

## Westosha Central High School SMART Team

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### An Exciting ER $\alpha$ in Breast Cancer Treatment

**PDB:** 3ERT

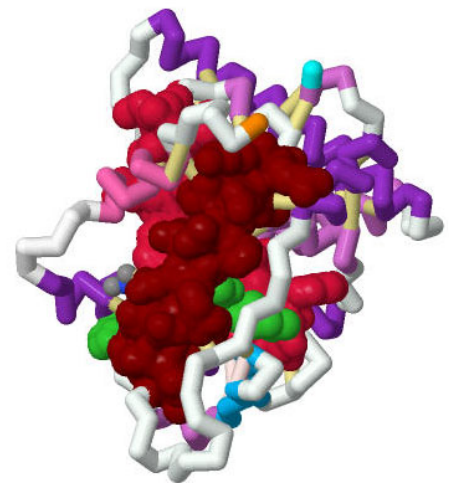
**Primary Citation:** Steinbacher, S., Bass, R., Stop, P., Rees, D.C., (2007). Structures of the Prokaryotic Mechanosensitive Channels MscL and MscS. *Current Topics in Membranes in Mechanosensitive Ion Channels, Part A* 58: 1-24.

**Format:** Alpha carbon backbone

**RP:** Zcorp with plaster

#### Description:

According to the American Cancer Society, one in eight U.S. women will develop breast cancer in their lifetime. Strikingly, many of these women share a significant genetic commonality. It has been shown that many breast cancer patients test positive for high levels of Estrogen Receptor (ER $\alpha$ ), a protein that regulates the differentiation and maintenance of neural, skeletal, cardiovascular, and reproductive tissues in their cells. ER $\alpha$  aids in the process of DNA transcription as a transcription factor. The activation of ER $\alpha$  occurs when a ligand, estradiol, diffuses through the lipid membrane and binds to the active site at the Ligand Binding Domain (LBD) while ER $\alpha$  is in the cytoplasm. Initially the LBD is inhibited by a chaperone protein, which immediately disjoins from ER $\alpha$  to allow estradiol to bind. The LBD is located at amino acid residues 303 to 552 highlighted in the model designed by the Westosha Central High School SMART Team using 3D printing technology. Afterwards, the complex is transported into the nucleus where the DNA Binding Domain (DBD) of the ER $\alpha$  protein binds to DNA and commences gene transcription. An overabundance of ER $\alpha$  leads to excessive transcription which may cause breast cancer. Therefore, in the treatment of breast cancer, inhibiting or degrading ER $\alpha$  is of immediate interest as a therapy.



**Specific Model Information:**

- Helix 3 is displayed in surface in Crimson
- Helix 5 is displayed in surface Dark Red
- Helices 1, 2, 4, 6, 7, 8, 9, 10, and 11 are colored in alternating orchid and dark orchid
- Amino acids (Glu353, Arg394, His524), are displayed in surface are responsible for binding the ligand
- Beta Sheet colored in Deep Sky Blue
- N-terminus colored cyan
- C-terminus colored orange
- Hydrogen bonds are colored thistle
- Structural supports in the model are colored khaki

<http://cbm.msoe.edu/smartTeams/>

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