Quiz on protein structure (Chiu lectures 1-2) Aug 17, 2008 (12pt total)

Name:

1) T or F: Secondary structure describes the three dimensional arrangement of structural motifs.

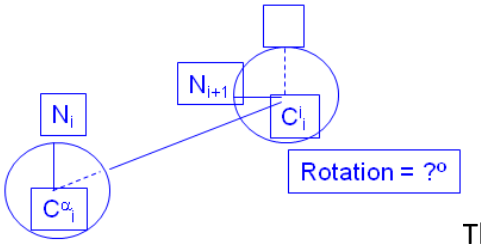
   Tertiary structure describes the 3D arrangement of structural motifs. (1pt)

2) How many rotational degrees of freedom do the main-chain atoms of proteins have and why?

   Because the peptide bond has a delocalized electronic structure, the peptide group (main-chain atoms) is planar (1pt) and only two (1pt) rotational degrees of freedom are available, the phi and psi angles.

3) T or F: The cis-peptide conformation is more energetically favorable than the trans-peptide conformation. (1pt)

4) What is the rotation angle called in the schematic shown below, and what is the angle value to rotate atom N_i to N_{i+1}? (2pt)



The rotation of N_i to N_{i+1} is -90^o for this psi angle.

5) List the order of compactness for the three types of helices (α, π and 3_{10}), from underwound to overwound. (1pt)

   π, α, and 3_{10}

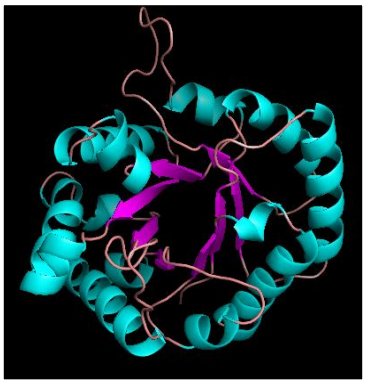
6) Under what environment are hydrophobic α-helices favored at the exterior of a protein?

   Hydrophobic α-helices are favored at the exterior of integral membrane proteins, because the lipid membrane is hydrophobic. (1pt)

7) Circle the amino acid that is most-likely to be found in loops: Ala, Met, Phe, Gly (1pt)

8) What is the time scale that secondary structures form? (1pt)

   microseconds



9) The TIM-barrel structure shown to the right is an example of what type of structure: α, β, α/β or $\alpha+\beta$? (1pt)

10) T or F: The TIM-barrel structure most likely folds by the forming the β-strand center first, then the surrounding α-helices form and help stabilize the center. (1pt)