

CLAIMS

1. An in vitro method for diagnosing a *Helicobacter pylori*-associated disease in a subject which comprises:~~Use of a composition comprising a preparation for~~

measuring the expression amount of a gene in vitro on a sample obtained from the subject,

wherein the gene to be measured comprises FGF21 (fibroblast growth factor 21, Gene ID: 26291) gene, ~~in the manufacture of a medicament for diagnosing a *Helicobacter pylori*-associated disease~~

wherein the *Helicobacter pylori*-associated disease is one selected from the group consisting of gastritis, gastric ulcer and gastric cancer,

wherein the measuring the expression amount of the gene is measuring the amount of mRNA of the gene, the amount of the protein expressed from the gene, or both.

2. ~~The~~ in vitro method of claim 1, wherein the ~~composition~~gene to be measured further comprises a ~~preparation for measuring the expression amount of~~ CTH (cystathionine g-lyase, Gene ID: 1491) or CREBRF (cAMP responsive element binding protein, Gene ID: 153222) genes.

3. ~~The~~ in vitro method of claim 2, wherein the ~~composition~~gene to be measured further comprises a ~~preparation for measuring the expression amount of~~ a gene selected from the group consisting of: DLL4 (delta-like 4, Gene ID: 54567), FGF18 (fibroblast growth factor 18, Gene ID:

8817), FOS (Fos proto-oncogene, AP-1 transcription factor subunit, Gene ID: 2353), PDK1 (phosphoinositide-dependent kinase-1, Gene ID: 5170), PTPRN (receptor-type tyrosine-protein phosphatase-like N, Gene ID: 5798), CLIC4 (chloride intracellular channel 4, Gene ID: 25932), PTPRB (protein tyrosine phosphatase, receptor type B, Gene ID: 5787), PPP1R15A (protein phosphatase 1 regulatory subunit 15A, Gene ID: 23645), PTPRH (protein tyrosine phosphatase, receptor type H, Gene ID: 5794), DDIT3 (DNA damage inducible transcript 3, Gene ID: 1649), BIRC3 (baculoviral IAP repeat containing 3, Gene ID: 330), FOXO3 (forkhead box O3, Gene ID: 2309), BCL2 (BCL2, apoptosis regulator, Gene ID: 596), PRKCE (protein kinase C epsilon, Gene ID: 5581), CHMP4C (charged multivesicular body protein 4C, Gene ID: 92421), CLDN14 (claudin 14, Gene ID: 23562), SLC7A11 (solute carrier family 7 member 11, Gene ID: 23657), BOC (BOC cell adhesion associated, oncogene regulated, Gene ID: 91653), AJUBA (ajuba LIM protein, Gene ID: 84962), LMO7 (LIM domain 7, Gene ID: 4008), MMP24 (matrix metalloproteinase 24, Gene ID: 10893), C3orf58 (divergent protein kinase domain 2A, Gene ID: 205428), KLF10 (Kruppel like factor 10, Gene ID: 7071), CSGALNACT1 (chondroitin sulfate N-acetylgalactosaminyltransferase 1, Gene ID: 55790), CEP120 (centrosomal protein 120, Gene ID: 153241), CHAC1 (ChaC glutathione specific gamma-glutamylcyclotransferase 1, Gene ID: 79094), ASNS (asparagine synthetase (glutamine-hydrolyzing), Gene ID: 440), NFE2L2 (nuclear factor, erythroid 2 like 2, Gene ID: 4780), RIOK3 (RIO kinase 3, Gene ID: 8780), TXNIP (thioredoxin interacting protein, Gene ID: 10628), MTR (5-methyltetrahydrofolate-homocysteine methyltransferase, Gene ID: 4548), IFRD1

(interferon related developmental regulator 1, Gene ID: 3475), ADGRA2 (adhesion G protein-coupled receptor A2, Gene ID: 25960), TBX4 (T-box 4, Gene ID: 9496), OVOL2 (ovo like zinc finger 2, Gene ID: 58495), ACVRL1 (activin A receptor like type 1, Gene ID: 94), ALB (albumin, Gene ID: 213), JADE1 (jade family PHD finger 1, Gene ID: 79960), MLLT11 (MLLT11, transcription factor 7 cofactor, Gene ID: 10962), ADORA1 (adenosine A1 receptor, Gene ID: 134), TNFRSF8 (TNF receptor superfamily member 8, Gene ID: 943), NLRP12 (NLR family pyrin domain containing 12, Gene ID: 91662), CASP14 (caspase 14, Gene ID: 23581), LTA (lymphotoxin alpha, Gene ID: 4049), SMAGP (small cell adhesion glycoprotein, Gene ID: 57228), NEO1 (neogenin precursor1, Gene ID: 4756), MTSS1 (MTSS1, I-BAR domain containing, Gene ID: 9788), TSPAN32 (tetraspanin 32, Gene ID: 10077), CLDN8 (claudin 8, Gene ID: 9073), MYBPH (myosin binding protein H, Gene ID: 4608), SGCE (sarcoglycan epsilon, Gene ID: 8910), CDH15 (cadherin 15, Gene ID: 1013), ARHGAP6 (Rho GTPase activating protein 6, Gene ID: 395), ZFP36L2 (ZFP36 ring finger protein like 2, Gene ID: 678), EHF (ETS homologous factor, Gene ID: 26298), SLAMF6 (SLAM family member 6, Gene ID: 114836), HLA-DPB1 (major histocompatibility complex, class II, DP beta 1, Gene ID: 3115), SSC5D (scavenger receptor cysteine rich family member with 5 domains, Gene ID: 284297), CCR4 (C-C motif chemokine receptor 4, Gene ID: 1233), CCR7 (C-C motif chemokine receptor 7, Gene ID: 1236), KLRG1 (killer cell lectin-like receptor subfamily G member 1, Gene ID: 10219), BLNK (B cell linker, Gene ID: 29760), IGFBP1 (insulin-like growth factor-binding protein 1, Gene ID: 3484), GIF (MIF, macrophage migration inhibitory factor, Gene ID: 4282) genes,

and a combination thereof.

~~4. The use of claim 1, wherein the preparation for measuring the expression amount of the gene is a preparation suitable for measuring the amount of mRNA of the gene, a preparation suitable for measuring the amount of the protein expressed from the gene, or both.~~

~~54. The use in vitro method of claim 41, wherein the preparation suitable for measuring the amount of mRNA of the gene comprises is performed by using a primer or probe that specifically binds to the mRNA or cDNA of the gene.~~

~~65. The use in vitro method of claim 41, wherein the preparation suitable for measuring the amount of the protein expressed from the gene comprises is performed by using an antibody or aptamer specific for the protein expressed from the gene.~~

~~6. The in vitro method of claim 1, further comprises comparing the measured expression amount of the gene with the normal expression amount of the gene.~~

~~7. A kit for diagnosing a *Helicobacter pylori*-associated disease, comprising a composition comprising a preparation for measuring the expression amount of FGF21 (fibroblast growth factor 21, Gene ID: 26291) gene in the manufacture of a medicament for diagnosing a *Helicobacter pylori*-associated disease.~~

8. ~~The kit of claim 7, wherein the composition further comprises a preparation for measuring the expression amount of CTH (cystathionine γ-lyase, Gene ID: 1491) or CREBRF (cAMP responsive element binding protein, Gene ID: 153222) genes.~~

9. ~~The kit of claim 8, wherein the composition further comprises a preparation for measuring the expression amount of a gene selected from the group consisting of: DLL4 (delta-like 4, Gene ID: 54567), FGF18 (fibroblast growth factor 18, Gene ID: 8817), FOS (Fos proto-oncogene, AP-1 transcription factor subunit, Gene ID: 2353), PDK1 (phosphoinositide-dependent kinase-1, Gene ID: 5170), PTPRN (receptor-type tyrosine-protein phosphatase-like N, Gene ID: 5798), CLIC4 (chloride intracellular channel 4, Gene ID: 25932), PTPRB (protein tyrosine phosphatase, receptor type B, Gene ID: 5787), PPP1R15A (protein phosphatase 1 regulatory subunit 15A, Gene ID: 23645), PTPRH (protein tyrosine phosphatase, receptor type H, Gene ID: 5794), DDIT3 (DNA damage inducible transcript 3, Gene ID: 1649), BIRC3 (baculoviral IAP repeat containing 3, Gene ID: 330), FOXO3 (forkhead box O3, Gene ID: 2309), BCL2 (BCL2, apoptosis regulator, Gene ID: 596), PRKCE (protein kinase C epsilon, Gene ID: 5581), CHMP4C (charged multivesicular body protein 4C, Gene ID: 92421), CLDN14 (claudin 14, Gene ID: 23562), SLC7A11 (solute carrier family 7 member 11, Gene ID: 23657), BOC (BOC cell adhesion associated, oncogene regulated, Gene ID: 91653), AJUBA (ajuba LIM protein, Gene ID: 84962), LMO7 (LIM domain 7, Gene ID: 4008), MMP24 (matrix metalloproteinase 24, Gene ID: 10893), C3orf58 (divergent protein kinase domain~~

~~2A, Gene ID: 205428), KLF10 (Kruppel like factor 10, Gene ID: 7071), CSGALNACT1 (chondroitin sulfate N-acetylgalactosaminyltransferase 1, Gene ID: 55790), CEP120 (centrosomal protein 120, Gene ID: 153241), CHAC1 (Chac glutathione specific gamma-glutamylcyclotransferase 1, Gene ID: 79094), ASNS (asparagine synthetase (glutamine hydrolyzing), Gene ID: 440), NFE2L2 (nuclear factor, erythroid 2 like 2, Gene ID: 4780), RIOK3 (RIO kinase 3, Gene ID: 8780), TXNIP (thioredoxin interacting protein, Gene ID: 10628), MTR (5-methyltetrahydrofolate-homocysteine methyltransferase, Gene ID: 4548), IFRD1 (interferon related developmental regulator 1, Gene ID: 3475), ADGRA2 (adhesion G protein-coupled receptor A2, Gene ID: 25960), TBX4 (T-box 4, Gene ID: 9496), OVOL2 (ovo like zinc finger 2, Gene ID: 58495), ACVRL1 (activin A receptor like type 1, Gene ID: 94), ALB (albumin, Gene ID: 213), JADE1 (jade family PHD finger 1, Gene ID: 79960), MLLT11 (MLLT11, transcription factor 7 cofactor, Gene ID: 10962), ADORA1 (adenosine A1 receptor, Gene ID: 134), TNFRSF8 (TNF receptor superfamily member 8, Gene ID: 943), NLRP12 (NLR family pyrin domain containing 12, Gene ID: 91662), CASP14 (caspase 14, Gene ID: 23581), LTA (lymphotoxin alpha, Gene ID: 4049), SMACP (small cell adhesion glycoprotein, Gene ID: 57228), NEO1 (neogenin precursor1, Gene ID: 4756), MTSS1 (MTSS1, I-BAR domain containing, Gene ID: 9788), TSPAN32 (tetraspanin 32, Gene ID: 10077), CLDN8 (claudin 8, Gene ID: 9073), MYBPH (myosin binding protein H, Gene ID: 4608), SGCE (sarcoglycan epsilon, Gene ID: 8910), CDH15 (cadherin 15, Gene ID: 1013), ARHGAP6 (Rho GTPase activating protein 6, Gene ID: 395), ZFP36L2 (ZFP36 ring finger protein like 2, Gene ID: 678), EHF (ETS~~

~~homologous factor, Gene ID: 26298), SLAMF6 (SLAM family member 6, Gene ID: 114836), HLA-DPB1 (major histocompatibility complex, class II, DP beta 1, Gene ID: 3115), SSC5D (scavenger receptor cysteine rich family member with 5 domains, Gene ID: 284297), CCR4 (C-C motif chemokine receptor 4, Gene ID: 1233), CCR7 (C-C motif chemokine receptor 7, Gene ID: 1236), KLRG1 (killer cell lectin-like receptor subfamily G member 1, Gene ID: 10219), BLNK (B cell linker, Gene ID: 29760), IGFBP1 (insulin-like growth factor-binding protein 1, Gene ID: 3484), GIF (MIF, macrophage migration inhibitory factor, Gene ID: 4282) genes, and a combination thereof.~~

~~10. The kit of claim 7, wherein the preparation for measuring the expression amount of the gene is a preparation suitable for measuring the amount of mRNA of the gene, a preparation suitable for measuring the amount of the protein expressed from the gene, or both.~~

~~11. The kit of claim 10, wherein the preparation suitable for measuring the amount of mRNA of the gene comprises a primer or probe that specifically binds to the mRNA or cDNA of the gene.~~

~~12. The kit of claim 10, wherein the preparation suitable for measuring the amount of the protein expressed from the gene comprises an antibody or aptamer specific for the protein expressed from the gene.~~

~~13. A method for providing information necessary for diagnosis of a *Helicobacter pylori*-associated disease in a~~

~~patient infected with *Helicobacter pylori*, the method comprising the steps of: preparing a specimen DNA from a sample of a patient infected with *Helicobacter pylori*; amplifying the specimen DNA using the composition comprising a preparation for measuring the expression amount of FGF21 (fibroblast growth factor 21, Gene ID: 26291) gene in the manufacture of a medicament for diagnosing a *Helicobacter pylori*-associated disease; and determining the expression level of a gene whose expression is increased or decreased by *Helicobacter pylori* infection from the amplification result.~~

~~14. The method for providing information necessary for diagnosis of a *Helicobacter pylori*-associated disease of claim 13, wherein the step of determining the expression level of the gene is measuring the amount of the mRNA of the gene, the amount of the protein expressed from the gene, or both.~~

~~15. The method for providing information necessary for diagnosis of a *Helicobacter pylori*-associated disease of claim 14, wherein measuring the amount of the mRNA of the gene is performed by using a primer or probe that specifically binds to the mRNA or cDNA of the gene.~~

~~16. The method for providing information necessary for diagnosis of a *Helicobacter pylori*-associated disease of claim 14, wherein measuring the amount of the protein expressed from the gene is performed by using an antibody or aptamer specific for the protein expressed from the gene.~~