to cause major health _____
- This happens because people have little immunity to the viruses' newly-shaped _____

Mutation Analogy: Translating mRNA into a protein can be like understanding an English sentence

English Sentence: **THE ONE BIG FLY HAD ONE RED EYE**

English Sentence #	Mutation Type?			# of letters <u>different</u> from the original sentence	Mutation Effect on sentence meaning?		
	addition	deletion	substitution		NONE	SMALL	BIG
1							
2							
3							
4							
5							
6							
7							

NOTES: Unit 5B (Cancer)



Topic 2: Sometimes healthy cells begin to stop obeying the cell cycle _____, start to divide _____, and refuse to _____ = _____

- Healthy cells move through the stages of cell division in an _____ way as they obey a complex set of START and STOP _____
- Cancer is caused by the accumulation of DNA _____ to various _____ and _____ genes in a cell.

A) Cancer has many _____: Here are a few _____ cancer loves to use.

- Activate _____ = _____ cell division (i.e., step on the cell division _____)
- Deactivate _____ genes = _____ cancer-fighting _____ (i.e., break the cell division _____)
- Deactivate _____ gene (i.e., avoid programmed cell _____ for broken cells)
- Deactivate _____ genes = _____ mutation rate → _____ loss of control
- Build a large network of _____ = _____ resources and **fuel** for _____
- Rebuild _____ for unlimited cell division = never reach the limit of _____ cell divisions

Let's Review:

- Cell division is _____ in cancer.
- Cancer cells form disorganized clumps called _____.
 - _____ tumors remain clustered and can be removed.
 - _____ tumors **metastasize**, or **break away**, and can form more tumors.
- Scientists are busy researching _____ to better understand the CAUSES of many human diseases in hopes of developing better treatments.
- One area of intense cell research is the quest to cure _____ by examining how healthy body cells are transformed into rebel cells that divide _____.
- Researchers are trying to understand how various combinations of _____ can lead to many different types of cancer.

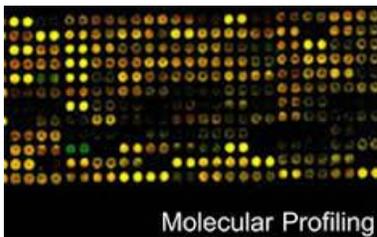
B) Cancer Statistics

- **1 of _____ men** and **1 of _____ women** will be diagnosed with cancer
- _____ Americans die from cancer every day
- One American dies of cancer _____

- The most **common** type of cancer is? _____
- The **deadliest** type of cancer is ? _____

C) Diagnosing Cancer

- Cancer tumors can be _____:Examples:
- Cancer tumors have a _____:Explain:
- Cancer _____ (DNA & Proteins) and free-floating cancer _____ are recently being detected in the _____: Explain:
- Doctors are even beginning to diagnose cancer by determining the exact combination of _____ in the cancer = _____



D) Treating Cancer

- Several traditional weapons are often used to treat cancer:
 - 1) _____
 - 2) _____
 - 3) _____
- A variety of new _____-based weapons are emerging
 - 1) _____
 - Some attack _____ proteins
 - Others deliver medicine by attaching to a cancer-only surface protein with an _____
 - 2) _____
 - Train the _____ to attack cancer
 - 3) _____
 - Use _____ to attack cancer