

Claims

1. A method for reducing the population of at least one intestinal and/or gastrointestinal species of bacteria, the method comprising the following steps:
 - 5 a) providing a biological sample containing bacteria of at least one intestinal and/or gastrointestinal species of bacteria, the intestinal and/or gastrointestinal species of bacteria directly or indirectly influencing a psychological, neurodegenerative and/or neurological illness and/or disorder of a host organism; and
 - 10 b) providing bacteriophages of at least one species of bacteriophages that are specific to the intestinal and/or gastrointestinal species of bacteria and that comprise at least one nucleic acid functionally associated with a promotor and/or a regulatory element, the nucleic acid being selected from the group comprising:
 - 15 i. a nucleic acid sequence coding for at least one antibacterial nucleic acid molecule; and
 - ii. a nucleic acid sequence encoding a nucleic acid molecule that is identical to the nucleic acid molecule encoded by the nucleic acid sequences from i) by at least 50 %; and
 - 20 iii. a nucleic acid sequence coding for at least one antibacterial polypeptide; and
 - iv. a nucleic acid sequence encoding a polypeptide that is identical to the polypeptide encoded by the nucleic acid sequences from iii) by at least 50 %; and
 - 25 v. a nucleic acid sequence for a fragment of a nucleic acid from i), ii), iii) or iv), the fragment encoding a nucleic acid molecule or a polypeptide; and
 - 30 c) contacting and incubating the biological sample with the bacteriophages, the incubation continuing until the population of

the intestinal and/or gastrointestinal species of bacteria has been reduced by at least 70 %.

2. The method according to claim 1, wherein step c) is followed by an evaluation of the reduction of the population of the intestinal and/or gastrointestinal species of bacteria.
3. The method according to claim 1 or 2, wherein the nucleic acid has two or more promoters and/or regulatory elements and/or wherein the nucleic acid encodes nucleic acid sequences for two or more nucleic acid molecules, polypeptides and/or fragments thereof.
4. The method according to any one of claims 1 to 3, wherein the intestinal and/or gastrointestinal species of bacteria is anaerobic and/or aerobic and wherein the species of bacteria belongs to *Acidaminococcaceae*, *Actinobacteria*, *Actinomycineae*, *Alistipes*, *Bacteroides*, *Bacteroidetes*, *Bifidobacterium*, *Clostridium*, *Coprococcus*, *Coriobacterium*, *Desulfovibrio*, *Enterobacterium*, *Enterococcus*, *Escherichia*, *Erysipelotrichia*, *Firmicutes*, *Fusobacterium*, *Lactobacillus*, *Lachnospiraceae*, *Paraprevotella*, *Porphyromonadaceae*, *Prevotella*, *Propionibacterium*, *Proteobacteria*, *Rikenellaceae*, *Ruminococcus*, *Streptococcus*, *Thermoanaerobacteria* or *Veillonella*.
5. The method according to any one of claims 1 to 4, wherein the psychological, neurodegenerative and/or neurological illness and/or disorder is an affective disorder, a personality disorder, a hallucination, an amnesia, a behavioral disorder, drug abuse, urticaria, a developmental disorder, a social disorder, an emotional disorder, a stress disorder, a dissociative disorder, a somatoform disorder, a neurotic disorder, a body dysmorphic disorder, a phobia, a phobic disorder, an anxiety disorder, a panic disorder, an obsessive-

compulsive disorder, schizophrenia, a schizotypal disorder, a schizoaffective disorder, a delusional disorder, a psychosis, a psychotic disorder, an eating disorder, a sleep disorder, sexual dysfunction, a gender identity disorder, a disorder of sexual preference, postpartum depression, a tic disorder, Asperger syndrome, attention deficit hyperactivity disorder, alcohol addiction, autism, Parkinson disease, Alzheimer disease, dementia, a motor neuron disease, a degenerative cerebellar disorder, epilepsy, multiple sclerosis, irritable bowel syndrome, pain, a nerve injury, a tumor, a vascular disease, stroke, and/or a mixture thereof.

6. A kit for implementing the method according to any one of the preceding claims, the kit comprising:
 - a) a container containing bacteriophages of at least one species of bacteriophages that are specific to at least one intestinal and/or gastrointestinal species of bacteria, the intestinal and/or gastrointestinal species of bacteria directly or indirectly influencing a psychological, neurodegenerative and/or neurological illness and/or disorder of a host organism, and that comprise at least one nucleic acid functionally associated with a promoter and/or a regulatory element; and
 - b) instructions for carrying out the method.
7. A bacteriophage comprising at least one nucleic acid functionally associated with a promoter and/or a regulatory element, the bacteriophage being specific to at least one intestinal and/or gastrointestinal species of bacteria, the intestinal and/or gastrointestinal species of bacteria directly or indirectly influencing a psychological, neurodegenerative and/or neurological illness and/or disorder of a host organism, and the nucleic acid being selected from the group comprising:

- a) a nucleic acid sequence coding for at least one antibacterial nucleic acid molecule; and
 - b) a nucleic acid sequence encoding a nucleic acid molecule that is identical to the nucleic acid molecule encoded by the nucleic acid sequences from a) by at least 50 %; and
 - c) a nucleic acid sequence coding for at least one antibacterial polypeptide; and
 - d) a nucleic acid sequence encoding a polypeptide that is identical to the polypeptide encoded by the nucleic acid sequences from c) by at least 50 %; and
 - e) a nucleic acid sequence for a fragment of a nucleic acid from a), b), c) or d), the fragment encoding a nucleic acid molecule or a polypeptide.
8. The bacteriophage according to claim 7, wherein the nucleic acid has two or more promoters and/or regulatory elements and/or wherein the nucleic acid encodes nucleic acid sequences for two or more nucleic acid molecules, polypeptides and/or fragments thereof.
9. The bacteriophage according to claim 7 or 8, wherein the intestinal and/or gastrointestinal species of bacteria is anaerobic and/or aerobic and wherein the species of bacteria belongs to *Acidaminococcaceae*, *Actinobacteria*, *Actinomycineae*, *Alistipes*, *Bacteroides*, *Bacteroidetes*, *Bifidobacterium*, *Clostridium*, *Coproccoccus*, *Coriobacterium*, *Desulfovibrio*, *Enterobacterium*, *Enterococcus*, *Escherichia*, *Erysipelotrichia*, *Firmicutes*, *Fusobacterium*, *Lactobacillus*, *Lachnospiracea*, *Paraprevotella*, *Porphyromonadaceae*, *Prevotella*, *Propionibacterium*, *Proteobacteria*, *Rikenellaceae*, *Ruminococcus*, *Streptococcus*, *Thermoanaerobacteria* or *Veillonella*.

10. The bacteriophage according to any one of claims 7 to 9, wherein the psychological, neurodegenerative and/or neurological illness and/or disorder is an affective disorder, a personality disorder, a hallucination, an amnesia, a behavioral disorder, drug abuse, urticaria, a developmental disorder, a social disorder, an emotional disorder, a stress disorder, a dissociative disorder, a somatoform disorder, a neurotic disorder, a body dysmorphic disorder, a phobia, a phobic disorder, an anxiety disorder, a panic disorder, an obsessive-compulsive disorder, schizophrenia, a schizotypal disorder, a schizoaffective disorder, a delusional disorder, a psychosis, a psychotic disorder, an eating disorder, a sleep disorder, sexual dysfunction, a gender identity disorder, a disorder of sexual preference, postpartum depression, a tic disorder, Asperger syndrome, attention deficit hyperactivity disorder, alcohol addiction, autism, Parkinson disease, Alzheimer disease, dementia, a motor neuron disease, a degenerative cerebellar disorder, epilepsy, multiple sclerosis, irritable bowel syndrome, pain, a nerve injury, a tumor, a vascular disease, stroke, and/or a mixture thereof.
11. ~~The Use of the~~ bacteriophages according to any one of claims 7 to 10 and/or a pharmaceutical composition comprising bacteriophages according to any one of claims 7 to 10 and at least one other ingredient, ~~in the manufacture of a medicament for use as a drug for~~ changing the composition of the gut microbiota, ~~as a drug for~~ preventing the development and/or decelerating the progression of the psychological, neurodegenerative and/or neurological illness and/or disorder and/or ~~as a drug for~~ treating the psychological, neurodegenerative and/or neurological illness and/or disorder, a bacterial infection, a metabolic illness, metabolic syndrome and/or cancer.

~~12. The bacteriophages according to any one of claims 7 to 10 and/or a pharmaceutical composition comprising bacteriophages according to any one of claims 7 to 10 and at least one other ingredient for use in treating the psychological, neurodegenerative and/or neurological illness and/or disorder, a bacterial infection, a metabolic illness, metabolic syndrome and/or cancer.~~

~~13. The bacteriophages according to any one of claims 7 to 10 and/or a pharmaceutical composition comprising bacteriophages according to any one of claims 7 to 10 and at least one other ingredient for use in a therapeutic method or in a non therapeutic method for changing the composition of the gut microbiota, in a therapeutic method or in a non-therapeutic method for preventing the development and/or decelerating the progression of the psychological, neurodegenerative and/or neurological illness and/or disorder and/or in a therapeutic method or in a non therapeutic method for treating the psychological, neurodegenerative and/or neurological illness and/or disorder, a bacterial infection, a metabolic illness, metabolic syndrome and/or cancer.~~

~~14.12.~~ _____ The bacteriophages and/or the pharmaceutical compositionuse according to any one of claims 11 to 13, wherein the psychological, neurodegenerative and/or neurological illness and/or disorder is an affective disorder, a personality disorder, a hallucination, an amnesia, a behavioral disorder, drug abuse, urticaria, a developmental disorder, a social disorder, an emotional disorder, a stress disorder, a dissociative disorder, a somatoform disorder, a neurotic disorder, a body dysmorphic disorder, a phobia, a phobic disorder, an anxiety disorder, a panic disorder, an obsessive-compulsive disorder, schizophrenia, a schizotypal disorder, a schizoaffective disorder, a delusional disorder, a psychosis, a psychotic disorder, an eating disorder, a sleep disorder, sexual

dysfunction, a gender identity disorder, a disorder of sexual preference, postpartum depression, a tic disorder, Asperger syndrome, attention deficit hyperactivity disorder, alcohol addiction, autism, Parkinson disease, Alzheimer disease, dementia, a motor neuron disease, a degenerative cerebellar disorder, epilepsy, multiple sclerosis, irritable bowel syndrome, pain, a nerve injury, a tumor, a vascular disease, stroke, and/or a mixture thereof.

15-13. ~~The bacteriophages and/or the pharmaceutical composition~~ use according to ~~any one of claims 11 to 13~~, wherein the bacterial infection is a bacterial infection of the airways, the teeth, the mouth, the jaw, the eye, the musculoskeletal system, the blood, the gastrointestinal tract, the skin, the cardiovascular system, the hormonal balance, the mind, the immune system, the nervous system, the metabolism, wounds, and/or the urogenital tract.

15 14. The bacteriophages according to any one of claims 7 to 10 and/or a pharmaceutical composition comprising the bacteriophages according to any one of claims 7 to 10 and at least one other ingredient, for use in therapy.