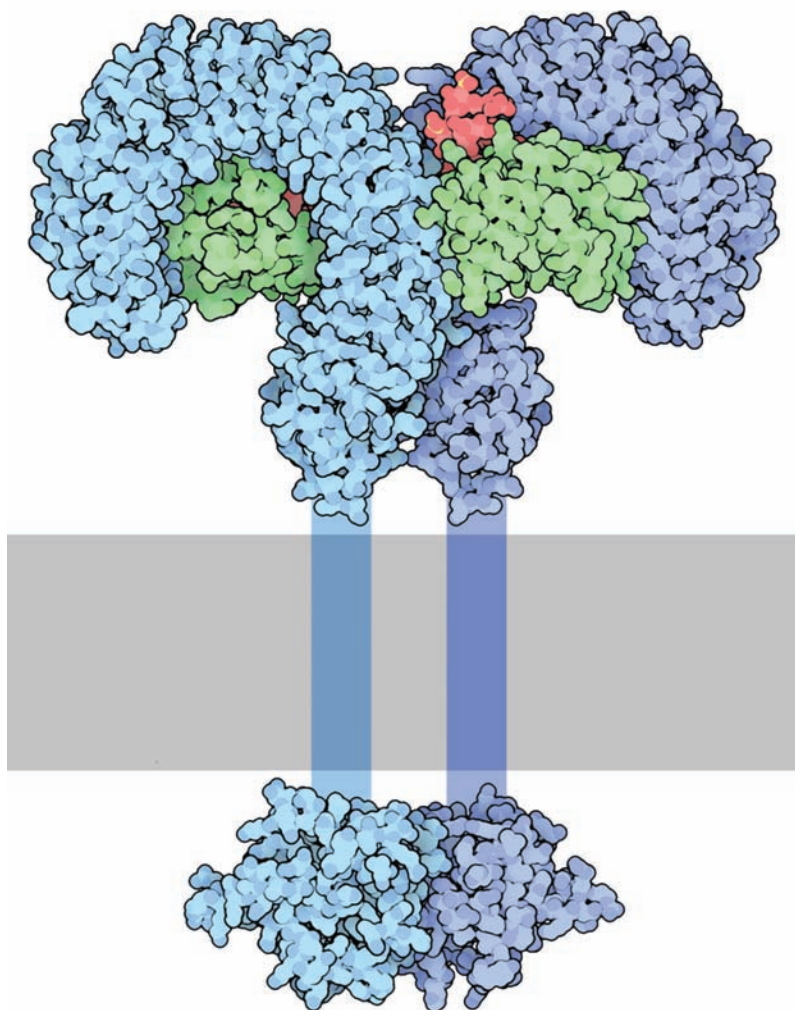


TOLL-LIKE RECEPTORS

frontline for the immune system



The innate immune system is hard-wired to battle common foes: for instance, the Toll protein in fruit flies specializes in recognizing bacterial and fungal infections. Our own cells contain 10 proteins similar to Toll, called **Toll-like receptors**, that each recognize distinctive molecules from bacteria and viruses. The one shown here recognizes lipopolysaccharide (shown in red), a molecule found in many bacterial cell walls. When they find these foreign molecules, our Toll-like receptors mobilize an inflammatory response that fights the pathogens. This response is very important: for instance, mice that are deficient in one step of the Toll-like receptor signaling pathway often die of infections from the normal bacteria found in their mouths.

The 2011 Nobel Prize in Physiology or Medicine was divided, one half jointly to Bruce A. Beutler and Jules A. Hoffmann *for their discoveries concerning the activation of innate immunity* and the other half to Ralph M. Steinman *for his discovery of the dendritic cell and its role in adaptive immunity*.

The PDB contains many examples of the Toll-like receptors (TLR) that are involved in the innate immune system. The role of the TLR shown was discovered by Bruce Beutler.

Illustration and text from the *Molecule of the Month* (doi: 10.2210/rcsb_pdb/mom_2011_11). Top: 3f6i (B.S. Park, D.H. Song, H.M. Kim, B.-S. Choi, H. Lee, J.-O. Lee (2009) *Nature* 458: 1191-1195), Bottom: 2j67 (T. Nyman, P. Stenmark, S. Flodin, I. Johansson, M. Hammarstrom, P. Nordlund (2008) *J.Biol.Chem.* 283: 11861).

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