

■ Lecture 06

■ Gene Expression = Protein Synthesis =
Transcription + Translation

■ Protein = Trait / Phenotype

- trait: a physical characteristic
 - a trait is also called a phenotype
 - traits can be unhelpful such as skin color
 - traits can be normal or disease such as cystic fibrosis, huntington's disease
-

■ Deciphering the genetic code from an amino acid sequence
hypothesis

Proteins:	Methionine - Serine - Tryptophan - Glycine - Leucine - Valine - Alanine						
	~	~	~	~	~	~	~
mRNA:	AUG	UCG	UGG	GGA	UUA	GUA	GCC
DNA:	TAC	AGC	ACC	CLT	AAT	CAT	CGG

We will name this gene #15 & i.e. this gene has a known chromosomal location.

An error in DNA Replication can cause a mutated gene
↳ mutations can cause phenotypic differences.

■ Mutagens: elements / factors that cause cancer

- ↳ Radiation → can cause the formation of a thymine dimer
 - ↳ Chemicals
 - ↳ cigarette smoke
 - ↳ infectious agents
-

Nucleotide Excision Repair

- ↳ it is possible for a cell to repair some mutations

■ Mutations

	No mutation	Silent
DNA	TCC	TTT
mRNA	UGG	UUU
Protein	Lys	Lys

■ Mutation Activity

"Wild - type"

AT + GGC



brown fur

Mutant

AA + GGC



white fur

]- alleles

■ Phenotypes - normal cell division \rightarrow Cancer

normal cell cycle

uncontrollable
cell division

\rightarrow irregular cell cycle

■ Cancer

- a mass of cells that are dividing out of control and have the ability to spread

- a group of diseases characterized by this

- benign tumor: build up of continuous cell division without the ability to move from the original site

- malignant tumor: a "cancerous" tumor with the ability to spread.

■ Cancerous cells

- Cancerous cells have no contact inhibition

- uncontrolled growth

- no apoptosis (cell "suicide") when defects are found

Cell Check Points

- checks if replication is going as expected
- if problems are found gives a chance to fix them
- else cell will self-destruct

Genes

- Proto-oncogene: normal cancer inhibiting gene
- oncogene: mutated gene that no longer functions properly
- Growth factor genes: tells cells to divide
- Tumor suppressor gene: prevents division
- DNA repair genes: repair replication errors (error not fixed)

Cancer Stats:

- 2nd leading cause of death
- 1 in 3 develop cancer
- 1 in 4 will die from cancer