CLAIMS:

1. A recombinant poxvirus comprising heterologous nucleic acids expressing excess double-stranded RNA (dsRNA) early in infection, wherein the heterologous nucleic acids generating dsRNA comprise sequences encoding partially or completely complementary RNA transcripts, wherein the complementary portions of RNA transcripts anneal after transcription to form dsRNA and wherein the complementary portions of the RNA transcripts overlap by more than 100 nucleotides.

2. The recombinant poxvirus of claim 1, further comprising heterologous sequences encoding one or more costimulatory molecules.

3. The recombinant poxvirus of claim 2, wherein the one or more costimulatory molecules is TRICOM (B7-1, ICAM-1, and LFA-3).

4. The recombinant poxvirus of any one of claims 1 to 3, further comprising heterologous sequences encoding one or more bacterial, viral, fungal, parasite, or tumor antigens.

5. The recombinant poxvirus of any one of claims 1 to 4, wherein the poxvirus is an orthopoxvirus, a parapoxvirus, a yatapoxvirus, an avipoxvirus, a leporipoxvirus, a suipoxvirus, a capripoxvirus, a cervidpoxvirus, or a molluscipoxvirus..

6. The recombinant poxvirus of claim 5, wherein the orthopoxvirus is selected from the group consisting of vaccinia virus, cowpox virus, and monkeypox virus.

7. The recombinant poxvirus of claim 6, wherein the vaccinia virus is selected from the group consisting of vaccinia virus-Western Reserve, vaccinia virus-Copenhagen, Dryvax, vaccinia virus Lister, vaccinia virus Acambis 2000 and 3000, rabbitpox virus, buffalopox virus, modified vaccinia virus Ankara (MVA), and modified vaccinia virus Ankara-Bavarian Nordic (MVA-BN).

8. The recombinant poxvirus of claim 6, wherein the complementary RNA transcripts comprise protein-encoding open reading frames (ORFs) or non-protein-coding genes.

9. The recombinant poxvirus of any one of claims 1 to 8, wherein the complementary portions of the RNA transcripts overlap by between 100 and 1000 nucleotides, preferably between 300 and 1000 nucleotides.

10. The recombinant poxvirus of claims 1 to 8, wherein the complementary portions of the RNA transcripts overlap by more than 700 nucleotides.

11. The recombinant poxvirus of claim 8, wherein the heterologous nucleic acids encoding completely or partially complementary RNA transcripts are identical within the complementary region, or have a similarity of more than 95%, within the complementary region.

12. The recombinant poxvirus of claim 11, wherein the two identical or highly similar sequences encoding partially or completely complementary transcripts are separated by one or more essential viral genes.

13. The recombinant poxvirus of claim 12, wherein a sense messenger RNA (mRNA) is transcribed from one of the two identical or highly similar sequences and an anti-sense mRNA is transcribed from the other identical or highly similar sequence.

14. The recombinant poxvirus of claim 13, wherein sense and antisense RNAs are transcribed from both strands of the same heterologous sequence insert.

15. The recombinant poxvirus of claim 13, wherein sense and antisense RNAs are transcribed from both strands of a native poxvirus sequence, preferably an early gene, more preferably an immediate-early gene.

16. The recombinant poxviruses of any one of claims 13 to 15, wherein expression of the sequences encoding complementary RNA transcripts are each directed by poxviral promoters.

17. The recombinant poxvirus of claim 16, wherein the poxviral promoters are early promoters or immediate-early promoters.

18. An immunogenic or pharmaceutical composition comprising the recombinant poxvirus of claims 1 to 17 and a pharmaceutically acceptable carrier or excipient.

19. An in vitro method of attenuating standard replication-competent vaccinia virus strains and other species derived from the chordopoxvirinae subfamily by expression of early dsRNA as described in claims 1-17.

20. Use of the recombinant poxvirus of claims 1 to 17 for manufacturing of a pharmaceutical composition for enhancing innate immune activation in a vertebrate subject.

21. The use of claim 20 for enhancing innate immune activation in a vertebrate subject; wherein said pharmaceutical composition enhances production of type I interferons (type I IFNs), cytokines and chemokines in the subject.

22. The use of claim 21, wherein administration of the pharmaceutical composition enhances production of the cytokines IFN-α, IFN-γ, IL-6, and IL-18.

23. The use of claim 21, wherein administration of the pharmaceutical composition enhances production of the chemokines CXCL1, CCL2 and CCL5.

24. The use of claim 21, wherein administration of the pharmaceutical composition enhances production of vector-specific CD8 T cells by at least 10%, preferably by 25%, more preferably by more than 50%.

25. The recombinant poxvirus of any one of claims 1 to 17, wherein the recombinant poxvirus used for generating the recombinant poxvirus is MVA-BN or a derivative thereof.