## What is Claimed is:

1. A composition comprising a basal salt nutrient solution and an ErbB3 ligand, said composition being essentially free of serum.
2. The composition of claim 1, wherein said composition is free of exogenous insulin and insulin substitutes.
3. The composition of claim 2, further comprising insulin-like growth factor or a functional fragment thereof.
4. The composition of claim 2, wherein said ErbB3 ligand is selected from the group consisting of Neuregulin-1, Heregulin-β (HRG-β), Heregulin-α (HRG-α), Neu differentiation factor (NDF), acetylcholine receptor-inducing activity (ARIA), glial growth factor 2 (GGF2), motor-neuron derived factor (SMDF), Neuregulin-2, Neuregulin-2β (NRG2-β), Epiregulin, Biregulin and functional fragments thereof.
5. The composition of claim 4, wherein said ErbB3 ligand is HRG-β or a functional fragment thereof.
6. The composition of claim 5, further comprising transforming growth factor beta (TGF-β), a TGF-β family member or a functional fragment thereof.
7. The composition of claim 6, wherein said TGF-β family member is selected from the group consisting of Nodal, Activin A, Activin B, bone morphogenic protein-2 (BMP2), bone morphogenic protein-4 (BMP4), and functional fragments thereof.
8. The composition of claim 7, comprising Activin A.
9. The composition of claim 8, further comprising insulin-like growth factor or a functional fragment thereof.
10. The composition of claim 9, wherein said composition is free of exogenous fibroblast growth factor.
11. The composition of claim 9, further comprising at least one fibroblast growth factor (FGF) selected from the group consisting of FGF-2, FGF-7, FGF-10, FGF-22 and functional fragments thereof.
12. The composition of claim 11, wherein said at least one FGF is FGF-7, FGF-10 and FGF-22.
13. The composition of claim 12, further comprising a serum albumin (SA).

14. The composition of claim 13, wherein the SA is bovine SA (BSA) or human SA (HSA).

15. The composition of claim 14, wherein the concentration of the SA is more than about 0.2%, volume to volume (v/v).

16. The composition of claim 14, wherein the concentration of SA is less than about 5% v/v.

17. The composition of claim 16, further comprising at least one insoluble substrate.

18. The composition of claim 17, wherein the at least one insoluble substrate is selected from the group consisting of a collagen, a fibronectin and fragments thereof.

19. A composition comprising a basal salt nutrient solution and a means for stimulating ErbB2-directed tyrosine kinase activity in differentiable cells.

20. The composition of claim 19, wherein said means for stimulating ErbB2-directed tyrosine kinase activity comprises at least one ligand that specifically binds ErbB3 in said differentiable cells.

21. The composition of claim 20, wherein the differentiable cells are primate embryonic stem cells.

22. A method of culturing differentiable cells, said method comprising

a) plating the differentiable cells on a cell culture surface;

b) providing a basal salt nutrient solution to said differentiable cells; and

c) providing a ligand that specifically binds ErbB3.

23. The method of claim 22, wherein the differentiable cells are primate embryonic stem cells.

24. The method of claim 23, wherein neither insulin nor an insulin substitute is provided to said embryonic stem cells.

25. The method of claim 23, further comprising providing insulin-like growth factor or a functional fragment thereof to said embryonic stem cells.

26. The method claim 25, wherein said ligand that specifically binds ErbB3 is selected from the group consisting of Neuregulin-1, Heregulin-β (HRG-β), Heregulin-α (HRG-α), Neu differentiation factor (NDF), acetylcholine receptor-inducing activity (ARIA), glial growth factor 2 (GGF2), motor-neuron derived factor (SMDF), Neuregulin-2, Neuregulin-2β (NRG2-β), Epiregulin, Biregulin and functional fragments thereof.

27. The method of claim 26, wherein said ligand is HRG-β or a functional fragment thereof.

28. The method of claim 27, further comprising providing to said cells transforming growth factor beta (TGF-β), a TGF-β family member or a functional fragment thereof.

29. The method of claim 28, wherein said TGF-β family member is selected from the group consisting of Nodal, Activin A, Activin B, bone morphogenic protein-2 (BMP2), bone morphogenic protein-4 (BMP4), and functional fragments thereof.

30. The method of claim 29, further comprising providing insulin-like growth factor or a functional fragment thereof to said embryonic stem cells.

31. The method of claim 30, further comprising providing at least one fibroblast growth factor (FGF) selected from the group consisting of FGF-2, FGF-7, FGF-10, FGF-22 and functional fragments thereof to said embryonic stem cells.

32. The method of claim 31, wherein said at least one FGF is FGF-7, FGF-10 and FGF-22.

33. The method of claim 32, further comprising providing a serum albumin (SA) to said embryonic stem cells.

34. The method of claim 33, wherein the SA is bovine SA (BSA) or human SA (HSA).

35. The method of claim 34, wherein the concentration of the SA is more than about 0.2%, volume to volume (v/v).

36. The method of claim 35, wherein the concentration of SA is less than about 5% v/v.

37. The method of claim 36, further comprising providing at least one insoluble substrate to said embryonic stem cells.

38. The method of claim 37, wherein the at least one insoluble substrate is selected from the group consisting of a collagen, a fibronectin and fragments thereof.

39. A method of culturing differentiable cells, said method comprising

a) plating the differentiable cells on a cell culture surface;

b) providing a basal salt nutrient solution to said differentiable cells; and

c) providing a means for stimulating ErbB2-directed tyrosine kinase activity in said differentiable cells.

40. The method of claim 39, wherein the differentiable cells are primate stem cells.

41. The method of claim 39, wherein said providing a means for stimulating ErbB2-directed tyrosine kinase activity comprises providing a ligand that specifically binds ErbB3.

42. A method of culturing differentiable cells, said method comprising

a) providing a cell dissolution reagent to a layer of said differentiable cells to break apart said cells into single cells, said layer of differentiable cells being contained in a culture chamber prior to said digestion;

b) placing said single cells into a tissue culture chamber;

c) providing a cell culture solution, wherein said stem cell culture solution comprises a basal salt nutrient solution and an ErbB3 ligand; and

d) placing the cultured single cell in conditions that permit growth and division of said single cell.

CLAIMS:

1. A method of expanding number of pluripotent stem cells, the method comprising culturing pluripotent stem cells in a culture medium comprising a basal salt nutrient solution and an ErbB3 ligand, wherein the cell medium is essentially free of serum, wherein the pluripotent stem cells expand in number and do not differentiate.

2. The method of claim 1, wherein the culture medium is free of exogenous insulin and insulin substitutes.

3. The method of any one of claims 1 or 2, wherein the ErbB3 ligand in the culture medium is selected from the group consisting of Neuregulin-β, Heregulin-β(HRG-β), Heregulin-α (HRG-α), Neu differentiation factor (NDF), acetylcholine receptor-inducing activity (ARIA), glial growth factor 2 (GGF2), motor-neuron derived factor (SMDF), Neuregulin-2, Neuregulin-2β (NRG2-β), Epiregulin, Biregulin and functional fragments thereof.

4. The method of claim 3, wherein the ErbB3 ligand is HRG-β.

5. The method of any one of claims 1-4, wherein the culture medium further comprises transforming growth factor beta (TGF-β) or a TGF-β family member.

6. The method of claim 5, wherein the TGF-β family member is selected from the group consisting of Nodal, Activin A, Activin B, bone morphogenetic protein-2 (BMP2), and bone morphogenetic protein-4 (BMP4).

7. The method of claim 6, wherein the TGF-β family member is Activin A.

8. The method of any one of claims 1-7, wherein the cell medium is free of exogenous fibroblast growth factor.

9. The method of any one of claims 1-7, wherein the cell medium further comprises at least one fibroblast growth factor (FGF) selected from the group consisting of FGF-2, FGF-7, FGF-10, and FGF-22.

10. The method of claim 9, wherein the at least one FGF is FGF-7, FGF-10 and FGF-22.

11. The method of any one of claims 1-10, wherein the culture medium comprises a serum albumin (SA).

12. The method of claim 11, wherein the SA is bovine SA (BSA) or human SA (HSA).

13. The method of claim 11, wherein the concentration of the SA is more than about 0.2%, volume to volume (v/v).

14. The method of claim 11, wherein the concentration of SA is less than about 5% v/v.

15. The method of any one of claims 1-14, wherein the pluripotent stem cells are selected from the group consisting of embryonic stem (ES) cells, early primitive ectoderm-like (EPL) cells, inner cell mass (ICM)/epiblast cells, embryonic germ (EG) cells, and pluripotent cells derived by dedifferentiation or nuclear transfer.

16. The method of claim 15, wherein the pluripotent stem cells are (ES) cells.

17. The method of any one of claims 1-16, wherein the pluripotent stem cells are of human origin and wherein the culture medium comprises an activator of insulin like growth factor 1 receptor (IGF1R).

18. The method of claim 17, wherein the activator of IGF1R comprises insulin-like growth factor 1 (IGF1) or longR3-IGF1.

19. The method of any one of claims 1-16, wherein the pluripotent stem cells are of mouse origin and the culture medium further comprises leukemia inhibitory factor (LIF).

20. The method of any one of claims 1-19, wherein the culturing comprises culturing the pluripotent stem cells on a solid surface in an adherent culture.

21. The method of any one of claims 1-19, wherein the culturing comprises culturing the pluripotent stem cells in a suspension culture.

22. A method of identifying a compound that modulates proliferation and/or differentiation of pluripotent stem cells, the method comprising:

culturing the pluripotent stem cells in a culture medium comprising a basal salt nutrient solution, an ErbB3 ligand, and a candidate compound, wherein the cell medium is essentially free of serum;

determining whether an increase or decrease in proliferation and/or differentiation occurs in the pluripotent stem cells cultured with the compound relative to a control, wherein the increase or decrease indicates that the compound modulates proliferation and/or differentiation of the pluripotent stem cells.

23. The method of claim 22, wherein the culturing comprises culturing the pluripotent stem cells on a solid surface in an adherent culture.

24. The method of claim 22, wherein the culturing comprises culturing the pluripotent stem cells in a suspension culture.

25. The method of claim any one of claims 22-24, wherein the culture medium is free of exogenous insulin and insulin substitutes.

26. The method of any one of claims 22-25, wherein the ErbB3 ligand in the culture medium is selected from the group consisting of Neuregulin-β, Heregulin-β(HRG-β), Heregulin-α (HRG-α), Neu differentiation factor (NDF), acetylcholine receptor-inducing activity (ARIA), glial growth factor 2 (GGF2),

motor-neuron derived factor (SMDF), Neuregulin-2, Neuregulin-2β (NRG2-β), Epiregulin, Biregulin and functional fragments thereof.

27. The method of claim 26, wherein the ErbB3 ligand is HRG-β.

28. The method of any one of claims 22-27, wherein the culture medium further comprises transforming growth factor beta (TGF-β) or a TGF-β family member.

29. The method of claim 28, wherein the TGF-β family member is selected from the group consisting of Nodal, Activin A, Activin B, bone morphogenetic protein-2 (BMP2), and bone morphogenetic protein-4 (BMP4.

30. The method of claim 29, wherein the TGF-β family member is Activin A.

31. The method of any one of claims 22-30, wherein the cell medium is free of exogenous fibroblast growth factor.

32. The method of any one of claims 22-30, wherein the cell medium further comprises at least one fibroblast growth factor (FGF) selected from the group consisting of FGF-2, FGF-7, FGF-10, and FGF-22.

33. The method of claim 32, wherein the at least one FGF is FGF-7, FGF-10 and FGF-22.

34. The method of any one of claims 22-33, wherein the culture medium comprises a serum albumin (SA).

35. The method of claim 34, wherein the SA is bovine SA (BSA) or human SA (HSA).

36. The method of claim 34, wherein the concentration of the SA is more than about 0.2%, volume to volume (v/v).

37. The method of claim 34, wherein the concentration of SA is less than about 5% v/v.

38. The method of any one of claims 22-37, wherein the pluripotent stem cells are selected from the group consisting of embryonic stem (ES) cells, early primitive ectoderm-like (EPL) cells, inner cell mass (ICM)/epiblast cells, embryonic germ (EG) cells, and pluripotent cells derived by dedifferentiation or nuclear transfer.

39. The method of claim 38, wherein the pluripotent stem cells are (ES) cells.

40. The method of any one of claims 22-39, wherein the pluripotent stem cells are of human origin and wherein the culture medium comprises an activator of insulin like growth factor 1 receptor (IGF1R).

41. The method of claim 40, wherein the activator of IGF1R comprises insulin-like growth factor 1 (IGF1) or longR3-IGF1.

42. The method of any one of claims 22-39, wherein the pluripotent stem cells are of mouse origin and the culture medium further comprises leukemia inhibitory factor (LIF).