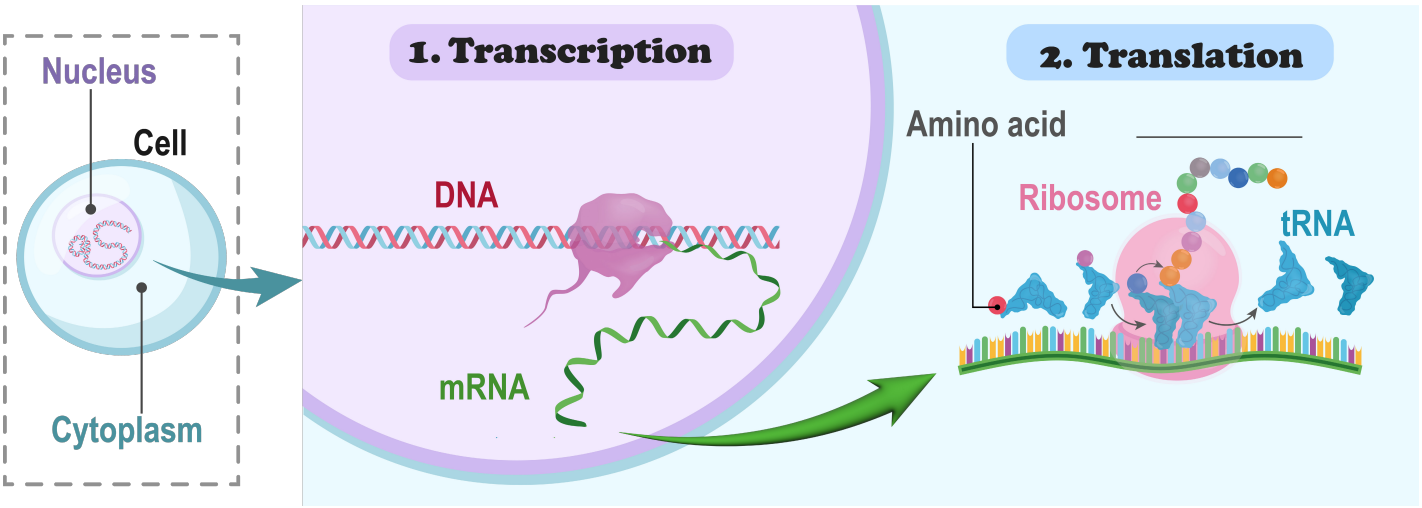
TOPIC: PROTEIN SYNTHESIS

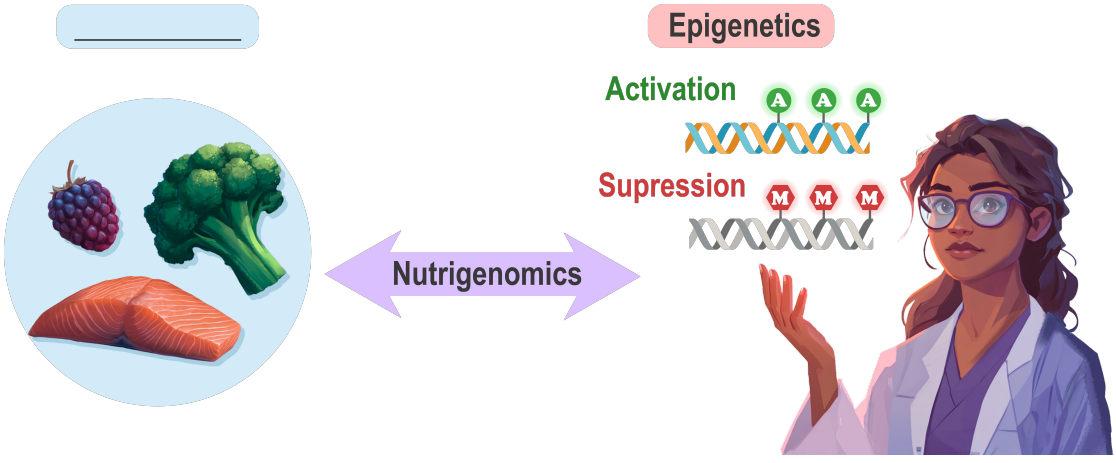
Protein Synthesis Occurs Via Gene Expression

- **Genes:** hereditary segments of _____ that code for a product (e.g. protein).
- Gene *expression* entails _____ major steps leading to protein synthesis:
  1. **Transcription:** a gene's DNA is used as a template to produce _____.
  2. **Translation:** *ribosomes* use mRNA to produce a chain of _____ *acids*, which folds to make a protein.



Epigenetics & Nutrigenomics

- Most body cells have a complete set of DNA, but _____ every gene is equally expressed in every cell.
  - **Epigenetics:** chemical modifications that _____ gene expression *without* changing the DNA sequence.
    - Affects the types & amounts of _____ that a cell makes.
  - **Nutrigenomics:** a branch of epigenetics studying how _____ in our diet impact gene expression.
    - Reveals the impact diet can have on our risk for chronic diseases. May lead to personalized nutrition.



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EXAMPLE

A scientist is researching a gene responsible for the production of a specific protein in liver cells. If the gene's DNA sequence has been mutated/altered, which of the following is the most likely effect?

a) The transcription process will be unaffected, but a larger quantity of protein will be produced.
b) The transcription process will produce an incorrect mRNA sequence, potentially leading to an incorrect amino acid sequence & a nonfunctional protein.
c) During translation, the wrong DNA sequence will be copied.
d) There will be no effect because the cell will always recognize & correct a mutation in the DNA sequence.

PRACTICE

Which of the following answers correctly explains the role of ribosomes during protein synthesis?

a) Ribosomes serve as a template to copy the DNA sequence.
b) Ribosomes are the monomers that form proteins when joined together.
c) Ribosomes "read" the DNA and copy it during transcription.
d) Ribosomes help "link" the amino acids together by facilitating the formation of peptide bonds with each other.

PRACTICE

Which of the following is a direct example of nutrigenomics?

a) A scientist studying how a genetic mutation may increase the likelihood of lactose intolerance.
b) A clinical trial on a new drug that may reduce blood cholesterol levels.
c) A researcher's theory that a high-fat diet may increase the expression of genes linked with inflammation.
d) All of the above are examples of nutrigenomics.