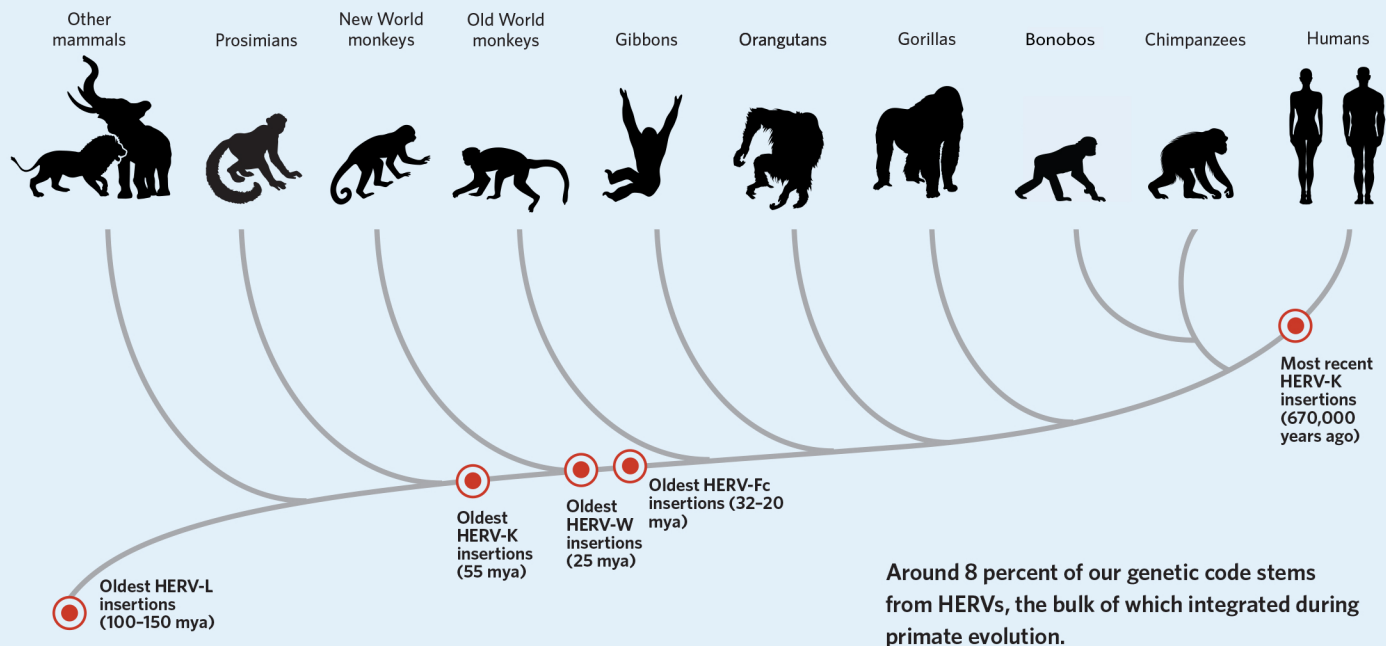


HERVS THROUGH THE AGES

Over the course of evolution, several groups of ancient viruses colonized our ancestors' genomes, leaving thousands of fragments of viral code in modern-day human DNA. The bulk of HERVs integrated during primate evolution. Subsequent mutations in these sequences have rendered older insertions nonfunctional, but some of the younger and more intact sequences from HERVs have been linked to disease.



- **HERV-K** viruses colonized the genomes of ancient primates as early as 55 million years ago (mya). Many of the youngest and most preserved elements, such as those in the HERV-K (HML-2) group, can produce viral proteins and have been linked to ALS.
- The **HERV-W** group, which invaded the genome starting around 25 mya, was first detected in multiple sclerosis patients and named MS-associated retrovirus (MSRV) for its connection to the myelin-degenerating condition.
- **HERV-Fc**, the youngest member of the HERV-F viruses, integrated into the genome more than 20 mya and has also been linked with multiple sclerosis.
- **HERV-L** elements have been detected in all placental mammals, and are thought to have integrated between 100 million and 150 mya. They represent the oldest HERVs in the human genome, are not known to produce any proteins, and so far have not been linked to disease.