SMART Teams 2014-2015 Research & Design Phase

Monona Grove High School SMART Team

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RecQ DNA Helicases in Human Disease

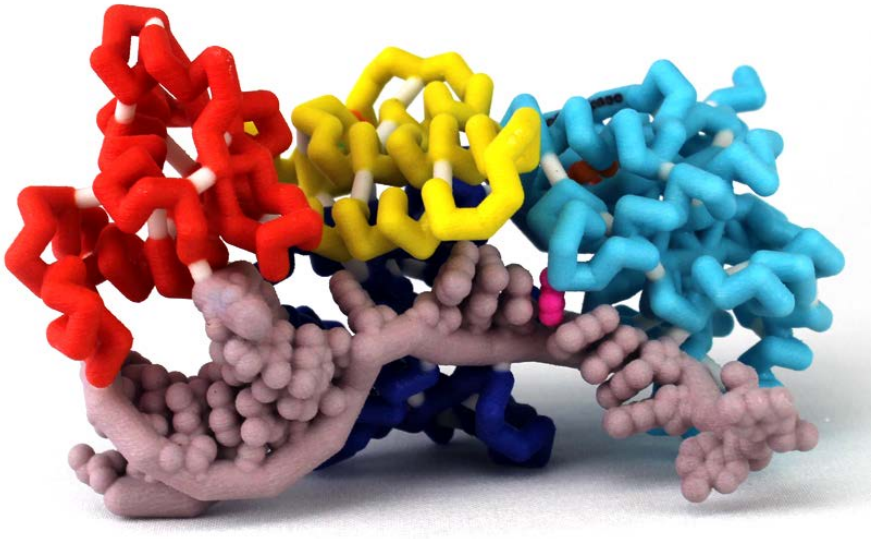
PDB: 4TMU

Primary Citation: Manthei, KA, Hill, MC, Burke, JE, Butcher, SE & **Keck, JL** (2015) "Structural mechanisms of DNA binding and unwinding in bacterial RecQ helicases" *Proceedings of the National Academy of Sciences* (in press).

Format: Alpha carbon backbone

RP: Zcorp with plaster

Description:
RecQ DNA helicases are found in all organisms and are central players in DNA replication, recombination, and repair. The Monona Grove High School SMART team used 3D printing technology to model the structure of a bacterial RecQ protein bound to DNA. Upon binding, the structure of the protein changes significantly and it becomes active. The positions of domains (colored cyan, blue, yellow, and red) are altered to grip the DNA (shown in grey).



Specific Model Information:

The molecule is colored by domains (helicase domain in teal and blue, zinc-binding domain in yellow, and winged-helix domain in red). DNA is shown in grey. Residues that are shown in orange are sites that cause Bloom's syndrome when mutated in humans. A residue that base stacks between DNA bases is shown in magenta. Two residues that complete coordination of the zinc ion along with two others that are colored orange as described above, are show in yellow. A zinc ion is in green. Struts were shown in the default color.