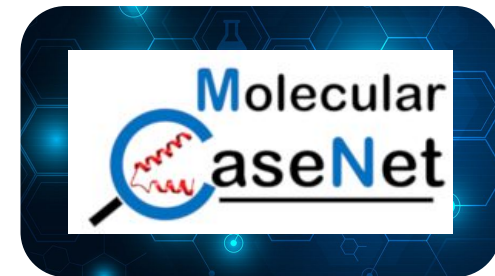


Molecular CaseNet:

Using a storytelling approach in exploring biomolecular structure–function relationships



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Associate Research Professor, Institute for Quantitative Biomedicine
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Overview

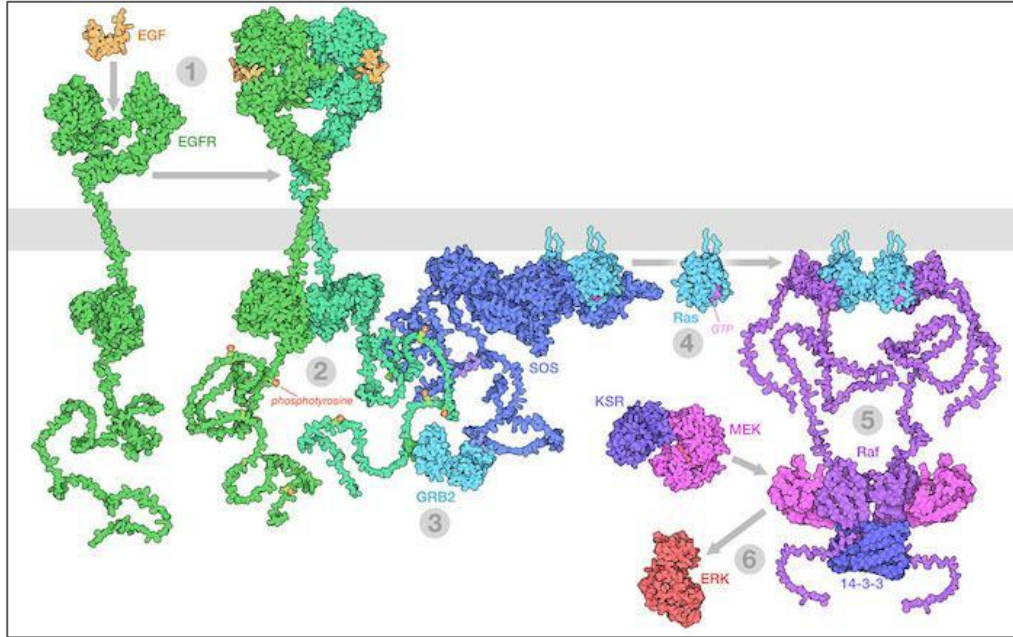
- Why use Molecular Case Studies?
- The Molecular Case Study Cycle
- How to connect with Molecular CaseNet?



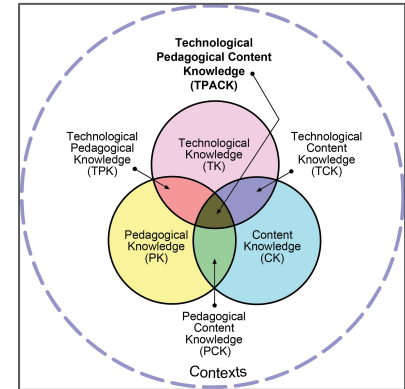
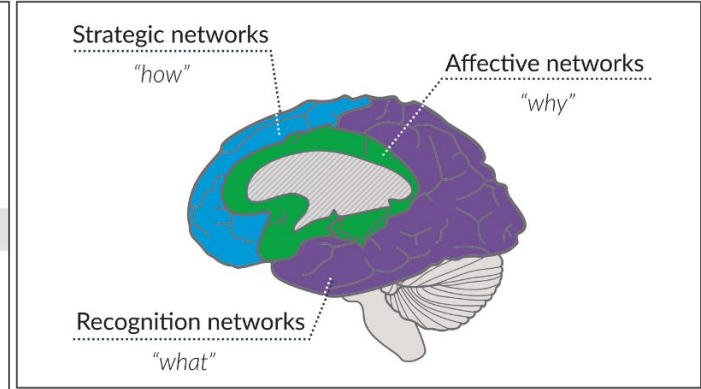
QUBES
A BioQUEST Project

This project is supported by the National Science Foundation - DBI 1827011; DBI 2018884

Molecular Storytelling: A Pedagogical Approach



<https://pdb101.rcsb.org/learn/exploring-the-structural-biology-of-cancer>



<https://www.cast.org/products-services/resources/2018/udl-learning-brain-neuroscience>

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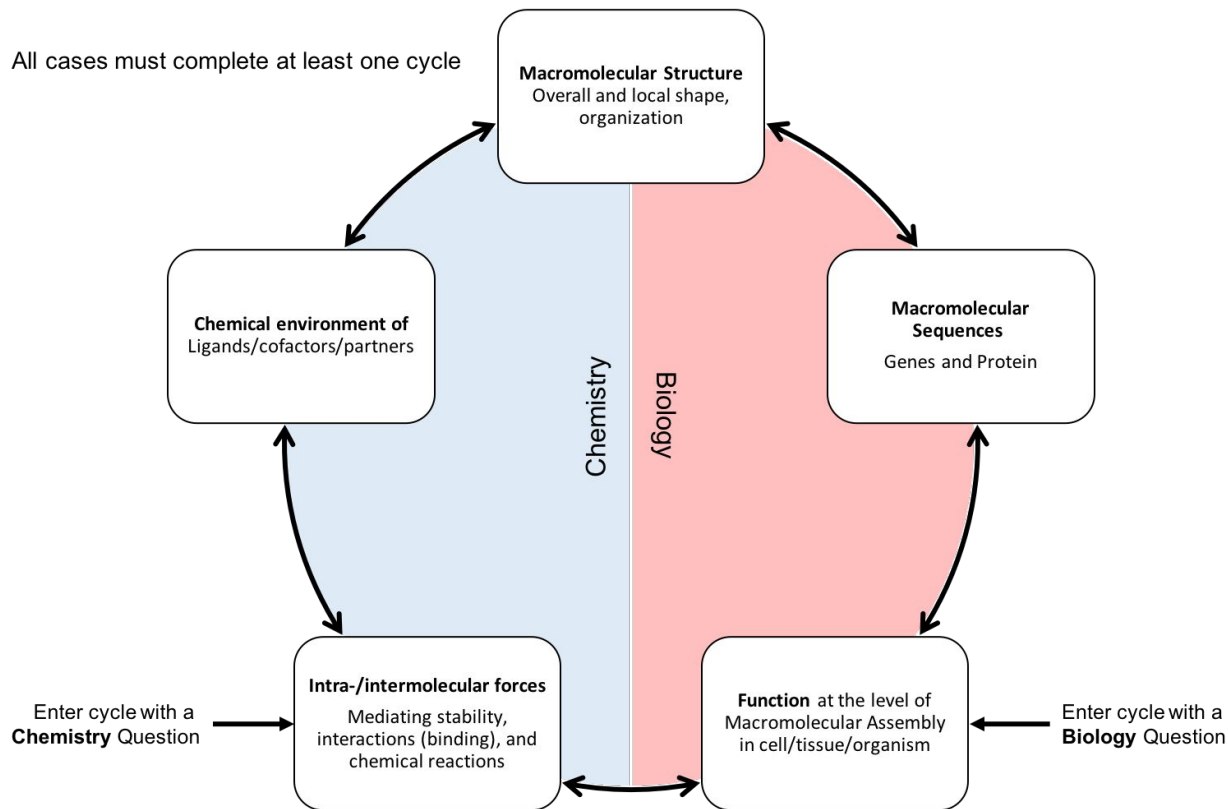
Why Use Molecular Case Studies?

Enable students/participants to ...

- query, navigate, and **integrate information from various public bioinformatics resources** (e.g., PDB, UniProt, PubMed, DrugBank, KEGG, and more) - *aligned with **NIBLSE Bioinformatics Core Competencies***
- **visualize and analyze** biomolecular structures - *aligned with **BioMolViz Framework***
- **explore the molecular basis** of biological phenomena - *aligned with **BioCore Guide***
- **examine** biomolecular structures **for in-depth understanding of intra- and intermolecular forces** in proteins, nucleic acids and their complexes facilitating their functions - *aligned with **Macromolecular, Supramolecular, and Nanoscale (MSN) Systems in the Curriculum***
- novel **perspectives of real world problems** and help **develop solutions** at the **interface of biology & chemistry** - *aligned with **ASBMB Foundational Concepts***

They **help you plan your curriculum** because they are modular, flexible, and adaptable active learning opportunities. They are accompanied by answer keys and teaching notes, and include opportunities to apply multidisciplinary concepts learned in class to authentic societal issues.

The Molecular Case Study Cycle



Nicholas' Story

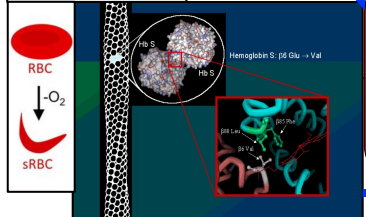
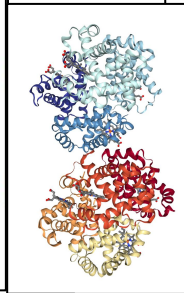
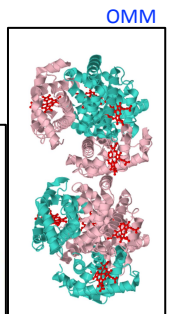
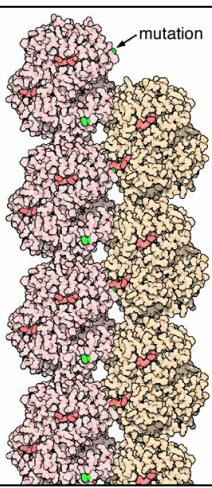


Goodsell, D.S., Dutta, S., Voigt, M., Zardecki, C. (2021) Molecular storytelling for online structural biology outreach and education; *Structural Dynamics*, 8(2); doi: 10.1063/4.0000077

Molecular Exploration

Getting to Structure

Introduction



Chemical environment of Ligands/cofactors/partners

Macromolecular Structure
Overall and local shape, organization

Macromolecular Sequences
Genes and Protein

Intra-/intermolecular forces
Mediating stability, interactions (binding), and chemical reactions

Function at the level of Macromolecular Assembly
in cell/tissue/organism



CCT	GAG	GAG
Pro	Glu	Glu
5	6	7
↓		
CCT	GTG	GAG
Pro	Val	Glu
5	6	7

Mutation of Glu6Val in HbS



Q1. What is the molecular basis for Nicholas' pain crises?

Chemistry

Biology

Deoxy HbS structure (PDB ID 2hbs)

5

How to connect with Molecular CaseNet?

- Join to use
 - published case studies or case studies for piloting at <https://molecular-casenet.rcsb.org/>
- Join the new Cohort in Fall 2023 (Sep./Oct.) to author your own molecular case study
 - Scan QR code to complete an interest form



Summary

- Why use Molecular Case Studies?
- The Molecular Case Study Cycle
- How to connect with Molecular CaseNet?

Hope to see you in a Showcase Sessions later today

