Accordingly, in a further example is provided a method of treating or preventing Parkinson's Disease in a subject, the method comprising administering to the subject a liquid, non-dairy probiotic preparation comprising a population of lactic acid bacteria. In one aspect is provided a use of a liquid, non-dairy probiotic preparation comprising a population of lactic acid bacteria in the manufacture of a medicament for treating or preventing Parkinson's Disease in a subject, wherein the population of lactic acid bacteria comprises each of *Lactobacillus rhamnosus, Lactobacillus acidophilus, Lactobacillus plantarum* and *Enterococcus faecium* bacteria, and wherein the medicament is to be administered to the subject. In certain examples, administration of the probiotic preparation improves in the subject one or more of: motor symptoms, non-motor symptoms, systemic inflammatory markers. In certain examples, administration of the probiotic preparation improves non-motor symptoms in the subject, for example improves gastrointestinal non-motor symptoms in the subject. In certain examples, administration of the probiotic preparation slows or prevents the onset of Parkinson's Disease symptoms such as motor symptoms.

In certain preferred examples the subject is in a state of gastrointestinal dysbiosis. In certain preferred examples the subject is exhibiting an elevated level of *Firmicutes* in their gut microbiota compared to healthy controls. In certain preferred examples the subject is exhibiting a reduced level of *Bacteroidetes* in their gut microbiota compared to healthy controls.

In certain preferred examples of all examples, the population of lactic acid bacteria comprises at least one of *Lactobacillus rhamnosus*, *Lactobacillus acidophilus, Lactobacillus plantarum* and *Enterococcus faecium* bacteria. In certain examples, the population of lactic acid bacteria comprises at least two or at least three of *Lactobacillus rhamnosus*, *Lactobacillus acidophilus, Lactobacillus plantarum* and *Enterococcus faecium* bacteria.

In certain examples, the population of lactic acid bacteria comprises *Lactobacillus rhamnosus*, *Lactobacillus acidophilus,* and *Lactobacillus plantarum* bacteria.

In certain preferred examples, the population of lactic acid bacteria comprises each of *Lactobacillus rhamnosus*, *Lactobacillus acidophilus, Lactobacillus plantarum* and *Enterococcus faecium* bacteria.

CLAIMS:

1. Use of a liquid, non-dairy probiotic preparation comprising a population of lactic acid bacteria in the manufacture of a medicament for treating or preventing Parkinson's Disease in a subject, wherein the population of lactic acid bacteria comprises each of *Lactobacillus rhamnosus, Lactobacillus acidophilus, Lactobacillus plantarum* and *Enterococcus faecium* bacteria, and wherein the medicament is to be administered to the subject.

2. The use according to claim 1, wherein administration of the probiotic preparation improves in the subject one or more of: motor symptoms, non-motor symptoms, systemic inflammatory markers.

3. The use according to claim 1 or claim 2, wherein administration of the probiotic preparation improves non-motor symptoms in the subject, optionally improves gastrointestinal non-motor symptoms in the subject.

4. The use according to any one of claims 1-3, wherein administration of the probiotic preparation improves intestinal barrier integrity.

5. The use according to any one of claims 1-4, wherein administration of the probiotic preparation improves intestinal barrier repair.

6. The use according to any one of claims 1-5, wherein administration of the probiotic preparation promotes a tolerogenic gut phenotype in the subject.

7. The use according to any one of claims 1-5 wherein administration of the probiotic preparation treats or prevents Parkinson's Disease in the subject by reducing the severity or slowing the progression of motor symptoms or by slowing or preventing the onset of motor symptoms.

8. The use according to any one of claims 1-6 wherein the subject is in a state of gastrointestinal dysbiosis, optionally wherein the subject is exhibiting an elevated level of *Firmicutes* and/or a reduced level of *Bacteroidetes* in their gut microbiota compared to healthy controls.

9. The use according to any one of the preceding claims, wherein the use promotes production of one or more anti-inflammatory molecules by intestinal epithelial cells, optionally wherein the one or more anti-inflammatory molecules are selected from IL-6 and IL-10.

10. The use according to any one of the preceding claims, wherein the use reduces production of one or more pro-inflammatory molecules by intestinal epithelial cells, optionally wherein the one or more pro-inflammatory molecules are selected from CXCL-10, TNFa, IL-8 and MCP-1.

11. The use according to any one of claims 4-10, wherein the use promotes production of one or more SCFAs.

12. The use according to any one of claims 4-11, wherein the use promotes production of one or more of acetate, propionate or butyrate, preferably butyrate.

13. The use according to any one of the preceding claims wherein the use reduces production of one or more branched chain fatty acids (BCFA) and/or ammonium by the subject's gut microbiota.

14. The use according to claim 13 wherein the one or more BCFAs is selected from isobutyrate, isovalerate and 2-methylbutyrate.

15. The use according to any one of the preceding claims wherein the medicament is to be administered to the subject at least once a week, preferably once a day.

16. The use according to any one of the preceding claims wherein the medicament is to be administered to the subject for a period of at least 1 month, at least 2 months or at least 3 months.