









## Chemical Uptake:

*Rank the following 4 possible routes of entry into the bloodstream from slowest to fastest.* 

a) injection; b) ingestion; c) inhalation; d) nasal "snorting"

















## Proteins (Polypeptides)

### Polypeptides

 Polypeptides are formed with a large number of amino acids (usually resulting in proteins with molecular weights between 6000 and 50 million amu).

#### **Protein Structure**

- Primary structure is the sequence of the amino acids in the protein.
- A change in one amino acid can alter the biochemical behavior of the protein. *Eg. Sickle Cell Anemia*

### Four Levels of Protein Structure

•1° : (Primary) The linear sequence of amino acids and disulfide bonds. eg. ARDV:Ala Arg Asp Val.

•2° : (Secondary) Local structures which include, folds, turns,  $\infty$ -helices and  $\beta$ -sheets held in place by hydrogen bonds. eg. hair curls, silk,

denaturing egg albumin

•3<sup>o</sup> : (Tertiary) *3-D* arrangement of all atoms in a single polypeptide chain. eg. collagen

•4º : (Quaternary) Arrangement of polypeptide chains into a functional protein, eg. hemoglobin.

### Different Protein Types -

- Enzymes: *Glutamine synthetase* 12 subunits of 468 residues each; total mol. wt. = 600,000 daltons
- Regulatory proteins: Insulin  $\alpha$  -alpha chain of 21 residues;  $\beta$  beta chain of 30 residues; total mol. wt. of 5,733 amu
- Structural proteins: Collagen Connectin proteins, β - MW of 2.1 million g/mol; length = 1000 nm; can stretch to 3000 nm.
- Transport proteins: Hemoglobin
- Contractile proteins: Actin, Myosin
- · Specialized proteins: Antifreeze in fish

A gene was first defined as: one piece of DNA that codes for one protein. (The definition is being expanded beyond proteins to include certain types of RNA.)





## **Protein Structure**

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- 2°: Local structures which include, folds, turns, α-helices and β-sheets held in place by hydrogen bonds.
- 3<sup>o</sup>: *3-D* arrangement of all atoms in a single polypeptide chain.
- 4º : Arrangement of polypeptide chains into a functional protein, eg. hemoglobin.











QUESTION		
Which pure substances will not form hydrogen bonds?		
I) CH <sub>3</sub> CH <sub>2</sub> OH		II) CH <sub>3</sub> OCH <sub>3</sub>
III) H <sub>3</sub> C–NH–CH <sub>3</sub>		IV) CH <sub>3</sub> F
A) I and II B) I and II	I C) II and III	D) II and IV



![](_page_4_Figure_2.jpeg)

![](_page_4_Figure_3.jpeg)

![](_page_4_Figure_4.jpeg)

![](_page_4_Figure_5.jpeg)

![](_page_5_Picture_0.jpeg)

![](_page_5_Picture_1.jpeg)

![](_page_5_Figure_2.jpeg)

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![](_page_5_Figure_8.jpeg)

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![](_page_6_Picture_0.jpeg)

![](_page_6_Picture_1.jpeg)

![](_page_6_Picture_2.jpeg)

![](_page_6_Picture_3.jpeg)

![](_page_6_Figure_4.jpeg)

![](_page_6_Figure_5.jpeg)

![](_page_7_Figure_0.jpeg)

![](_page_7_Figure_1.jpeg)

![](_page_7_Figure_2.jpeg)

![](_page_7_Figure_3.jpeg)

![](_page_7_Figure_4.jpeg)

![](_page_7_Picture_5.jpeg)

# Biohacking:

![](_page_8_Picture_1.jpeg)

- Biohackers may soon be able to afford an all-in-one desktop genome printer: a device much like an inkjet printer that employs the letters AGTC — genetic base pairs — instead of the color model CMYK.
- A Girl genetic base pairs instead of the color model CMYK.
  A similar device already exists for institutional labs, called BioXp 3200, which sells for about \$65,000. But at-home biohackers can start with DNA Playground from Amino Labs, an Easy Bake genetic oven that costs less than an iPad, or The Odin's Crispr gene-editing kit for \$159.

https://www.nytimes.com/2018/05/14/science/biohackers-gene-editing-virus.html? rref=collection%2Fsectioncollection %2Fscience&action=cit&contentCollection=science&region=rank&module=packag e&version=highlights&contentPlacement=1&pgtype=sectionfront