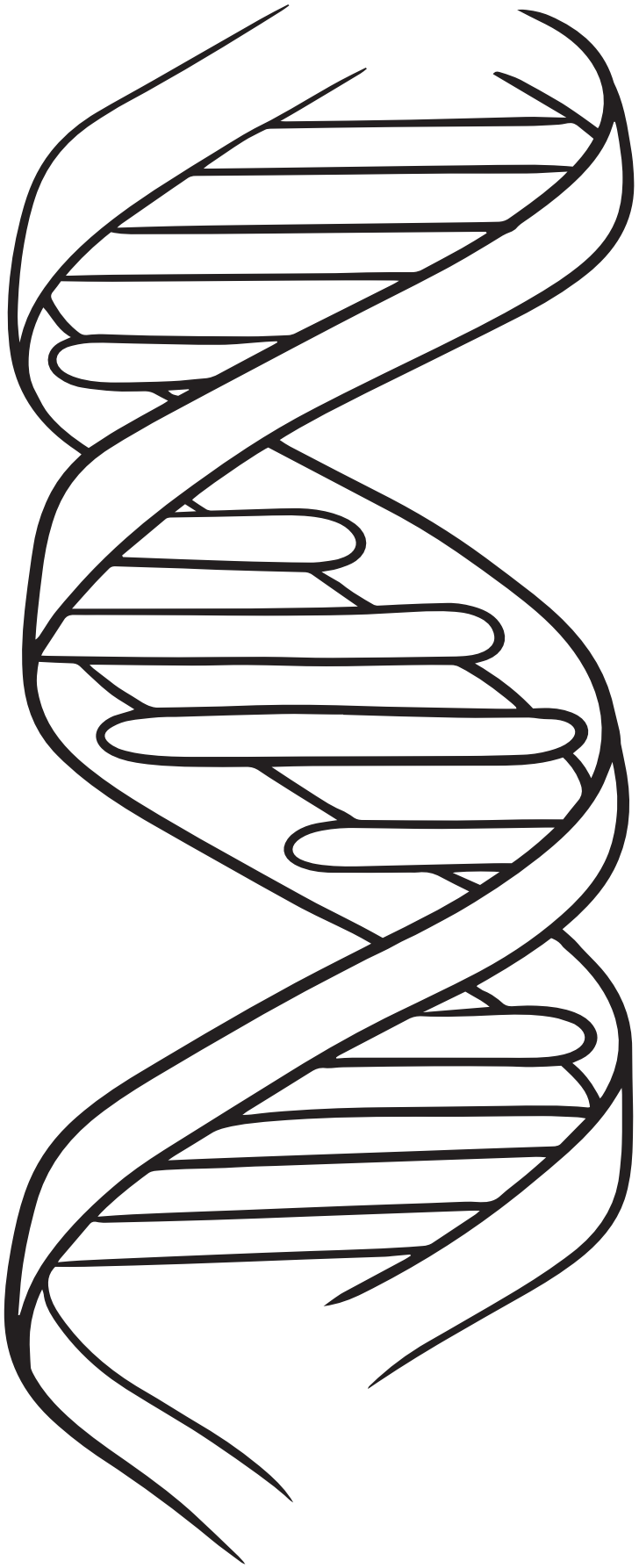

Understanding Translation Mechanisms

By Punit Tak

1. Objective

To explore and understand the biological process of translation — where messenger RNA (mRNA) is decoded by ribosomes to synthesize proteins — using immersive EON XR technology. This training aims to provide an interactive understanding of the molecular mechanisms and components involved in protein synthesis.

2. Target Audience

High school biology students (Class 11–12)

Undergraduate biology or biotechnology students

Educators and enthusiasts interested in molecular biology

3. Key Concepts Covered

- Central Dogma of Molecular Biology (DNA → RNA → Protein)
- Role and structure of mRNA, tRNA, and ribosomes
- Genetic code: codons and anticodons
- Initiation, elongation, and termination phases of translation
- Peptide bond formation and polypeptide synthesis

4. Scene Overview (EON XR)

Scene Title: *Translation in Action*

***Environment**: 3D cellular environment focusing on the cytoplasm*

***Scene Elements**:*

***mRNA strand**: Moving from nucleus to ribosome*

***Ribosome complex**: Animated ribosome (small and large subunits)*

***tRNA molecules**: Carrying specific amino acids*

***Codon-Anticodon Pairing**: Dynamic binding animation*

***Polypeptide Chain Formation**: Growing protein chain animation*

***Audio Narration**: Step-by-step explanation with visual cues*

5. Learning Activities

Activity 1: Label the Components

Identify and label parts of the ribosome, mRNA, and tRNA

Activity 2: Codon Matching Quiz

Match mRNA codons with corresponding tRNA anticodons and amino acids

Activity 3: Translation Simulation

Drag and drop correct tRNA to codon site in ribosome to simulate elongation

Activity 4: Assessment

Multiple-choice questions and short-answer questions on translation phases and functions of each component

6. Skills Developed

- **Hard Skills**: Understanding molecular biology processes, bioinformatics basics
- **Soft Skills**: Critical thinking, scientific observation, interactive learning

7. Outcome

By the end of this EON XR experience, learners will:

> Visually grasp how proteins are made from genetic instructions

> Understand the real-time function of ribosomes and tRNA

> Be able to explain each phase of translation in detail

> Appreciate the significance of translation in biology and medicine