~~We~~ Celaims:

1. A composition comprising a clonal population of stem cells isolated from an esophagus of a subject with Barrett's esophagus, wherein the stem cells differentiate into Barrett's epithelium, wherein the stem cells are characterized as having an mRNA profile wherein the amount of one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 mRNA are each in the range of 5 to 50 percent of the amount of actin mRNA in the stem cell.

2. The composition of claim 1, wherein the stem cells are characterized as having an mRNA profile wherein the amount of one or more CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 mRNA are each at least 10 percent of the amount of actin mRNA in the stem cell.

3. The composition of claim 1, wherein the mRNA is CDH17 mRNA.

4. A purified cell preparation comprising Barrett's esophagus (BE) stem cells, wherein the BE stem cells differentiate into columnar epithelial cells and are characterized as having an mRNA profile wherein the amount of one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 mRNA are each in the range of 5 to 50 percent of the amount of actin mRNA in the stem cell.

5. The purified cell preparation of claim 4, wherein the stem cells are characterized as having an mRNA profile wherein the amount of one or more CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 mRNA are each at least 10 percent of the amount of actin mRNA in the stem cell.

6. The purified cell preparation of claim 4, wherein the mRNA is CDH17 mRNA.

7. An isolated Barrett's esophagus (BE) stem cell capable of producing columnar epithelial cells, which BE stem cell is characterized as having an mRNA profile wherein the amount of one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 mRNA are each in the range of 5 to 50 percent of the amount of actin mRNA in the stem cell.

8. The isolated Barrett's esophagus (BE) stem cell of claim 7, wherein the stem cell is characterized as having an mRNA profile wherein the amount of one or more CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 mRNA are each at least 10 percent of the amount of actin mRNA in the stem cell.

9. The isolated Barrett's esophagus (BE) stem cell of claim 7, wherein the mRNA is CDH17 mRNA.

10. A method of screening for an agent which may be used to treat or prevent the occurrence of Barrett's esophagus, comprising

a) providing BE stem cells;

b) contacting the BE stem cells with the test agent;

c) detecting the ability of the test agent to reduce viability, growth or differentiation of the BE stem cells;

wherein if the test agent reduces the viability, growth or differentiation of the BE stem cells than the test agent may be effective in the treatment or prevention of Barrett's esophagus and wherein the test agent specifically binds to or reduces the expression of one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

11. The method of claim 10, wherein the mRNA with reduced expression is CDH17.

12. The method of claim 11, wherein the test agent is also contacted with normal cells or tissue of the local alimentary canal, and the differential ability, if any, of the test agent to reduces the viability, growth or differentiation of the normal cells or tissue is compared to that with the BE stem cells.

13. The method of claim 11, wherein the BE stem cells are human BE stem cells.

14. The method of claim 11, wherein the test agent is selected for further drug development if the test agent reduces the viability, growth or ability to differentiation of the BE stem cells is reduced by at least 70%.

15. The method of claim 11, wherein the BE stem cells are provided as a clonal population of cells.

16. The method of claim 11, wherein the test agent is small molecule, carbohydrate, peptide or nucleic acid.

17. The method of claim 11, wherein the test agent specifically binds to a cell surface protein on the clonal population of cells.

18. The method of claim 11, wherein the test agent is an antibody or antibody mimetic.

19. A method of screening for an agent effective in the detection of Barrett's esophagus comprising

a) providing a BE stem cells;

b) contacting the BE stem cells with the test agent;

c) detecting the ability of the test agent to bind to the BE stem cells;

wherein if the test agent binds to the BE stem cells, the test agent may be an agent effective in the detection of Barrett's esophagus wherein the test agent specifically binds to one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

20. The method of claim 19, wherein the test agent specifically binds to CDH17.

21. The method of claim 19, wherein the BE stem cells are human BE stem cells.

22. The method of claim 19, wherein the BE stem cells are provided as a clonal population of cells.

23. The method of claim 19, wherein the test agent is also contacted with normal cells or tissue of the alimentary canal, and the differential ability, if any, of the test agent to bind to the normal cells or tissue is compared to that with the BE stem cells.

24. The method of claim 19, wherein the test agent is an antibody or antibody mimetic.

25. The method of claim 24, wherein the test agent is a monoclonal antibody.

26. An *in vitro* method of detecting the presence of esophageal metaplasia, such as associated with Barrett's esophagus, in a patient comprising

a) providing a detection agent that specifically binds to a BE stem cell relative to normal tissue of the esophagus and (optionally) stomach;

b) ~~administering the detection agent to a patient or~~ contacting the detection agent with a biopsy ~~therefrom~~ sample from a patient; and

c) detecting whether the detection agent binds to BE stem cells in the ~~esophagus~~ biopsy sample from ~~of~~ the patient,

wherein the detection agent specifically binds to one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

27. The method of claim 26, wherein the detection agent specifically binds to CDH17.

28. The method of claim 26, wherein the patient is a human.

~~29. The method of claim 26, wherein the detection step is performed in vitro on a biopsy sample.~~

~~30. The method of claim 26, wherein the detection step is performed in vivo.~~

~~31~~29. The method of claim 26, wherein the detection agent is an antibody.

~~32~~30. The method of claim ~~31~~29, wherein the detection agent is a monoclonal antibody.

~~33~~31. The method of claim 26, wherein the detection agent is Positron Emission Tomography (PET) imaging agent or magnetic resonance imaging (MRI) contrast agent.

~~34~~32. The method of claim 26, wherein the detection agent is radioisotope or contrast enhancing isotope, such as ^{3}H, ^{11}C, ^{177}Lu, ^{111}Indium, ^{67}Cu, ^{99m}Tc, ^{124}I, ^{125}I, ^{131}I and ^{89}Zr.

~~35~~33. The method of claim 26, wherein the detection agent is detected in the patient by Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), Fluorescent Imaging, or Near-infrared (NIR) Emission Spectroscopy.

34. A detection agent that specifically binds to a BE stem cell relative to normal tissue of the esophagus and (optionally) stomach for use in a method of detecting the presence of esophageal metaplasia, such as associated with Barrett's esophagus, in a patient; wherein the method comprises:

a) providing a detection agent that specifically binds to a BE stem cell relative to normal tissue of the esophagus and (optionally) stomach;

b) administering the composition comprising the detection agent to a patient or contacting the composition comprising the detection agent with a biopsy therefrom; and

c) detecting whether the detection agent binds to BE stem cells in the esophagus of or biopsy sample from the patient,

35. Use of a detection agent that specifically binds to a BE stem cell relative to normal tissue of the esophagus and (optionally) stomach for the preparation of a composition for a method of detecting the presence of esophageal metaplasia, such as associated with Barrett's esophagus, in a patient; wherein the method comprises:

a) providing a detection agent that specifically binds to a BE stem cell relative to normal tissue of the esophagus and (optionally) stomach;

b) administering the composition comprising the detection agent to a patient or contacting the composition comprising the detection agent with a biopsy therefrom; and

c) detecting whether the detection agent binds to BE stem cells in the esophagus of or biopsy sample from the patient,

36. ~~A method for treating or preventing Barrett's esophagus and/or esophageal metaplasia in a subject in need thereof comprising administering to the subject~~ Use of an effective amount of an therapeutic agent that is cytotoxic or cytostatic for Barrett's Esophagus (BE) stem cells in the esophagus of the subject, or inhibits differentiation of the BE stem cells to columnar epithelium, wherein the therapeutic agent specifically binds to or reduces the expression of one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 for the preparation of a composition for treating or preventing Barrett's esophagus and/or esophageal metaplasia in a subject in need thereof, wherein the composition is for administering to the subject .

37. The ~~method~~ use of claim 36, wherein the therapeutic agent specifically binds to or reduces the expression of CDH17.

38. The ~~method~~ use of claim 36, wherein the subject is a mammal.

39. The ~~method~~ useof claim 38, wherein the mammal is a human.

40. The ~~method~~ use of claim 36, wherein the differentiation of the BE stem cells to columnar epithelium is reduced by 70, 80, 90, 95, 96, 97, 98, 99 or 100% from treatment with the therapeutic agent.

41. The ~~method~~ use of claim 36, wherein the therapeutic agent is an antibody or antibody mimetic.

42. The ~~method~~ use of claim 41, wherein the therapeutic agent is a monoclonal antibody.

43. The ~~method~~ use of claim 41 or 42, wherein the antibody or antibody mimetic is conjugated to a cytotoxic or cytostatic moiety.

44. The ~~method~~ use of claim 36, wherein the therapeutic agent is a nucleic acid or nucleic acid analog.

45. The ~~method~~ use of claim 44, wherein the therapeutic agent is an RNAi or antisense composition.

46. The ~~method~~ use of claim 45, wherein the RNAi or antisense composition reduces the level of expression of a gene selected from the group consisting of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

47. The method of claim 46, wherein the gene is CDH17.

48. An *in vitro* method of detecting the presence of Barrett's esophagus (BE) stem cells, in a patient comprising

a) providing a detection agent that specifically binds to a BE stem cell relative to normal tissue of the esophagus and (optionally) stomach;

b) ~~administering the detection agent to a patient or~~ contacting the detection agent with a biopsy sample from the patient ~~therefrom~~; and

c) detecting whether the detection agent binds to BE stem cells in the ~~esophagus~~ biopsy sample from~~of~~ the patient,

wherein the detection agent specifically binds to one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

49. The method of claim 48, wherein the detection agent specifically binds to CDH17.

50. The method of claim 48, wherein the patient is a human.

~~51. The method of claim 48, wherein the detection step is performed in vitro on a biopsy sample~~.

~~52. The method of claim 48, wherein the detection step is performed in vivo.~~

~~53~~51. The method of claim 48, wherein the detection agent is an antibody.

~~54~~52. The method of claim ~~53~~51, wherein the detection agent is a monoclonal antibody.

~~55~~53. The method of claim 48, wherein the detection agent is Positron Emission Tomography (PET) imaging agent or magnetic resonance imaging (MRI) contrast agent.

~~56~~54. The method of claim 48, wherein the detection agent is radioisotope or contrast enhancing isotope, such as ^{3}H, ^{11}C, ^{177}Lu, ^{111}Indium, ^{67}Cu, ^{99m}Tc, ^{124}I, ^{125}I, ^{131}I and ^{89}Zr.

~~57~~55. The method of claim 48, wherein the detection agent is detected in the patient by Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), Fluorescent Imaging, or Near-infrared (NIR) Emission Spectroscopy.

~~58~~56. A method of detecting the likelihood of the presence of intestinal metaplasia (IM), in a patient comprising

a) providing a detection agent that specifically binds to CDH17;

b) ~~administering the detection agent to a patient or~~ contacting the detection agent with a biopsy sample from the patient~~therefrom~~; and

c) detecting whether the detection agent binds to the cells in the biopsy of the patient,

wherein if the detection agent binds to the cells in the biopsy of the patient the IM is more likely to be present in the patient.

~~59~~57. The method of claim ~~58~~56, further comprising the steps of

d) providing a detection agent that specifically binds to Villin;

e) ~~administering the detection agent to a patient or~~ contacting the detection agent with ~~a~~the biopsy sample~~therefrom~~; and

f) detecting whether the detection agent binds to the cells in the biopsy of the patient.

~~60~~58. The method of claim ~~58~~56, further comprising the steps of

d) providing a detection agent that specifically binds to CDX2;

e) ~~administering the detection agent to a patient or~~ contacting the detection agent with ~~a~~the biopsy ~~therefrom~~sample; and

f) detecting whether the detection agent binds to the cells in the biopsy of the patient.

~~61~~59. The method of claim ~~58~~56, wherein the intestinal metaplasia comprises a cell type selected from the group consisting of Barrett's esophagus stem cells, gastric adenocarcinoma precursors and pancreatic adenocarcinoma precursors.

~~62~~60. The method of claim ~~58~~56, wherein the intestinal metaplasia is selected from the group consisting of Barrett's esophagus, gastric intestinal metaplasia and intraepithelial pancreatic mucinous metaplasia.

~~63~~61. The method of claim ~~58~~56, wherein the patient is a human.

~~64. The method of claim 58, wherein the detection step is performed in vitro on a biopsy sample.~~

~~65. The method of claim 58, wherein the detection step is performed in vivo.~~

~~66~~62. The method of claim ~~58~~56, wherein the detection agent is an antibody.

~~67~~63. The method of claim ~~66~~62, wherein the detection agent is a monoclonal antibody.

~~68~~64. The method of claim ~~58~~56, wherein the detection agent is Positron Emission Tomography (PET) imaging agent or magnetic resonance imaging (MRI) contrast agent.

~~69~~65. The method of claim ~~58~~56, wherein the detection agent is radioisotope or contrast enhancing isotope, such as ^{3}H, ^{11}C, ^{177}Lu, ^{111}Indium, ^{67}Cu, ^{99m}Tc, ^{124}I, ^{125}I, ^{131}I and ^{89}Zr.

~~70~~66. The method of claim ~~58~~56, wherein the detection agent is detected in the patient by Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), Fluorescent Imaging, or Near-infrared (NIR) Emission Spectroscopy.

~~71~~67. A composition comprising a binding agent that specifically binds to a protein selected from the group consisting of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4 attached to an imaging agent.

~~72.~~68 The composition of claim ~~71~~67, wherein the protein is CDH17.

~~73~~69. The composition of claim ~~71~~67, wherein the binding agent is covalently attached to the imaging agent.

~~74~~70. The composition of claim ~~71~~67, wherein the binding agent is non-covalently attached to the imaging agent.

~~75~~71. The composition of claim ~~71~~67, wherein the imaging agent is selected from the group consisting of optical coherence tomography (OCT) detection/contrast agents, positron emission tomography (PET) detection/contrast agents, magnetic resonance imaging (MRI) detection/contrast agents, ultrasound detection/contrast agents, X-ray detection/contrast agents and single-photon emission computed tomography (SPECT) detection/contrast agents.

~~76~~72. The composition of claim ~~75~~71, wherein the OCT detection/contrast agents are selected from the group consisting of near-infrared dyes, polypyrrole nanoparticles, optical detection/contrast agents and engineered microsphere contrast agents.

~~77~~73. The composition of claim ~~75~~71, wherein the PET detection/contrast agents are selected from the group consisting of ^{18}F-fluoride, 3'-deoxy-3'-[^{18}F]fluorothymidine, ^{18}F-fluoromisonidazole, gallium, technetium-99m, thallium, oxygen, nitrogen, iron, carbon, ^{43}K, ^{52}Fe, ^{57}Co, ^{67}Cu, ^{67}Ga, ^{68} Ga, ^{123}I, ^{125}I, ^{131}I, ^{l32}I, and ^{99}Tc.

~~78~~74. The composition of claim ~~75~~71, wherein the MRI detection/contrast agents are selected from the group consisting of ferro, antiferro, ferrimagnetic or superparamagnetic material, ferrite with spinel structure, ferrite with a magnetoplumbite structure other hexagonal ferrite structures, paramagnetic ions, comprise a paramagnetic contrast agent, a super paramagnetic contrast agent, a diamagnetic agent and combinations thereof.

~~79~~75. The composition of claim ~~75~~71, wherein the ultrasound detection/contrast agents are selected from the group consisting of shell encapsulated gas bubbles; shell encapsulated droplets; and nanoparticles.

~~80~~76. The composition of claim ~~75~~71, wherein the X-ray detection/contrast agents are selected from the group consisting of iodinated contrast-enhancing units; barium sulfate-based contrast-enhancing units; metal ion chelates; boron clusters with a high proportion of iodine; iodinated polysaccharides, polymeric triiodobenzenes; particles from iodinated compounds displaying low water solubility; liposomes containing iodinated compounds; and iodinated.

~~81~~77. The composition of claim ~~75~~71, wherein the SPECT detection/contrast agents are selected from the group consisting of ^{99}mTc, ^{123}I, ^{131}I, ^{67}Cu, ^{111}In, and ^{201}Tl.

~~82~~78. The composition of claim ~~75~~71, wherein the binding agent is selected from the group consisting of antibodies, aptamers, peptides, cell surface receptor ligands, and small molecules.

~~83~~79. A method of screening for an agent which may be used to treat or prevent the occurrence of Barrett's esophagus, comprising

a) providing BE stem cells;

b) providing one or more of esophageal and gastric cardia stem cells;

c) contacting the BE stem cells and one or more of esophageal and gastric cardia stem cells with the test agent; and

d) detecting the ability of the test agent to reduce viability, growth or differentiation of the BE stem cells relative to one or more of esophageal and gastric cardia stem cells;

wherein if the test agent reduces the viability, growth or differentiation of the BE stem cells relative to one or more of esophageal and gastric cardia stem cells than the test agent may be effective in the treatment or prevention of Barrett's esophagus.

~~84~~80. The method of claim ~~83~~79, wherein the test agent specifically binds to or reduces the mRNA expression of one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

~~85~~81. The method of claim ~~84~~80, wherein the test agent specifically binds to CDH17.

~~86~~82. The method of claim ~~84~~80, wherein the mRNA with reduced expression is CDH17.

~~87~~83. The method of claim ~~84~~80, wherein the test agent is also contacted with normal cells or tissue of the local alimentary canal, and the differential ability, if any, of the test agent to reduces the viability, growth or differentiation of the normal cells or tissue is compared to that with the BE stem cells.

~~88~~84. The method of claim ~~84~~80, wherein the BE stem cells are human BE stem cells.

~~89~~85. The method of claim ~~84~~80, wherein the test agent is selected for further drug development if the test agent reduces the viability, growth or ability to differentiation of the BE stem cells is reduced by at least 70%.

~~90~~86. The method of claim ~~84~~80, wherein the BE stem cells are provided as a clonal population of cells.

~~91~~87. The method of claim ~~84~~80, wherein the test agent is a small molecule, carbohydrate, peptide or nucleic acid.

~~92~~88. The method of claim ~~84~~80, wherein the test agent specifically binds to a cell surface protein on the clonal population of cells.

~~93~~89. The method of claim ~~84~~80, wherein the test agent is an antibody or antibody mimetic.

~~94~~90. A method of screening for an agent effective in the detection of Barrett's esophagus comprising

a) providing a BE stem cells;

b) providing one or more of esophageal and gastric cardia stem cells;

c) contacting the BE stem cells and one or more of esophageal and gastric cardia stem cells with the test agent; and

d) detecting the ability of the test agent to bind to the BE stem cells and one or more of esophageal and gastric cardia stem cells;

wherein if the test agent binds to the BE stem cells with greater affinity than it binds to one or more of esophageal and gastric cardia stem cells, the test agent may be an agent effective in the detection of Barrett's esophagus.

~~95~~91. The method of claim ~~94~~90, wherein the test agent specifically binds to one or more of CDH17, CLRN3, TM4SF4, FAM3B, NMUR2, MUC17, CEACAM7, ANXA13, SLC16A4, CD44, NPNT, PLBD1, TFF3 and REG4.

~~96~~92. The method of claim ~~95~~91, wherein the test agent specifically binds to CDH17.

~~97~~93. The method of claim ~~94~~90, wherein the BE stem cells are human BE stem cells.

~~98~~94. The method of claim ~~94~~90, wherein the BE stem cells are provided as a clonal population of cells.

~~99~~95. The method of claim ~~97~~93, wherein the test agent is also contacted with normal cells or tissue of the alimentary canal, and the differential ability, if any, of the test agent to bind to the normal cells or tissue is compared to that with the BE stem cells.

~~100~~96. The method of claim ~~94~~90, wherein the test agent is an antibody or antibody mimetic.

~~101~~97. The method of claim ~~100~~96, wherein the test agent is a monoclonal antibody.