been exposed to adenovirus (Id). This has been proven detrimental in a human immunodeficiency virus (HIV-1) phase IIb vaccine trial in which the vector-based vaccines provided favorable conditions for HIV-1 replication (Smaill, F. *et al.*, Sci. Transl. Med. (2013) 5: 205).

[0009] There remains a need in the art for the development of improved vaccine therapeutics.

SUMMARY

[0009a] In one aspect, the present disclosure refers to a capsid-free closed ended DNA (ceDNA) vector comprising at least one nucleic acid sequence positioned between flanking inverted terminal (ITRs), wherein the at least one nucleic acid sequence encodes an antigen, or an immunogenic peptide.

[0009b] In another aspect, the present disclosure refers to a method of expressing an antigen, or an immunogenic peptide, in a cell comprising contacting the cell with the ceDNA vector as described herein, wherein the cell is *in vitro*.

[0009c] In another aspect, the present disclosure refers to a use of the ceDNA vector as described herein in the manufacture of a medicament for expressing an antigen, or an immunogenic peptide in a cell, wherein the medicament is to be contacted with the cell.

[0009d] In another aspect, the present disclosure refers to a use of the ceDNA vector as described herein in the manufacture of a medicament for preventing or treating a bacterial, a viral, a parasitic or a fungal infection in a subject, wherein the medicament is to be administered to the subject.

[0009e] In another aspect, the present disclosure refers to a use of the ceDNA vector as described herein in the manufacture of a medicament for preventing or treating a cancer in a subject, wherein the medicament is to be administered to the subject.

[0009f] In another aspect, the present disclosure refers to a use of the ceDNA vector as described herein in the manufacture of a medicament for preventing or treating an autoimmune disease or disorder in a subject, wherein the medicament is to be administered to the subject.

[0009g] In another aspect, the present disclosure refers to a pharmaceutical composition comprising the ceDNA vector as described herein.

[0009h] In another aspect, the present disclosure refers to a vaccine composition comprising the ceDNA vector as described herein.

[0009i] In another aspect, the present disclosure refers to a composition comprising the ceDNA vector as described herein and a lipid, wherein the lipid is a lipid nanoparticle (LNP).

[0009j] In another aspect, the present disclosure refers to a kit comprising the ceDNA vector as described herein, the pharmaceutical composition as described herein or the composition as described herein.

[0009k] In another aspect, the present disclosure refers to the ceDNA vector as described herein for use in therapy.

BRIEF DESCRIPTION

[0010] The technology described herein relates to capsid-free (*e.g.*, non-viral) DNA vectors with covalently-closed ends (referred to herein as a "closed-ended DNA vector" or a "ceDNA vector"), where the ceDNA vector comprises a nucleic acid sequence that encodes an antigen, or an immunogenic peptide. The application of one or more ceDNA vectors expressing one or more nucleic acid sequences that encode one or more antigens, or immunogenic peptides, is useful to: treat, prevent or reduce the severity of a disease or disorder in a subject, be minimally invasive in delivery, be repeatable and dosed-to-effect, have rapid onset of therapeutic effect, and/or result in sustained expression of antigen, or immunogenic peptide.

[0011] Unlike traditional vaccines, which are manufactured *ex vivo* and may trigger unwanted cellular responses, the ceDNA vaccines described herein are presented to the cellular system in a more native fashion. By employing a ceDNA vector to deliver a transgene (*e.g.*, a nucleic acid sequence) encoding antigen, or immunogenic peptide to cells or tissues, the adaptive immune response is bypassed, and the desired antibody specificities are produced without the use of immunization or passive transfer. That is, the ceDNA vector enters the cell *via* endocytosis, then escapes from the endosomal compartment and is transported to the nucleus. The transcriptionally active ceDNA episome results in the expression of antigens that may then be secreted from the cell into the circulation. The ceDNA vector may therefore enable continuous, sustained and long-term delivery of antibodies (*e.g.*, the therapeutic antibodies, or antigen-binding fragments therein, described herein) administered by a single injection. This is particularly advantageous in the context of nucleic acid vaccine compositions, where DNA vaccines show a slower increase in expression and a more sustained expression as compared to mRNA vaccines which may show more increased initial expression, that decreased more quickly.

According to some aspects, the disclosure provides a capsid-free closed ended DNA (ceDNA) vector comprising at least one nucleic acid sequence between flanking inverted terminal (ITRs), wherein the at least one nucleic acid sequence encodes an antigen, or an immunogenic peptide. According to some embodiments, the antigen, or the immunogenic peptide, is derived from a bacterial, a viral, a fungal or a parasitic infectious agent. According to some embodiments, the antigen, or the immunogenic peptide, is a tumor associated antigen. According to some embodiments, the antigen, or the immunogenic peptide, is associated with an autoimmune condition. According to some embodiments of the foregoing aspects and embodiments, the antigen, or the immunogenic peptide, is selected from one or more of those set forth in Tables 1-8. According to some