

WHAT IS CLAIMED IS:

1. A method for treating symptoms of autism spectrum disorder (ASD) in a human child, comprising introducing into the child's gastrointestinal tract an effective amount of one or more of the bacterial species of *Faecalibacterium prausnitzii*, *Roseburia inulinivorans*, *Eubacterium hallii*, *Dorea longicatena*, or *Eubacterium siraeum*.
2. The method of claim 1, wherein the introducing step comprises oral administration to the subject a composition comprising an effective amount of the one or more of the bacterial species.
3. The method of claim 1, wherein the introducing step comprises delivery to the small intestine, ileum, or large intestine of the subject a composition comprising an effective amount of the one or more of the bacterial species.
4. The method of claim 1, wherein the introducing step comprises fecal microbiota transplantation (FMT).
5. The method of claim 4, wherein the FMT comprises administration to the child a composition comprising processed donor fecal material.
6. The method of claim 2, wherein the composition is orally administered.
7. The method of claim 2, wherein the composition is directly deposited to the child's gastrointestinal tract.
8. The method of claim 1, wherein the level or relative abundance of the one or more of the bacterial species is determined in a first stool sample obtained from the child prior to the introducing step and in a second stool sample obtained from the child after the introducing step.
9. The method of claim 8, wherein the level of the one or more of the bacterial species is determined by quantitative polymerase chain reaction (PCR).
10. A method for treating symptoms of autism spectrum disorder (ASD) in a human child, comprising reducing the level or relative abundance of one or more of the bacterial species of *Clostridium nexile*, *Dialister invisus*, *Clostridium bolteae*, *Clostridium*

sybiosum, *Eubacterium limosum*, *Clostridiales bacterium_1_7_47FAA*, *Clostridium ramosum*, *Anaerotruncus colihominis*, *Clostridium citroniae*, or *Alistipes indistinctus* in the child's gastrointestinal tract.

11. The method of claim 10, wherein the reducing step comprising FMT.
12. The method of claim 10, wherein the reducing step comprises treating the subject with an anti-bacterial agent.
13. The method of claim 12, wherein a composition comprising processed donor fecal material is introduced to the gastrointestinal tract of the subject after the subject is treated with the anti-bacterial agent.
14. The method of claim 13, wherein the composition is orally administered.
15. The method of claim 13, wherein the composition is directly deposited to the gastrointestinal tract of the child.
16. The method of claim 10, wherein the level or relative abundance of the one or more of the bacterial species is determined in a first stool sample obtained from the child prior to the reducing step and in a second stool sample obtained from the child after the reducing step.
17. The method of claim 16, wherein the level of the one or more bacterial species is determined by quantitative polymerase chain reaction (PCR).
18. A kit for treating symptoms of ASD, comprising: a first container containing a first composition comprising (i) an effective amount of one of the bacterial species set forth in Table 1, or (ii) an effective amount of an anti-bacterial agent that suppresses growth of one of the bacterial species set forth in Table 2, and a second container containing a second composition comprising (i) an effective amount of another one of the bacterial species set forth in Table 1, or (ii) an effective amount of an anti-bacterial agent that suppresses growth of another one of the bacterial species set forth in Table 2.
19. The kit of claim 18, wherein the first composition comprises processed donor fecal material for FMT.

20. The kit of claim **18** or **19**, wherein the first composition is formulated for oral administration.

21. The kit of claim **18**, wherein the second composition is formulated for oral administration.

22. The kit of claim **19**, wherein both the first and second compositions are formulated for oral ingestion.

23. A method for determining risk for autism spectrum disorder (ASD) in a human child, comprising:

(1) determining, in a stool sample from the child, the relative abundance of any one of the bacterial species set forth in Table 1 or 2; and

(2) detecting the relative abundance from step (1) being no lower than the cutoff value in Table 1 or a standard control value or being lower than the cutoff value or a standard control value in Table 2 and determining the child as not having increased risk for ASD; or detecting the relative abundance from step (1) being lower than the cutoff value in Table 1 or a standard control value or being no lower than the cutoff value in Table 2 or a standard control value and determining the child as having an increased risk for ASD.

24. A method for assessing risk for autism spectrum disorder (ASD) in two human children, comprising:

(1) determining, in a stool sample from each of the two children, the relative abundance of any one of the bacterial species set forth in Table 1 or 2;

(2) determining the relative abundance of a bacterial species set forth in Table 1 from step (1) being higher in the stool sample from the first child or the relative abundance of a bacterial species set forth in Table 2 from step (1) being lower in the stool sample from the first child; and

(3) determining the second child as having a higher risk for ASD than the first child.

25. A method for determining risk for autism spectrum disorder (ASD) in a human child, comprising:

(1) obtaining in a stool sample from the child a value of (a) the relative abundance of *Alistipes indistinctus* (Ai) or *Anaerotruncus colihominis* (Ac), or (b) the combined score of levels of three bacterial species Ai, Ac, and *Eubacterium hallii* (Eh), which is calculated by $I1 + \beta1 * Ai + \beta2 * Eh + \beta3 * Ac$; and

(2) detecting the value to be higher than a standard control value and determining the individual as having increased risk of ASD.

26. A method for determining risk for autism spectrum disorder (ASD) in a human child, comprising:

(1) obtaining in a stool sample from the child a value of the relative abundance of *Eubacterium hallii* (Eh); and

(2) detecting the value to be lower than a standard control value and determining the individual as having increased risk of ASD.

27. The method of any one of claims **23-26**, wherein the relative abundance of the bacterial species is determined by quantitative PCR.

28. A method for assessing risk for autism spectrum disorder (ASD) in a human child, comprising:

(1) determining, in a stool sample from the child, the level or relative abundance of one or more of the bacterial species set forth in Table 3;

(2) determining the level or relative abundance of the same bacterial species in a stool sample from a reference cohort comprising normal and ASD children;

(3) generating decision trees by random forest model using data obtained from step (2) and running the level or relative abundance of one or more of the bacterial species from step (1) down the decision trees to generate a risk score; and

(4) determining the child with a risk score greater than 0.5 as having an increased risk for ASD and determining the child with a risk score no greater than 0.5 as having no increased risk for ASD.

29. The method of claim **28**, wherein the one or more bacterial species comprise *Alistipes indistinctus*.

30. The method of claim **28**, wherein the one or more bacterial species comprise *Alistipes indistinctus*, *candidate division TM7 single-cell isolate TM7c*, and *Streptococcus cristatus*.

31. The method of claim **28**, wherein the one or more bacterial species comprise *Alistipes indistinctus*, *candidate division TM7 single-cell isolate TM7c*, *Streptococcus cristatus*, *Eubacterium limosum*, and *Streptococcus oligofermentans*.

32. A kit for assessing risk for autism spectrum disorder (ASD), comprising reagents for detecting one or more of the bacterial species set forth in Table 1, 2, or 3.

33. The kit of claim **32**, wherein the reagents comprise a set of oligonucleotide primers for amplification of a polynucleotide sequence from any one of the bacterial species set forth in Table 1, 2, or 3.

34. The kit of claim **33**, wherein the amplification is PCR, preferably quantitative PCR.

35. A method for determining developmental age of a child, comprising the steps of:

- (a) quantitatively determining the relative abundance of one or more bacterial species selected from Table 8 or 9 in a stool sample taken from the child;
- (b) quantitatively determining the relative abundance of the one or more bacterial species in a stool sample taken from a reference cohort consisting of typically developing children;
- (c) generating decision trees by random forest model using data obtained from step (b); and
- (d) running the relative abundances obtained from step (a) down the decision trees from step (b) to generate a developmental age for the child.

36. The method of claim **35**, wherein the one or more bacterial species comprise *Streptococcus gordonii*, *Enterococcus avium*, *Eubacterium_sp_3_1_31*, *Clostridium hathewayi*, and *Corynebacterium durum*.

37. The method of claim 35, wherein the one or more bacterial species comprise *Streptococcus gordonii*, *Enterococcus avium*, *Eubacterium_sp_3_1_31*, and *Clostridium hathewayi*.

38. The method of claim 35, wherein the one or more bacterial species comprise *Streptococcus gordonii*, *Enterococcus avium*, and *Eubacterium_sp_3_1_31*.

39. The method of claim 35, wherein the one or more bacterial species comprise *Streptococcus gordonii* and *Enterococcus avium*.

40. The method of claim 35, wherein the one or more bacterial species comprise *Streptococcus gordonii*.

41. The method of claim 35, wherein the child is between about 3 to about 6 years old.

42. A kit for determining developmental age of a child, comprising: a first container containing a first reagent for detecting a first bacterial species set forth in Table 8 or 9, and a second container containing a second reagent for detecting a second bacterial species set forth in Table 8 or 9.

43. The kit of claim 42, comprising three or more containers each of which containing a reagent for detecting a different bacterial species set forth in Table 8 or 9.

44. The kit of claim 42, comprising two or more containers each of which containing a reagent for detecting a different bacterial species selected from the group consisting of (1) *Streptococcus gordonii*, *Enterococcus avium*, *Eubacterium_sp_3_1_31*, *Clostridium hathewayi*, and *Corynebacterium durum*; (2) *Streptococcus gordonii*, *Enterococcus avium*, *Eubacterium_sp_3_1_31*, and *Clostridium hathewayi*; (3) *Streptococcus gordonii*, *Enterococcus avium*, and *Eubacterium_sp_3_1_31*; or (4) *Streptococcus gordonii* and *Enterococcus avium*.

45. The kit of claim 42, wherein the reagents comprise a set of oligonucleotide primers for amplification of a polynucleotide sequence from any one of the bacterial species set forth in Table 8 or 9.

46. The kit of claim 45, wherein the amplification is PCR.

- 47.** The kit of claim **46**, wherein the PCR is quantitative PCR (qPCR).
- 48.** A method for promoting growth and development of a child, comprising administering to the child an effective amount of one or more bacterial species selected from Table 8.
- 49.** The method of claim **48**, wherein the child is between about 3 to about 6 years old.
- 50.** A kit for promoting growth and development of a child, comprising: a first container containing a first composition comprising (i) an effective amount of one of the bacterial species set forth in Table 8, and a second container containing a second composition comprising (i) an effective amount of another one of the bacterial species set forth in Table 8.
- 51.** The kit of claim **50**, wherein the first or second composition comprises processed donor fecal material for FMT.
- 52.** The kit of claim **50** or **51**, wherein the first composition is formulated for oral administration.
- 53.** The kit of claim **50** or **51**, wherein the second composition is formulated for oral administration.
- 54.** The kit of claim **51**, wherein both the first and second compositions are formulated for oral ingestion.