

Human HLA-B

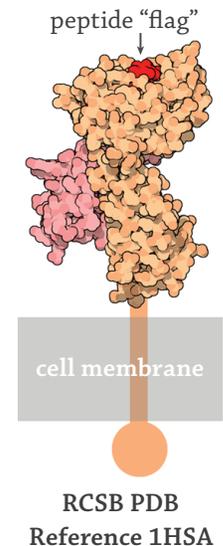
Protein Function

T-cells in the immune system find and destroy threats to the body like harmful bacteria, viruses, and toxins. To do that, T-cells need a way to tell the difference between stuff that is “self” and stuff that is “not self.”

For instance, when a virus enters a cell it begins producing proteins to control the host cell and replicate itself. When these proteins are identified as abnormal, they’re sent through a protein shredding machine that breaks the protein into tiny pieces, called peptides.

These “non-self” peptides are passed to Human Leukocyte Antigen (HLA-B) proteins tethered to the outside of the cell. HLA-B proteins have special grooves that can hold peptide fragments. The peptides stick out of the groove and act as “self” or “not self” flags.

During early childhood, HLA-B proteins help teach newborn T-cells the difference between “self” and “not self” peptide flags. Then, throughout the rest of our lives, they present “not self” peptide flags to T-cells. This signals the T-cell to destroy the foreign invader.



High Protein Variability

We are constantly being exposed to pathogens and toxins. To respond to new threats, it is advantageous if our HLA-B proteins can bind to and present a wide variety of peptide flags.



HLA-B, partial amino acid sequence (11 of 362 total)

For this reason, HLA-B is the most highly variable gene in the human genome. Even a single base change can alter how or if the protein binds to a particular peptide. Without mutation, HLA-B simply couldn’t do its job.

Scientists have identified several thousand HLA-B alleles. Depending on where your ancestors lived and what diseases they were able to survive, you have a unique set of HLA-B proteins selected to help identify previously encountered invaders.

HLA-B Alleles & Health

Which mutations you carry in your HLA-B genes can impact health – in both positive and negative ways:

- In organ transplants, if the donor and recipient HLA-B alleles don’t match, the organ has a high likelihood of being rejected as “not self.” That’s why organ transplants work best with close relatives.
- Several HLA-B alleles are associated with adverse drug reactions. In people with these alleles exposure to the certain drugs causes the T-cells to release a substance that destroys mucus membranes such as the airways, making it difficult to breathe.
- Inflammation is an immune response that causes swelling around foreign material. Several HLA-B alleles cause this response to go wrong resulting in conditions like ankylosing spondylitis, a severe joint disorder.
- Some HLA-B alleles can improve response to specific pathogens. B35 can protect you from malaria, while B27 can help you fight off HIV.

