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Generation and usage of a genetically engineered Virophage with RTase for the treatment of Ebola

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Abstract

Ebola virus is a deadly virus that causes Hemorrhagic fever and death in infected individuals. There has been no proper treatment agent for this deadly virus. This novel approach involves treatment and curing of Ebola viral infection by using a genetically engineered Virus (Virophage) that would inhibit its propagation inside the cell after its entry by competing with its expression as well as replication and by reverse transcribing the genetic material of Ebola. The main idea involves the generation of a new Virophage with RTase in it but lacking the RNA dependent RNA polymerase along with VP24 and VP30 genes such that it is replication defective and competes with the actual Ebola's RNA dependent RNA polymerase resulting in inhibition of its replication. Since the virophage is spliced with the RTase gene, the replication of the virophage's negative sense RNA using the Ebola's polymerase would cause the expression of the RTase which would non-specifically reverse transcribe all the available RNAs (both positive and negative sense ssRNA) in the cytosol resulting in the production of the complementary DNA of Ebola as well as the available virophage. Since the Ebola's polymerase is RNA dependent, it couldn't produce RNA from the reverse transcribed DNA and there is lesser possibility of the cDNA of Ebola to be integrated into the host's chromosome. This is because the filoviridae family lacks the integrase enzyme unlike the Retroviridae. As a result, the Ebola's replication as well as expression in the host is inhibited.

Experimental design

STEP1: Generation of a virophage that has its genome similar to that of the actual Ebola having RTase but lacking genes of VP24, 35 so as to elicit immunity simultaneously during the inhibition of the virus.
STEP2: *In-vitro* testing for inhibition of ebola's life cycle.
STEP3: *In-vivo* testing in rats for effective inhibition of Ebola and development of resistance to it.

Supporting Details

There has been a report of Ebola survivor, a 48 year old patient (yet Ebola RNA found after 565 days of recovery from EBV using RT PCR in the patient's semen, although no active viral particles were observed) with previous HIV infection [5].

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