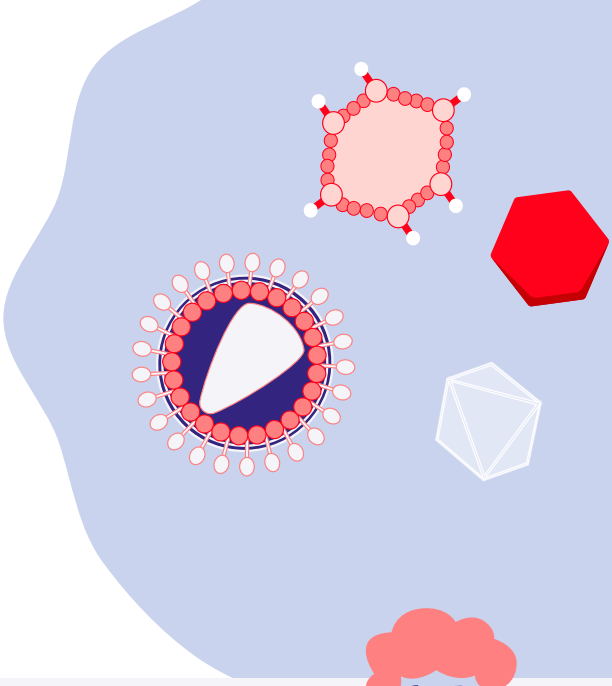
Viral Vector Overview



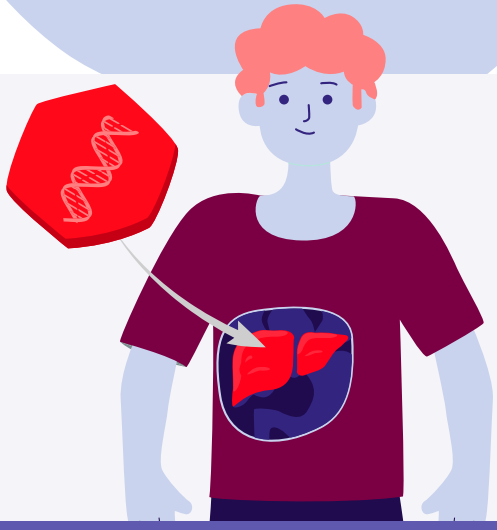
Why Viruses?

A vector is a vehicle used to deliver therapeutic genetic material - DNA or RNA - into a cell. For gene therapy, there are four main types of vectors, all derived from viruses because a virus is good at getting into cells. But the viral genes are removed, so only the therapeutic genes are delivered. Researchers carefully choose which viral vector to use to treat a disease based on:

- How well researchers understand the virus
- How well the virus can target certain cells
- How safe it is to use

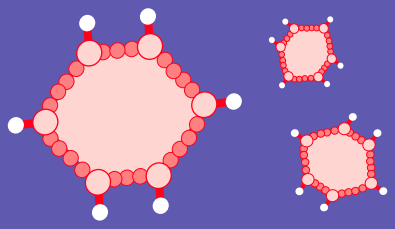
Adeno-Associated Viral (AAV) Vectors

- Are able to deliver only small DNA packages, or genes, to cells
- Are non-integrating, or don't insert themselves into cells' genome
- Are typically used to target non-dividing cells, such as liver or nerve cells
- Are most effective for in vivo treatments when vectors are injected directly into the body
- Can be limited by innate immunity since many people are exposed to AAVs through natural infections. The immune cells may destroy the vector before it can deliver the therapy
- Can be limited to a single dose since antibodies may develop



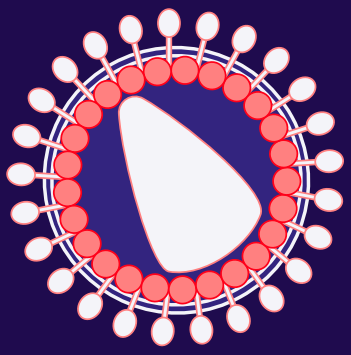
Adenoviral Vectors

- Can deliver packages up to 8x larger than AAVs
- Are similar to AAVs in that they are non-integrating into the cells' genome and target non-dividing cells
- Can cause strong immune responses resulting in potentially harmful inflammation throughout the body, that decreases treatment effectiveness. Scientists are working to improve this vector type to have a milder response



Lentiviral + Retroviral Vectors

- Can deliver larger genetic packages of RNA, which is converted into DNA. During this process, the vectors integrate into the genome of the target cell
- Are typically used to target dividing cells, like T cells, which are immune cells, and stem cells. The new genetic material is copied into all the new cells beyond the original cell
- Are most effective for ex vivo treatments when the person's cells are removed from the body, modified by vectors delivering working genes, and then returned to the body to improve function



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