

Protein Synthesis

Transcription and Translation

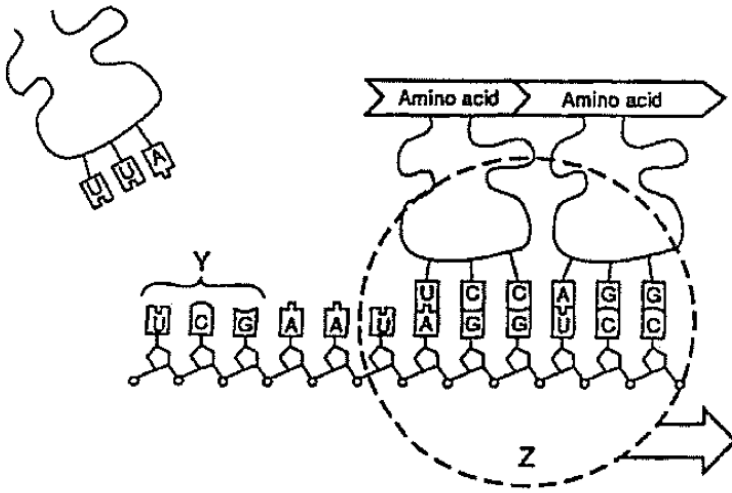
A. Protein Synthesis

1. Protein synthesis occurs at organelles known as _____ which are made of _____
2. The instructions that code for the protein is known as _____ and is located within the _____
3. Because _____ cannot leave the _____ protein synthesis must be broken up into 2 steps _____ and _____
4. The first step is _____ and occurs in the _____. During this process a DNA template is used to create a strand of _____. This strand carries the information to synthesize ONE protein and is known as a _____.
5. A group of 3 nucleotides (triplet) on DNA is called a _____ and on the mRNA it is called a _____
6. The second step of protein synthesis is called _____. This process takes place at the _____. The mRNA codons travel from the nucleus, through the _____ to the ribosome where each codon is matched with its complimentary _____. Each anticodon is at the base of a _____ molecule that carries a specific _____. As the tRNA molecules attach to the mRNA in the ribosome they leave behind the _____ they were carrying. These amino acids are bonded together by strong _____ bonds. As more and more amino acids are bonded together a _____ is formed.

B. Transcription and Translation Practice

DNA Template	TAC	GCG	GTA	CAT	CCA	TAG	GAT	GAA	TTA	ACT
mRNA codons	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
tRNA anticodons	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Amino acids	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

1. Identify the tRNA, mRNA, codons, anticodons, ribosome and polypeptide.



Universal Genetic Code Chart
Messenger RNA Codons and the Amino Acids for Which They Code

		SECOND BASE					
		U	C	A	G		
FIRST BASE	U	UUU } PHE UUC } UUA } LEU UUG }	UCU } UCC } SER UCA } UCG }	UAU } TYR UAC } UAA } STOP UAG }	UGU } CYS UGC } UGA } STOP UGG } TRP	U	C
	C	CUU } CUC } LEU CUA } CUG }	CCU } CCC } PRO CCA } CCG }	CAU } HIS CAC } CAA } GLN CAG }	CGU } CGC } ARG CGA } CGG }	U	C
	A	AUU } AUC } ILE AUA } AUG } MET or START	ACU } ACC } THR ACA } ACG }	AAU } ASN AAC } AAA } LYS AAG }	AGU } SER AGC } AGA } ARG AGG }	U	C
	G	GUU } GUC } VAL GUA } GUG }	GCU } GCC } ALA GCA } GCG }	GAU } ASP GAC } GAA } GLU GAG }	GGU } GGC } GLY GGA } GGG }	U	C
						THIRD BASE	
						G	A

2. Pay attention to what way the ribosome is traveling down the, what are the 4 amino acids, in order, that are coded for? (hint: the first codon is UCG)

D. Gene mutations

1. Any change in an organism's DNA codes is known as a _____
2. Gene mutations occur when only one gene on the chromosome is affected. This means that the production of only one _____ is potentially altered.

There are **four** basic types of gene mutations: (complete the example of each below)

3. A _____ mutation occurs when one nitrogenous base is replaced by a different one.

Original DNA template AAT TGC CCC AGG

Mutated DNA template

4. An _____ mutation occurs when two adjacent nucleotides switch position

Original DNA template AAT TGC CCC AGG

Mutated DNA template

5. An _____ occurs when an extra nucleotide is added to the original DNA code.

Original DNA template AAT TGC CCC AGG

Mutated DNA template

6. A _____ mutation occurs when a nucleotide is dropped from the original DNA code

Original DNA template AAT TGC CCC AGG

Mutated DNA template

7. Describe what a frame shift mutation is

8. Which two types of gene mutations cause frame shifts?

_____ and _____

9. A mutation is a change in the DNA sequence. This sequence is then _____ into mRNA codons, these codons are then _____ into amino acids. So a change in a DNA (triplet) _____ changes the mRNA _____ which can then code for a different _____ . A different amino acid sequence will create a different _____

10. Describe how a mutation can end up not affecting the protein produced.

E. Gene Expression

1. Every cell in your body contains **ALL** of your genetic information, this means every cell has the genes for every protein that your cells can make. To be **efficient** cells only **express** or use certain genes to make the proteins that they need to carry out their function.

C. Proteins, DNA and RNA

1. A protein's _____ determines its function
2. Its shape is based on its _____ sequence
3. Its amino acid sequence is based on its _____ sequence (codons)
4. List 4 compounds in the body that are made of proteins
 1. _____
 2. _____
 3. _____
 4. _____
3. List 3 ways in which DNA and RNA differ
 - _____
 - _____
 - _____
4. What are the three types of RNA and what is the role of each?
 - _____
 - _____
 - _____
5. Where are all three types of RNA manufactured? _____

Use the next two pages to draw out each of the processes involved in protein synthesis

Transcription

Translation