Claims

1. A composition for use in treating a viral infection, comprising:

a vector comprising an origin of replication of the virus, said origin of replication is not transcribed to generate a sequence-specific targeting moiety, a sequence encoding a nuclease, and a sequence encoding a sequence-specific targeting moiety that targets the nuclease to a genome of the virus by targeting the nuclease to a viral nucleic acid within the genome of the virus to cleave the viral nucleic acid with the nuclease without interfering with the host genome within a cell.

2. The composition of claim 1, wherein the nuclease is selected from the group consisting of a zinc-finger nuclease, a transcription activator-like effector nuclease, and a meganuclease.

3. The composition of claim 1, wherein the nuclease is a Cas9 nuclease and the sequence-specific targeting moiety comprises a guide RNA.

4. The composition of claim 1, wherein the viral nucleic acid is latent in a host cell.

5. The composition of claim 1, wherein the viral nucleic acid is cleaved by creating a double-strand break in said viral nucleic acid.

6. The composition of claim 1, wherein a polynucleotide is inserted into the viral nucleic acid.

7. The composition of claim 1, wherein the viral nucleic acid is from a virus selected from the group consisting of adenovirus, herpes simplex virus, varicella-zoster virus, Epstein-Barr virus, human cytomegalovirus, human herpesvirus type 8, human papillomavirus, BK virus JC virus, and smallpox.

8. The composition of claim 1, wherein the vector is a viral vector selected from the group consisting of retrovirus, lentivirus, adenovirus, herpesvirus, poxvirus, alphavirus, vaccinia virus, and adeno-associated viruses.

9. The composition of claim 1, wherein the vector is introduced into the cell via a non-viral vector.

10. The composition of claim 9, wherein said non-viral vector is selected from the group consisting of a nanoparticle, a cationic lipid, a cationic polymer, a metallic nanoparticle, a nanorod, a liposome, microbubbles, a cell-penetrating peptide, and a liposphere.

11. The composition of claim 9, wherein the non-viral vector comprises polyethyleneglycol.

12. The composition of claim 1, wherein the vector is a plasmid.

13. The composition of claim 12, wherein the nuclease is a Cas9 nuclease and the sequence-specific targeting moiety comprises a guide RNA.

14. The composition of claim 13, wherein the viral nucleic acid is latent in a host cell.

15. The composition of claim 14, wherein the viral nucleic acid is from Epstein-Barr virus.

16. The composition of claim 15, wherein the viral nucleic acid is cleaved by creating a double-strand break in said viral nucleic acid.

17. A composition for use in treating an infection by a virus, comprising:

a plasmid that comprises an origin of replication of the virus, said origin of replication is not transcribed to generate a guide RNA, a sequence encoding a Cas9 nuclease, and a sequence encoding a guide RNA that targets a portion of a genome of the virus by targeting the Cas9 nuclease to the portion of the genome of the virus to cleave the genome of the virus with the Cas9 nuclease without interfering with the host genome within a cell.

18. The composition of claim 17, wherein copy number of the plasmid preferentially in cells infected by the virus by means of the viral origin of replication of the virus is increased.

19. The composition of claim 18, wherein the portion of the genome of the virus comprises a 20 nucleotide segment 5’ to a protospacer adjacent motif within the genome of the virus, and wherein a portion of the guide RNA is at least 60% complementary to the portion of the genome of the virus, and wherein the portion of the guide RNA has no match in a human genome.

20. The composition of claim 18, wherein the guide RNA binds to the genome of the virus within a latency-related target.