

STRUCTURAL BIOLOGY WITH DR ANGELA GRONENBORN

TALKING POINTS

Knowledge:

1. What is structural biology?
2. What is NMR spectroscopy?

Comprehension:

3. Why are fluorine isotopes useful for structural biology?
4. Why is studying proteins and nucleic acids worthwhile?

Application:

5. Angela talks about making sure that adding fluorine to proteins doesn't affect their function. How do you think the researchers test this?

Analysis:

6. What skills do you think make for an effective researcher in Angela's lab?
7. Which other disciplines do you think need to get involved for the results of Angela's research to be used in developing a pharmaceutical drug?
8. Angela has a background in chemistry and physics rather than biology. Do you think this influences her work? How?

ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

The following website has an array of 3D biomolecules you can view: <https://www.biotopics.co.uk/jsmol/jscontents.html>

Use it to explore what different biomolecules look like – you can manipulate how they are displayed, highlight areas of interest, and explore their structure.

Use this site, and further research using the internet, to fill in the table below. The following points will help you:

- There are four major classes of large biomolecules: proteins, nucleic acids, carbohydrates and lipids.
- The function of a biomolecule relates to what it does in an organism. Why is it important?
- Important structural characteristics are those that help the biomolecule fulfil its function. Think about characteristics such as size, shape, strength of bonds, interactions with other molecules, and the conditions it needs to work under. Find at least two for each biomolecule.
- The last two rows are left blank, for you to fill in with biomolecules that particularly interest you

MORE RESOURCES

- This video from the National Institute of General Medical Sciences provides an excellent introduction to structural biology: <https://www.youtube.com/watch?v=tdd7op5feJw>
- The Human Protein Atlas has a huge amount of information on the proteins in the human body. It is a great way to learn about any particular proteins that interest you, and to find out more about their role in the body and their relevance to medicine: <https://www.proteinatlas.org/>
- This video from the University of Pittsburgh features Dr Angela Gronenborn talking about her work: <https://www.youtube.com/watch?v=b42dYrTYZM>

Biomolecule	Class	Function	Important structural characteristics
Amylase			
DNA			
Collagen			
Glucose			
Glycogen			
Phospholipid			

ANGELA RECOMMENDS the Worldwide Protein Data Bank, where structural biologists 'deposit' their structures. Serving as the single global repository of information about the 3D structures of proteins, nucleic acids and complex assemblies, it has an extensive educational portal: <http://pdb101.rcsb.org/>

Challenge yourself to make a paper model of a molecule: <http://pdb101.rcsb.org/learn/paper-models>