impacted by IL-6 dysregulation.

SUMMARY

The present disclosure is directed to individual peptide immunogen constructs targeting Interleukin 6 (IL-6) and formulations thereof for immunotherapy of diseases impacted by IL-6 dysregulation.

These individual IL-6 peptide immunogen constructs have 30 or more amino acids in length comprising functional B cell epitopes derived from the IL-6 Receptor binding regions E42-C83 (SEQ ID NO: 16) or N144-I166 (SEQ ID NO: 19) or fragments thereof, which are linked through spacer residue(s) to heterologous T helper cell (Th) epitopes derived from pathogen proteins. These IL-6 peptide constructs, containing both designed B cell- and Th cell epitopes act together to stimulate the generation of highly specific antibodies directed against IL-6R binding region, offering therapeutic immune responses to subjects predisposed to, or suffering from, a disease impacted by IL-6 dysregulation.

In some examples, the disclosed IL-6 peptide immunogen constructs comprise a hybrid peptide having a B cell antigenic site (SEQ ID NOs: 5-20; 72-74, shown in **Table 1**) derived from the IL-6R binding region or fragments thereof, that is linked to a heterologous Th epitope derived from pathogenic proteins (SEQ ID NOs: 78-106 and 216-226, shown in **Table 2**) that act together to stimulate the generation of highly specific antibodies that are cross-reactive with the recombinant human IL-6 (SEQ ID NO: 1), or IL-6 of other species such as macaque (SEQ ID NO: 2), mouse (SEQ ID NO: 3), and rat IL-6 (SEQ ID NO: 4).

In some aspects, the present disclosure is directed to a use of a IL-6 peptide immunogen construct in the manufacture of a medicament for preventing and/or treating a disease impacted by IL-6 dysregulation in an animal, wherein the disease impacted by IL-6 dysregulation is rheumatoid arthritis, wherein the IL-6 peptide immunogen construct is selected from the group consisting of SEQ ID NOs: 107, 116, 118, 124-129, 131-145, 148, and 157.

In another aspect, the present disclosure is directed to a composition comprising a IL-6 peptide immunogen construct selected from the group consisting of SEQ ID NOs: 107, 116, 118, 124-129, 131-145, 148, and 157.

In another aspect, the present disclosure is directed to a pharmaceutical composition comprising: a IL-6 peptide immunogen construct selected from the group consisting of SEQ ID NOs: 107, 116, 118, 124-129, 131-145, 148, and 157; and a pharmaceutically acceptable delivery vehicle and/or adjuvant.

In another aspect, the present disclosure is directed to a use of the pharmaceutical composition according to the disclosure in the manufacture of a medicament for preventing and/or treating a disease impacted by IL-6 dysregulation in an animal, wherein the disease impacted by IL-6 dysregulation is rheumatoid arthritis.

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CLAIMS

1. Use of a IL-6 peptide immunogen construct in the manufacture of a medicament for preventing and/or treating a disease impacted by IL-6 dysregulation in an animal, wherein the disease impacted by IL-6 dysregulation is rheumatoid arthritis, wherein the IL-6 peptide immunogen construct is selected from the group consisting of SEQ ID NOs: 107, 116, 118, 124-129, 131-145, 148, and 157.

2. A composition comprising a IL-6 peptide immunogen construct selected from the group consisting of SEQ ID NOs: 107, 116, 118, 124-129, 131-145, 148, and 157.

3. A pharmaceutical composition comprising:

   a. a IL-6 peptide immunogen construct selected from the group consisting of SEQ ID NOs: 107, 116, 118, 124-129, 131-145, 148, and 157; and
   b. a pharmaceutically acceptable delivery vehicle and/or adjuvant.

4. The pharmaceutical composition of claim 3, wherein

   the IL-6 peptide immunogen construct is mixed with an CpG oligodeoxynucleotide (ODN) to form a stabilized immunostimulatory complex.

5. Use of the pharmaceutical composition according to claim 3 in the manufacture of a medicament for preventing and/or treating a disease impacted by IL-6 dysregulation in an animal, wherein the disease impacted by IL-6 dysregulation is rheumatoid arthritis.