Claims

1. A production method of a retinal pigment epithelial cell comprising the following steps:
(1) a first step for culturing a pluripotent stem cell in a medium comprising an FGF receptor inhibitor and/or an MEK inhibitor for a period of not more than 30 days, and
(2) a second step for culturing the cell obtained in the first step in the presence of a Nodal signal transduction pathway inhibitor and/or a Wnt signal transduction pathway inhibitor to form a retinal pigment epithelial cell.

2. The production method according to claim 1, wherein the first step is performed in serum-free conditions.

3. The production method according to claim 1 or 2, wherein the first step is performed in the absence of feeder cells.

4. The production method according to any one of claims 1 to 3, wherein the medium in the first step further comprises a factor for maintaining an undifferentiated state.

5. The production method according to claim 4, wherein the factor for maintaining an undifferentiated state is an FGF signal transduction pathway agonist.

6. The production method according to claim 5, wherein the FGF signal transduction pathway agonist is bFGF.

7. The production method according to any one of claims 1 to 6, wherein the FGF receptor inhibitor is at least one kind selected from the group consisting of PD173074 and SU5402.

8. The production method according to any one of claims 1 to 7, wherein the MEK inhibitor is at least one kind selected from

the group consisting of PD0325901, PD184352, U0126, TAK-733 and AZD-8330.

9. The production method according to any one of claims 1 to 8, wherein the Nodal signal transduction pathway inhibitor is an Alk4, 5 or 7 inhibitor.

10. The production method according to claim 9, wherein the ALK4, 5 or 7 inhibitor is SB431542.

11. The production method according to any one of claims 1 to 10, wherein the Wnt signal transduction pathway inhibitor is CKI-7.

12. The production method according to any one of claims 1 to 11, wherein the pluripotent stem cell is a primate pluripotent stem cell.

13. The production method according to any one of claims 1 to 12, wherein the pluripotent stem cell is a human pluripotent stem cell.

14. The production method according to any one of claims 1 to 13, wherein the medium in the first step is a medium further comprising a BMP receptor inhibitor.

15. The production method according to claim 14, wherein the BMP receptor inhibitor is an ALK2/3 inhibitor.

16. The production method according to claim 15, wherein the ALK2/3 inhibitor is LDN193189.

17. The production method according to any one of claims 1 to 16, wherein the medium in the first step further comprises a Sonic hedgehog signal transduction pathway agonist.

18. The production method according to claim 17, wherein the Sonic hedgehog signal transduction pathway agonist is SAG.

19. The production method according to any one of claims 1 to 18, wherein the medium in the first step further comprises a PKC inhibitor.

20. The production method according to claim 19, wherein the PKC inhibitor is Go6983.

21. The production method according to any one of claims 1 to 20, wherein the culture period in the first step is a period sufficient for inducing gene expression of at least one of eye field transcription factors and of not more than 30 days, optionally wherein the eye field transcription factors are PAX6, LHX2 and SIX3.

22. The production method according to any one of claims 1 to 21, wherein the culture period in the first step is for 2 days to 13 days.

23. The production method according to any one of claims 1 to 22, wherein the culture period in the first step is for 4 days to 6 days.

24. A reagent for evaluating toxicity or efficacy of a test substance comprising a retinal pigment epithelial cell produced by the production method according to any one of claims 1 to 23.

25. A method of evaluating toxicity or efficacy of a test substance comprising contacting a retinal pigment epithelial cell produced by the production method according to any one of claims 1 to 23 with the substance, and assaying the effect of the substance on the cells.

26. An agent for treating a disease based on disorder of retinal pigment epithelial cells, comprising a retinal pigment epithelial cell produced by the production method according to any one of claims 1 to 23.

27. Use of a retinal pigment epithelial cells produced by the production method according to any one of claims 1 to 23 in the manufacture of a medicament for treating a disease based on disorder of retinal pigment epithelial cells.

28. A retinal pigment epithelial cell produced by the production method according to any one of claims 1 to 23 for use in the treatment of a disease based on disorder of retinal pigment epithelial cells.

29. A pharmaceutical composition comprising a retinal pigment epithelial cell produced by the production method according to any one of claims 1 to 23 as an active ingredient.