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What is claimed is:

1. A lactic acid bacterium (LAB) comprising an exogenous nucleic acid encoding a fusion protein comprising (A) an N-terminal mucin binding polypeptide and (B) a C-terminal cell adherence polypeptide that comprises a cell-wall anchoring domain.
2. The bacterium of claim 1, wherein said cell adherence polypeptide is selected from the group consisting of cell and mucus-binding protein A (CmbA), mucus binding protein (Mub), mucus adhesion promoting protein (MapA), lactococcal mucin binding protein (MbpL), and any combination thereof.
3. The bacterium of claim 2, wherein said cell adherence polypeptide is CmbA, such as *Lactobacillus reuteri* CmbA.
4. The bacterium of claim 2, wherein said CmbA polypeptide has an amino acid sequence at least 80% identical to SEQ ID NO: 1.
5. The bacterium of claim 1, wherein said mucin-binding polypeptide is a trefoil factor (TFF) selected from TFF1, TFF2, and TFF3.
6. The bacterium of claim 4, wherein said TFF polypeptide has an amino acid sequence at least 80% identical to SEQ ID NO: 3.
7. The bacterium according to claim 1, wherein said fusion protein comprises CmbA and a TFF.
8. The bacterium of claim 1, wherein said fusion protein further comprises a secretion signal peptide, such as SSusp45.
9. The bacterium of claim 1, wherein said exogenous nucleic acid encoding a fusion protein is transcriptionally regulated by a promoter selected from the group consisting of a *thyA* promoter (*PthyA*), an *hlla* promoter (*PhllA*), and a *gapB* promoter (*PgapB*).
10. The bacterium of claim 1, further comprising an exogenous nucleic acid encoding at least one therapeutic polypeptide selected from
 - a. a cytokine;
 - b. an interleukin (IL), such as IL-2, IL-10, IL-18;

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- c. an antibody or a fragment thereof, such as an anti TNF α antibody, an antibody to IL-4, an antibody to IL-5, an antibody to IL-13, an antibody to IL-15, an antibody to immunoglobulin E (IgE);
 - d. an antigen, such as proinsulin (PINS), glutamic acid decarboxylase (GAD65), insulinoma-associated protein 2 (IA-2), islet-specific glucose-6-phosphatase catalytic subunit-related protein (IGRP), zinc transporter 8 (ZnT8), chromogranin A, (prepro) islet amyloid polypeptide (ppIAPP), peripherin, citrullinated glucose-regulated protein (GRP), a tree pollen allergen (including a birch pollen allergen or a Japanese cedar pollen allergen), a weed pollen allergen, a grass pollen allergen, a food allergen (including a peanut allergen, a milk allergen, an egg allergen, a gluten allergen (gliadin epitope), a dust-mite allergen, a mold allergen, an animal dander allergen;
 - e. a hormone such as glucagon-like peptide 1 (GLP-1), glucagon-like peptide 2 (GLP-2), glucagon, exendin-4, epidermal growth factor and growth hormone;
 - f. a TFF, such as TFF 1, TFF2, and TFF3.
 - g. an enzyme such as phenylalanine ammonia lyase (PAL), an amino acid decarboxylase;
 - and
 - h. any combinations thereof.
11. The bacterium of claim 10, wherein at least one therapeutic polypeptide is PAL.
 12. The bacterium of claim 10, wherein said exogenous nucleic acid encoding at least one therapeutic polypeptide is transcriptionally regulated by a *gapB* promoter (*PgapB*).
 13. The LAB of claim 1 selected from the group consisting of a *Lactobacillus* species (sp.) bacterium, a *Bifidobacterium* sp. bacterium, a *Streptococcus* sp. bacterium, and an *Enterococcus* sp. bacterium, and a *Lactococcus* sp. bacterium, such as *Lactococcus lactis*.
 14. The bacterium of claim 1, wherein said bacterium comprising an exogenous nucleic acid encoding a fusion protein has:

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- a. an increased gastro-intestinal (GI) transit time of at least 10%; and/or
- b. an increased adherence to intestinal mucosa of at least 10%; and/or
- c. an increased *in vitro* mucin-binding capability of at least 20%; and/or
- d. an increased *in vitro* Caco-2 cell-binding capability of at least 10%;

when compared to a corresponding bacterium not comprising said exogenous nucleic acid encoding said fusion protein.

15. The bacterium of any one of the preceding claims, further comprising at least one mutation or insertion that increases trehalose accumulation selected from
- a. insertion of *Escherichia coli otsB*;
 - b. insertion of a polycistronic expression cassette comprising a *usp45* promoter, *usp45*, and an exogenous nucleic acid encoding a trehalose-6-phosphate phosphatase and optionally an intergenic region, such as *rpmD*, between said *usp45* and said exogenous nucleic acid encoding a trehalose-6-phosphate phosphatase;
 - c. insertion of a polycistronic expression cassette comprising trehalose transporters *llmg_0453* and *llmg_0454*, positioned 3' of an *hllA* promoter (*PhllA*);
 - d. inactivation of *trePP*;
 - e. inactivation of *ptcC*; and
 - f. a combination of any of (a)-(e).
16. A pharmaceutical composition comprising the bacterium of any one of the preceding claims, and a pharmaceutically acceptable carrier.
17. The use of the bacterium of any one of claims 1 to 15, or the pharmaceutical composition of claim 16, in the treatment or prevention of a disease selected from the group consisting of an autoimmune disease, an allergy, a metabolic disease, and a gastro-intestinal disease.

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18. The use of the bacterium of any one of claims 1 to 15, or the pharmaceutical composition of claim 16, for the preparation of a medicament for the treatment or prevention of a disease selected from the group consisting of an autoimmune disease, an allergy, a metabolic disease, a gastro-intestinal disease, and a nutritional defect.
19. A method for the treatment of a disease in a subject in need thereof comprising administering to said subject a therapeutically effective amount of the bacterium of any one of claims 1 to 15 or the composition of claim 16, wherein said disease is selected from type-1 diabetes (T1D), celiac disease, inflammatory bowel disease, and phenylketonuria (PKU).
20. A nucleic acid encoding a fusion protein, said nucleic acid comprising:
 - a. a sequence encoding a cell-adherence polypeptide selected from the group consisting of cell and mucus-binding protein A (CmbA), Mub, MapA, MbpL, and any combinations thereof; and
 - b. a sequence encoding a mucin-binding polypeptide selected from a TFF polypeptide, MubBP, and a combination thereof.