Exercise: Fluorescent protein analysis

# Green Fluorescent Protein (GFP)

1) Open PDB 1EMA

How did you manage to open this structure?

Klik of tik om tekst in te voeren.

2) what is the general shape of this protein?

Klik of tik om tekst in te voeren.

3) How many alpha helices are visible?

Klik of tik om tekst in te voeren.

4) How many beta strands are visible?

Klik of tik om tekst in te voeren.

5) Find the N-terminus; what is the first residue in this structure (residue name and number)?

Klik of tik om tekst in te voeren.

6) Starting from the N-terminus, locate the second alpha helix

What is the first residue (name + number): Klik of tik om tekst in te voeren.

What is the last residue (name + number): Klik of tik om tekst in te voeren.

7) Color alpha helices in blue and provide a illustrating the protein with blue helices:

8) Find the chromophore (TIP: its residue name is listed as a standard amino acid in the select menu, but it does not have a canonical 3 letter abbreviation for amino acids)

Show the atom representation and provide a screenshot to illustrate:

This chromophore is actually created by a combination of 3 amino acids, which ones?

Klik of tik om tekst in te voeren.

# Comparing GFP to different fluorescent proteins

1) Open PDB 1OXD (cyan fluorescent protein)

Do both proteins look similarly?

Klik of tik om tekst in te voeren.

Are both structures properly aligned? Explain

Klik of tik om tekst in te voeren.

2) Align 1OXD to 1EMA

How did you perform the alignment? Klik of tik om tekst in te voeren.

What is the obtained RMSD? Klik of tik om tekst in te voeren.

Give two places where you can find the RMSD after alignment:

Klik of tik om tekst in te voeren.

3) Find the chromophore

What is the residue name of this chromophore? Klik of tik om tekst in te voeren.

What are the 3 amino acids that combine to form the chromophore in 1OXD?

Klik of tik om tekst in te voeren.

4) Calculate the distance between two atoms in each model: atom OG1 of the chromophore and atom OE2 of residue Glu 266

What is the distance in 1EMA: Klik of tik om tekst in te voeren.

What is the distance in 1OXD: Klik of tik om tekst in te voeren.

5) Open PDB 4HE4

What is the residue name of the chromophore in 4HE4? Klik of tik om tekst in te voeren.

Does the chromophore differ from 1EMA? Klik of tik om tekst in te voeren.

6) Try to identify what causes the different color in fluorescence between 1EMA and 4HE4 (very hard – TIP: have a look at the PDB website for 4HE4 and find the corresponding scientific publication to get started)

Klik of tik om tekst in te voeren.