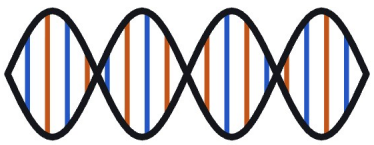
HOW YOUR CELLS BUILD TINY MACHINES

From DNA to Protein

Every cell follows a recipe to build proteins: tiny machines that keep you alive.

@HETSYSCDT

Follow us!

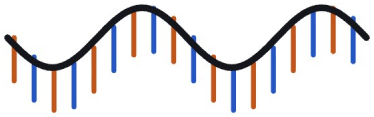


01 DNA The recipe book

DNA is a giant recipe book inside every cell. It is written with just 4 letters: A, T, G and C.

`ATG` `GCT` `AAA` `TGG` `…`

COPY transcription: the recipe is copied

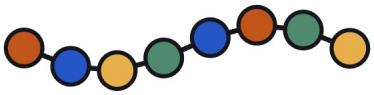


02 RNA The copied recipe

The cell copies one recipe onto a strip called RNA, so the book stays safe. RNA uses U instead of T.

`AUG` `GCU` `AAA` `UGG` `…`

READ translation: a ribosome reads 3 letters at a time

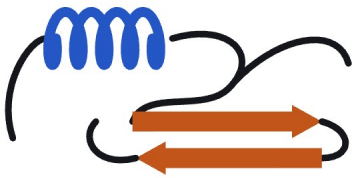


03 Protein chain Beads on a string

Every 3 letters means one bead, called an amino acid. The beads join up into a long chain.

`Met` `Ala` `Lys` `Trp` `…`

FOLD the chain twists and squishes into shape



04 Folded protein The finished machine

Every amino acid is different, so they pull and push on each other:

- **Water-shy** amino acids hide in the middle, away from water.
- **+ and –** charges attract each other, like magnets.
- Tiny **hydrogen bonds** zip the chain into spirals (helices) and zig-zags (sheets).
- Every protein has its own **sequence** (order of amino acids), so each one folds in its own way.

Different sequence → different shape → different job!

05 How do scientists see it? With computers!

Some of them are hard to watch under a microscope, so we use a computer to help instead.

Molecular dynamics

Moves every atom, a tiny step at a time, to watch a protein fold, wobble and grab onto a drug.

Structure prediction

Tools like AlphaFold predict a protein's 3D shape straight from its amino acid sequence.

Bioinformatics

Compares DNA from different people and living things to find genes and spot disease mutations.

DNA simulations

Show DNA bending and twisting, and proteins gripping it to switch genes on and off.

Recipe → Copy → Chain → Computers help us understand diseases and design new medicines