1. The Pentose Phosphate Pathway (PPP) is a metabolic pathway occurring in the cytoplasm that mainly generates NADPH and ribose 5-phosphate. NADPH is used for the reduction of reactive oxygen species (ROS) such as hydrogen peroxide. PPP has oxidative and non-oxidative phases, which are irreversible and reversible, respectively.

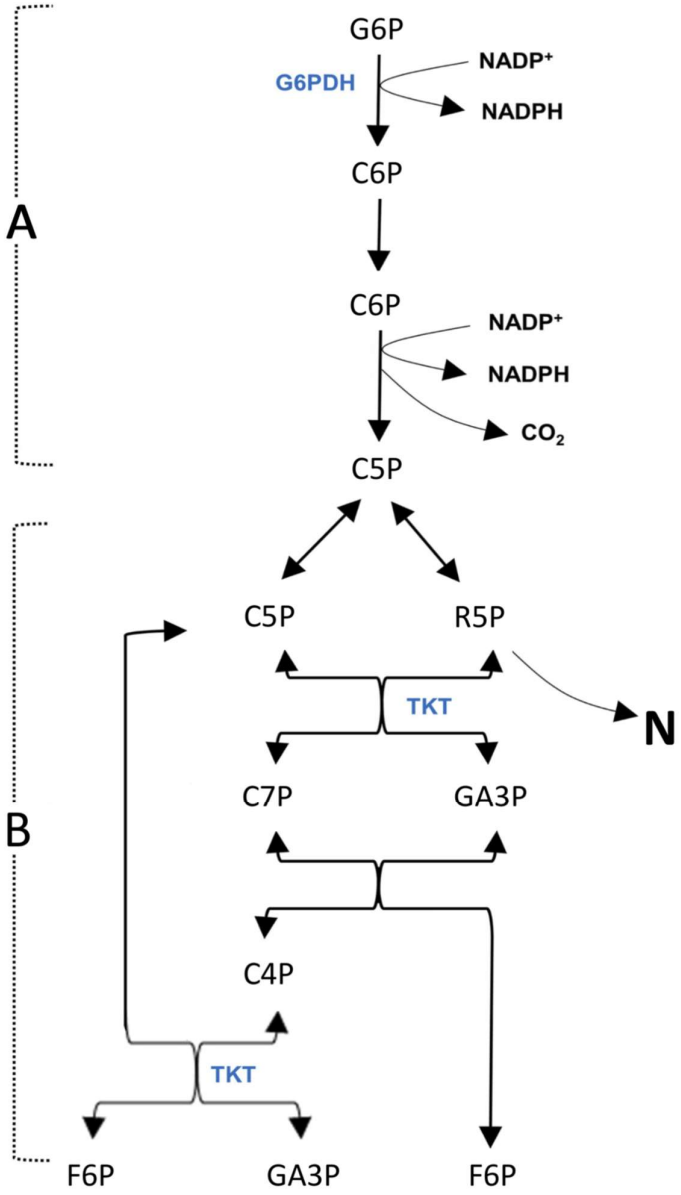

Figure 1. **A** Oxidative. **B** Non-oxidative. G6P – glucose 6-phosphate, GA3P – glyceraldehyde 3-phosphate, F6P – fructose 6-phosphate, R5P – ribose 5-phosphate, G6PDH – glucose 6-phosphate dehydrogenase, TKT – transketolase, N - nucleotides. CXP - other intermediates where X is the position of phosphorylated carbon. Note that all intermediates of PPP are phosphorylated on the last carbon.

Please indicate "T" for true statements and "F" for false ones.

A. In actively dividing cells, the reactions occurring before the first TKT-catalyzed reaction are more active than those occurring later.

B. TKT catalyzes a reaction that transfers a one-carbon fragment.

C. Deficiency of G6PDH activity will reduce the level of available NADPH in red blood cells.

D. For each molecule of G6P, there will be two molecules of F6P produced through both phases.

2. The bonds between the central carbon atom and attached groups in peptides can rotate freely. The rotation angles of the N-Cα and Cα-C bonds are called Φ and ψ angles, respectively. To measure the ψ angle, first draw the Cα-C bond horizontally so that the N group is at 0 degrees (in the same plane as the Cα-C bond). Then rotate the distal N group around the Cα-C bond until the structure matches the structure that you aim to measure as shown in Figure 1C. For the Φ angle, place the N-Cα bond horizontally and rotate the distal C group. The Ramachandran plot visually represents the combinations of Φ and ψ angles in a peptide backbone (Figure 1B).

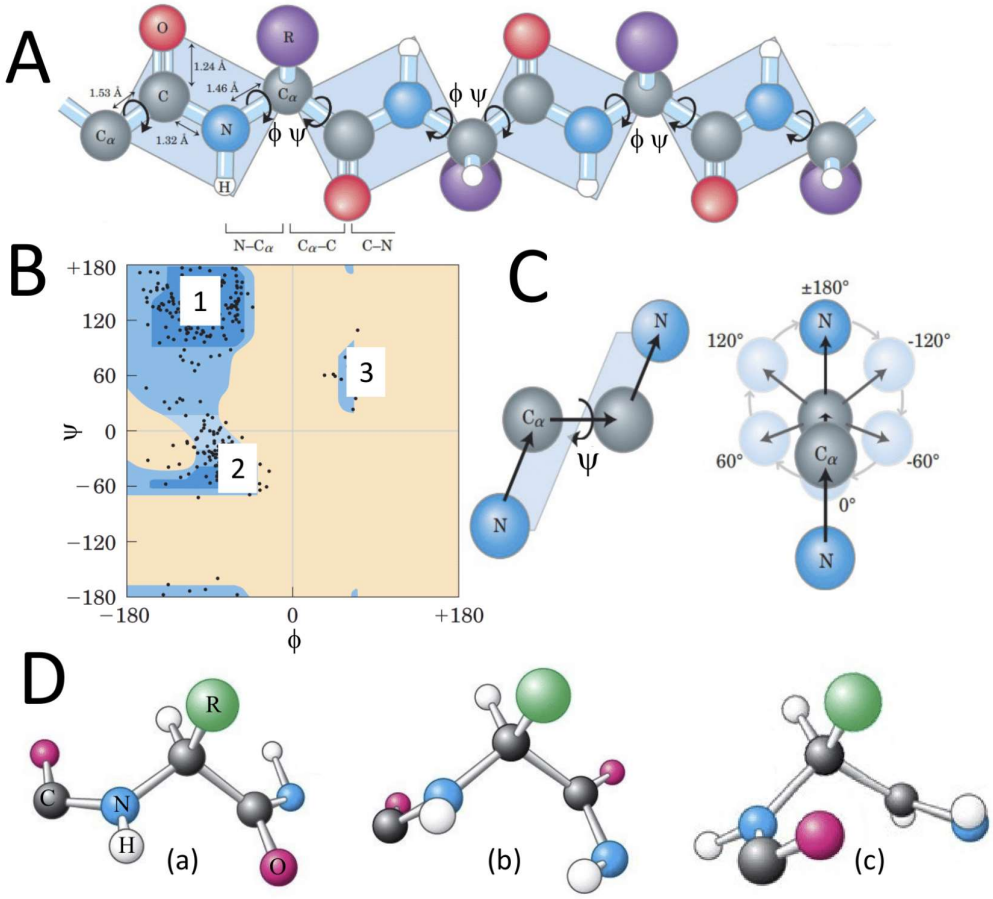

Figure 1. **A** Part of the peptide with shown Φ and ψ angles. **B** The Ramachandran plot with the values of Φ and ψ angles for all the amino acid residues except Gly in the rabbit's pyruvate kinase. **C** The ψ angle values are created by the rotation. **D** Three structures of amino acids' residues.

On your answer sheet, indicate "T" for true statements and "F" for false ones.

A. The structure (a) in Figure 1D is located in Region 2 in Figure 1B.

B. The structure (b) in Figure 1D is located in Region 3 in Figure 1B.

C. The structure (c) in Figure 1D is uncommon in rabbit's pyruvate kinase.

D. Amino acids, other than glycine, with 0 degrees of both Φ and ψ angles do not occur in rabbit's pyruvate kinase.