

What is claimed is:

1. A method of treating birch allergy in a subject, the method comprising administering to the subject a pharmaceutical composition comprising:

(a) a first anti-Bet v 1 antibody or antigen-binding fragment thereof, wherein the first anti-Bet v 1 antibody comprises a heavy chain complementarity determining region (HCDR) 1 comprising the amino acid sequence of SEQ ID NO:2, an HCDR2 comprising the amino acid sequence of SEQ ID NO:3, an HCDR3 comprising the amino acid sequence of SEQ ID NO:4, a light chain complementarity determining region (LCDR) 1 comprising the amino acid sequence of SEQ ID NO:6, an LCDR2 comprising the amino acid sequence of SEQ ID NO:7, and an LCDR3 comprising the amino acid sequence of SEQ ID NO:8; and/or

(b) a second anti-Bet v 1 antibody or antigen-binding fragment thereof, wherein the second anti-Bet v 1 antibody comprises an HCDR1 comprising the amino acid sequence of SEQ ID NO:12, an HCDR2 comprising the amino acid sequence of SEQ ID NO:13, an HCDR3 comprising the amino acid sequence of SEQ ID NO:14, an LCDR1 comprising the amino acid sequence of SEQ ID NO:16, an LCDR2 comprising the amino acid sequence of SEQ ID NO:17, and an LCDR3 comprising the amino acid sequence of SEQ ID NO:18; and/or

(c) a third anti-Bet v 1 antibody or antigen-binding fragment thereof, wherein the third anti-Bet v 1 antibody comprises an HCDR1 comprising the amino acid sequence of SEQ ID NO:22, an HCDR2 comprising the amino acid sequence of SEQ ID NO:23, an HCDR3 comprising the amino acid sequence of SEQ ID NO:24, an LCDR1 comprising the amino acid sequence of SEQ ID NO:26, an LCDR2 comprising the amino acid sequence of SEQ ID NO:27, and an LCDR3 comprising the amino acid sequence of SEQ ID NO:28.

2. The method of claim 1, wherein the pharmaceutical composition comprises the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody.

3. The method of claim 2, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 5 mg to about 500 mg.

4. The method of claim 3, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 50 mg.

5. The method of claim 3, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 150 mg.

6. The method of claim 3, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 300 mg.

7. The method of any one of claims 1 to 6, wherein the pharmaceutical composition is administered subcutaneously.

8. The method of any one of claims 1 to 6, wherein the pharmaceutical composition is administered intravenously.

9. The method of any one of claims 1 to 8, wherein a single dose of the pharmaceutical composition is administered prior to the start of birch pollen season.

10. The method of any one of claims 1 to 9, wherein the first anti-Bet v 1 antibody comprises a heavy chain variable region (HCVR) comprising the amino acid sequence of SEQ ID NO:1 and a light chain variable region (LCVR) comprising the amino acid sequence of SEQ ID NO:5.

11. The method of claim 10, wherein the first anti-Bet v 1 antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:9 and a light chain comprising the amino acid sequence of SEQ ID NO:10.

12. The method of any one of claims 1 to 9, wherein the second anti-Bet v 1 antibody comprises an HCVR comprising the amino acid sequence of SEQ ID NO:11 and an LCVR comprising the amino acid sequence of SEQ ID NO:15.

13. The method of claim 12, wherein the second anti-Bet v 1 antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:19 and a light chain comprising the amino acid sequence of SEQ ID NO:20.

14. The method of any one of claims 1 to 9, wherein the third anti-Bet v 1 antibody comprises an HCVR comprising the amino acid sequence of SEQ ID NO:21 and an LCVR comprising the amino acid sequence of SEQ ID NO:25.

15. The method of claim 14, wherein the third anti-Bet v 1 antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:29 and a light chain comprising the amino acid sequence of SEQ ID NO:30.

16. The method of any one of claims 1 to 15, wherein treatment with the pharmaceutical composition:

reduces a subject's Total Nasal Symptom Score (TNSS);

reduces a subject's Total Ocular Symptom Score (TOSS);

reduces a subject's Total Symptom Score (TSS);

reduces a subject's Daily Medication Score (DMS);

reduces a subject's Combined Symptom and Medication Score (CSMS);

reduces a subject's birch skin prick test (SPT) mean wheal diameter; and/or

increases a subject's number of well days in which rescue medication is not utilized and the subject's TSS is ≤ 2 of 18.

17. The method of claim 16, wherein treatment with the pharmaceutical composition reduces a subject's TNSS, TOSS, TSS, DMS, and/or CSMS for the duration of birch pollen season.

18. The method of any one of claims 1 to 17, wherein treatment with the pharmaceutical composition reduces allergic rhinitis symptoms in the subject.

19. The method of claim 18, wherein treatment with the pharmaceutical composition:

reduces a subject's Total Nasal Symptom Score (TNSS) AUC (0-1 hr) after nasal allergen challenge (NAC) by at least about 20%, relative to a baseline TNSS AUC (0-1 hr) value after NAC for the subject prior to the onset of treatment; and/or

reduces a subject's peak TNSS after NAC by at least about 25%, relative to a baseline peak TNSS value after NAC for the subject prior to the onset of treatment.

20. The method of claim 19, wherein administration of a single dose of the pharmaceutical composition:

reduces a subject's TNSS AUC (0-1 hr) after NAC by at least about 20% for at least two months after the pharmaceutical composition is administered; and/or

reduces a subject's peak TNSS after NAC by at least about 25% for at least two months after the pharmaceutical composition is administered.

21. The method of any one of claims 1 to 20, wherein treatment with the pharmaceutical composition reduces allergic conjunctivitis symptoms in the subject.

22. The method of claim 21, wherein treatment with the pharmaceutical composition reduces a subject's TOSS AUC (0-1 hr) after NAC, relative to a baseline TOSS AUC (0-1 hr) value after NAC for the subject prior to the onset of treatment.

23. The method of any one of claims 1 to 22, wherein treatment with the pharmaceutical composition improves peak nasal inspiratory flow (PNIF) in the subject by at least about 30%, relative to a baseline PNIF value for the subject prior to the onset of treatment.

24. The method of any one of claims 1 to 23, wherein treatment with the pharmaceutical composition reduces birch sensitization in the subject by at least about 50% as measured by a skin prick test (SPT) with a birch allergen extract.

25. The method of claim 24, wherein administration of a single dose of the pharmaceutical composition reduces birch sensitization in the subject by at least about 60% for at least two months after the pharmaceutical composition is administered.

26. The method of any one of claims 1 to 25, wherein the subject to be treated has a baseline serum allergen-specific IgE level ≥ 0.35 kUa/L for birch tree pollen and/or Bet v 1 allergen.

27. The method of any one of claims 1 to 26, wherein the subject to be treated has a baseline positive SPT with a birch allergen extract.

28. A method of reducing one or more symptoms of an allergic reaction to a Fagales allergen in a subject, the method comprising administering to the subject a pharmaceutical composition comprising:

(a) a first anti-Bet v 1 antibody or antigen-binding fragment thereof, wherein the first anti-Bet v 1 antibody comprises a heavy chain complementarity determining region (HCDR) 1 comprising the amino acid sequence of SEQ ID NO:2, an HCDR2 comprising the amino acid sequence of SEQ ID NO:3, an HCDR3 comprising the amino acid sequence of SEQ ID NO:4, a light chain complementarity determining region (LCDR) 1 comprising the amino acid sequence of SEQ ID NO:6, an LCDR2 comprising the amino acid sequence of SEQ ID NO:7, and an LCDR3 comprising the amino acid sequence of SEQ ID NO:8; and/or

(b) a second anti-Bet v 1 antibody or antigen-binding fragment thereof, wherein the second anti-Bet v 1 antibody comprises an HCDR1 comprising the amino acid sequence of SEQ ID NO:12, an HCDR2 comprising the amino acid sequence of SEQ ID NO:13, an HCDR3 comprising the amino acid sequence of SEQ ID NO:14, an LCDR1 comprising the amino acid sequence of SEQ ID NO:16, an LCDR2 comprising the amino acid sequence of SEQ ID NO:17, and an LCDR3 comprising the amino acid sequence of SEQ ID NO:18; and/or

(c) a third anti-Bet v 1 antibody or antigen-binding fragment thereof, wherein the third anti-Bet v 1 antibody comprises an HCDR1 comprising the amino acid sequence of SEQ ID NO:22, an HCDR2 comprising the amino acid sequence of SEQ ID NO:23, an HCDR3 comprising the amino acid sequence of SEQ ID NO:24, an LCDR1 comprising the amino acid sequence of SEQ ID NO:26, an LCDR2 comprising the amino acid sequence of SEQ ID NO:27, and an LCDR3 comprising the amino acid sequence of SEQ ID NO:28.

29. The method of claim 28, wherein the Fagales allergen is Bet v 1.

30. The method of claim 28 or 29, wherein the subject is sensitized to Bet v 1 and to at least one other Fagales allergen.

31. The method of any one of claims 28 to 30, wherein the pharmaceutical composition comprises the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody.

32. The method of claim 31, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 5 mg to about 500 mg.

33. The method of claim 32, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 50 mg.

34. The method of claim 32, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 150 mg.

35. The method of claim 32, wherein the pharmaceutical composition comprises each of the first anti-Bet v 1 antibody, the second anti-Bet v 1 antibody, and the third anti-Bet v 1 antibody at a dose of about 300 mg.

36. The method of any one of claims 28 to 35, wherein the pharmaceutical composition is administered subcutaneously.

37. The method of any one of claims 28 to 35, wherein the pharmaceutical composition is administered intravenously.

38. The method of any one of claims 28 to 37, wherein the first anti-Bet v 1 antibody comprises a heavy chain variable region (HCVR) comprising the amino acid sequence of SEQ ID NO:1 and a light chain variable region (LCVR) comprising the amino acid sequence of SEQ ID NO:5.

39. The method of claim 38, wherein the first anti-Bet v 1 antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:9 and a light chain comprising the amino acid sequence of SEQ ID NO:10.

40. The method of any one of claims 28 to 37, wherein the second anti-Bet v 1 antibody comprises an HCVR comprising the amino acid sequence of SEQ ID NO:11 and an LCVR comprising the amino acid sequence of SEQ ID NO:15.

41. The method of claim 40, wherein the second anti-Bet v 1 antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:19 and a light chain comprising the amino acid sequence of SEQ ID NO:20.

42. The method of any one of claims 28 to 37, wherein the third anti-Bet v 1 antibody comprises an HCVR comprising the amino acid sequence of SEQ ID NO:21 and an LCVR comprising the amino acid sequence of SEQ ID NO:25.

43. The method of claim 42, wherein the third anti-Bet v 1 antibody comprises a heavy chain comprising the amino acid sequence of SEQ ID NO:29 and a light chain comprising the amino acid sequence of SEQ ID NO:30.

44. The method of any one of claims 28 to 43, wherein treatment with the pharmaceutical composition reduces allergic rhinitis symptoms in the subject.

45. The method of any one of claims 28 to 44, wherein treatment with the pharmaceutical composition reduces allergic conjunctivitis symptoms in the subject.

46. The method of any one of claims 28 to 45, wherein treatment with the pharmaceutical composition reduces sensitization to the Fagales allergen in the subject.

47. The method of any one of claims 28 to 46, wherein the subject to be treated has a baseline serum allergen-specific IgE level ≥ 0.35 kUa/L for the Fagales allergen.

48. The method of any one of claims 28 to 47, wherein the subject to be treated has a baseline positive SPT to the Fagales allergen.