

## Exploring Biology and Medicine Using 3D Biomacromolecules with PDB-101

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Outreach initiatives organized by the RCSB Protein Data Bank aim to help teachers, students, and the curious public explore the 3D world of proteins, nucleic acids, and biomacromolecular machines.

The online portal PDB-101 (<http://pdb101.rcsb.org/>) helps this broad community understand biology and medicine in 3D. PDB-101 materials ("101", as in an entry level course) are developed using the structures of proteins and nucleic acids available in the Protein Data Bank (PDB) archive. Learning about the diverse shapes and functions of these biological macromolecules helps to understand all aspects of biomedicine and agriculture, from protein synthesis to health and disease to biological energy.

Paper models, the ongoing Molecule of the Month series, posters, molecular animations, and other materials created support exploration and extended learning. Curricula provide authentic, hands-on teaching materials, individual and group activities and assessment suggestions. PDB-101 can be searched by molecule name or keyword. A Browse option displays all available resources, organized by topics such as immune system and renewable energy. A "Guide to Understanding PDB Data" is built around more PDB-specific information: PDB Data, Visualizing Structures, Reading Coordinate Files, and Potential Challenges (including biological assembly vs. asymmetric unit).

In the annual RCSB PDB Video Challenge, high school students across the USA are invited to create short videos that tell a molecular story of health and disease. Past topics have included HIV/AIDS and diabetes; 2019 will focus on anti-microbial resistance. A panel of expert judges reviews the submissions for scientific content, creativity, overall impact, originality, entertainment value, and production quality. An additional award is made for the Viewer's Choice as selected during an open voting period.

PDB-101 materials are also part of in-person outreach, which includes participation with Science Olympiad, science festivals, and other classroom experiences.

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