CLAIMS

1. An immunogenic product comprising at least one cytokine conjugated with a carrier protein, wherein the at least one cytokine is ~~selected from the group comprising IL-4, IL-13 and mixtures~~or a fragment thereof, and wherein the carrier protein is CRM_{197}.

~~2. The immunogenic product according to claim 1, wherein the at least one cytokine is IL-4.~~

~~3. The immunogenic product according to claim 1 or claim 2, wherein the at least one cytokine is IL-13.~~

4.2. The immunogenic product according to ~~any one of~~ claims ~~1 to 3~~, wherein the immunogenic product further ~~comprising~~ comprises ~~CRM_{197} coupled with both~~ IL-4 ~~and IL-13~~.

5.3. A composition comprising at least one immunogenic product according to ~~any one of~~ claims ~~1 to 4~~or 2.

~~6. The composition according to claim 5, comprising a mixture of at least two immunogenic products according to any one of claims 1 to 4.~~

7.4. The composition according to claim ~~5 or claim 6~~3, comprising a mixture of an immunogenic product comprising IL-4 and CRM_{197} with an immunogenic product comprising IL-13 and CRM_{197}.

8.5. The composition according to ~~any one of~~ claims ~~5 3 to~~ or ~~7~~4, comprising a mixture of an immunogenic product comprising IL-4 and CRM_{197} with an immunogenic product comprising IL-13 and CRM_{197} at a weight ratio ranging from ~~about~~ 10:1 to ~~about~~ 1:10.

9.6. The composition according to any one of claims ~~5~~ 3 to ~~8~~5, further comprising at least one pharmaceutically acceptable excipient and/or at least one adjuvant.

~~10.~~7. The composition according to any one of claims ~~5~~ 3 to ~~9~~6, being an emulsion.

~~11.~~8. A method for producing an immunogenic product according to ~~any one of~~ claims~~s~~ 1 ~~to~~ or 42, the method comprising steps of:

a) contacting the ~~at least one cytokine~~IL-13 or fragment thereof with a heterobifunctional crosslinker containing a NHS-ester, preferably N-[γ-maleimidobutyryloxy]-succinimide ester (sGMBS);

b) contacting the CRM_{197}~~carrier protein~~ with a heterobifunctional crosslinker containing a NHS-ester, preferably N-succinimidyl-S-acetylthioacetate (SATA), to generate a CRM_{197}-NHS-ester ~~carrier-heterobifunctional crosslinker~~ complex;

c) contacting the heterobifunctional crosslinker containing NHS-ester-cytokine ~~sGMBS-cytokine~~ complex obtained at step (a) with the CRM_{197}-NHS-ester ~~carrier-heterobifunctional crosslinker~~ complex obtained at step (b).

9. The method according to claim 7, comprising steps of:

a) contacting IL-13 or a fragment thereof with N-[γ-maleimidobutyryloxy]-succinimide ester (sGMBS);

b) contacting CRM_{197} with a N-succinimidyl-S-acetylthioacetate (SATA) to generate a CRM_{197}-SATA-ester complex;

c) contacting the sGMBS – cytokine complex obtained at step (a) with the CRM_{197}-SATA-ester complex obtained at step (b).

~~c)~~

~~12.~~10. Use of an immunogenic product according to ~~any one of~~ claims~~s~~ 1 ~~to~~ or ~~4~~ 2, or a composition according to any one of claims ~~5~~ 3 to ~~10~~7, ~~for~~ in the manufacture of a medicament for treating an inflammatory disorder, ~~preferably~~ wherein said disorder is associated with aberrant IL-4 and/or IL-13 expression or activity.

~~13.~~11. The use according to claim ~~12~~10, wherein the inflammatory disorder is selected from the group comprising asthma (either allergic or non-allergic), allergic conditions (such as, for example, food allergies, venom allergy, allergy to animals, drug allergy, hyper IgE syndrome, allergic rhinitis, allergic conjunctivitis and

allergic enterogastritis), atopic disorders (such as, for example, atopic dermatitis, urticaria (including chronic idiopathic urticaria and chronic spontaneous urticaria), eczema), bullous pemphigoid, respiratory disorders (such as allergic and nonallergic asthma, chronic obstructive pulmonary disease (COPD)), nasal polyposis and other conditions involving airway inflammation (such as, for example, eosinophilia, fibrosis and excess mucus production including cystic fibrosis and pulmonary fibrosis, systemic sclerosis (SSc)); inflammatory and/or autoimmune disorders or conditions, gastrointestinal disorders or conditions (such as, for example, inflammatory bowel diseases (IBD) and eosinophilic esophagitis (EE), and eosinophilic-mediated gastrointestinal disease, ulcerative colitis and Crohn's disease); systemic lupus erythematosus, liver disorders or conditions (such as, for example, cirrhosis, and hepatocellular carcinoma), scleroderma; fibrotic diseases or disorders (such as, for example, fibrosis of the liver (such as, for example, fibrosis caused by a hepatitis B and/or C virus)), scleroderma; solid tumors or cancers such as leukemia (such as, for example, B cell chronic lymphocytic leukaemia), glioblastoma, lymphoma (such as, for example, Hodgkin's lymphoma) and mastocytosis.

~~14.~~12. The use according to ~~any one of~~ claims ~~12~~ 10 ~~to~~ or ~~13~~11, wherein the inflammatory disorder is selected from asthma (e.g., allergic asthma), atopic dermatitis, chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, food allergy, nasal polyposis and eosinophilic esophagitis, preferably wherein said inflammatory disorder is allergy, asthma, or atopic dermatitis.

~~15.~~13. The use according to any one of claims ~~12~~ 10 to ~~13~~12, wherein the ~~immunogenic~~ medicament is for administration to ~~product or the composition~~ induces~~s~~ desensitization toward an allergen.

~~16.~~14. Use of an immunogenic product according to ~~any one of~~ claims 1 ~~to~~ or ~~4~~ 2, or a composition according to any one of claims ~~5~~ 3 to ~~10~~ 7 ~~for~~ in the manufacture of a medicament for inducing desensitization of a subject allergic to a specific antigen, wherein said ~~immunogenic product or composition~~medicament and said specific antigen are to be administered to the allergic subject.