Claims

1. A method for producing a retinal progenitor cell, comprising
(1) a first step of subjecting pluripotent stem cells to floating culture in a serum-free medium to form an aggregate of pluripotent stem cells, and
(2) a second step of subjecting the aggregate formed in step (1) to floating culture in a serum-free medium or serum-containing medium each being free of a substance acting on the Sonic hedgehog signal transduction pathway that can enhance signal transduction mediated by Shh and containing a substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP at a concentration necessary for differentiation induction into retinal cells from day 1 or later from the start of the floating culture in step (1) until a cell expressing Rax gene appears, thereby obtaining an aggregate containing retinal progenitor cells.

2. A method for producing a retinal tissue, comprising
(1) a first step of subjecting pluripotent stem cells to floating culture in a serum-free medium to form an aggregate of pluripotent stem cells,
(2) a second step of subjecting the aggregate formed in step (1) to floating culture in a serum-free medium or serum-containing medium each being free of a substance acting on the Sonic hedgehog signal transduction pathway that can enhance signal transduction mediated by Shh and containing a substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP at a concentration necessary for differentiation induction into retinal cells from day 1 or later from the start of the floating culture in step (1) until a cell expressing Rax gene appears, thereby obtaining an aggregate containing retinal progenitor cells, and
(3) a third step of subjecting the aggregate formed in step (2) to floating culture in a serum-free medium or serum-

containing medium each being free of any of a substance acting on the Sonic hedgehog signal transduction pathway that can enhance signal transduction mediated by Shh, a substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP and a substance acting on the Wnt signal pathway that can enhance signal transduction mediated by Wnt, thereby obtaining an aggregate containing retinal tissues and being substantially free of non-neural head ectoderm.

3. A method for producing a retinal layer-specific neural cell,
comprising
(1) a first step of subjecting pluripotent stem cells to floating culture in a serum-free medium to form an aggregate of pluripotent stem cells,
(2) a second step of subjecting the aggregate formed in step (1) to floating culture in a serum-free medium or serum-containing medium each being free of a substance acting on the Sonic hedgehog signal transduction pathway that can enhance signal transduction mediated by Shh and containing a substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP at a concentration necessary for differentiation induction into retinal cells from day 1 or later from the start of the floating culture in step (1) until a cell expressing Rax gene appears, thereby obtaining an aggregate containing retinal progenitor cells, and
(3) a third step of subjecting the aggregate formed in step (2) to floating culture in a serum-free medium or serum-containing medium each being free of any of a substance acting on the Sonic hedgehog signal transduction pathway that can enhance signal transduction mediated by Shh, a substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP and a substance acting on the Wnt signal pathway that can enhance signal transduction mediated by Wnt until the intended retinal layer-specific neural cells appear, thereby

obtaining an aggregate containing retinal tissues containing the intended retinal layer-specific neural cells and being substantially free of non-neural head ectoderm.

4. The method according to any one of claims 1 to 3, wherein the pluripotent stem cells are primate pluripotent stem cells.

5. The method according to any one of claims 1 to 4, wherein the pluripotent stem cells are human pluripotent stem cells.

6. The method according to any one of claims 1 to 5, wherein the step (1) and step (2) are performed in the presence of a serum replacement.

7. The method according to any one of claims 1 to 6, wherein the floating culture is performed in the absence of a basement membrane preparation.

8. The method according to any one of claims 1 to 7, wherein the substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP is one or more proteins selected from the group consisting of BMP2, BMP4, BMP7 and GDF7.

9. The method according to any one of claims 1 to 8, wherein the substance acting on the BMP signal transduction pathway that can enhance signal transduction pathway mediated by BMP is added to the medium between day 1 and day 15 from the start of the floating culture in step (1).

10. A reagent for evaluating toxicity or drug efficacy, comprising an aggregate in which not less than 85% of the cells are RAX positive, wherein the aggregate contains a retinal progenitor cell, retinal tissue or retinal layer-specific neural cell produced by the method according to any one of claims 1 to 9.

11. A method of evaluating toxicity or drug efficacy of a test substance, comprising bringing an aggregate in which not less than 85% of the cells are RAX positive into contact with the test substance, wherein the aggregate contains a retinal progenitor cell, retinal tissue or retinal layer-specific neural cell produced by the method according to any one of claims 1 to 9, and examining the influence of the substance on the cell or tissue.

12. An aggregate in which not less than 85% of the cells are RAX positive, the aggregate comprising a retinal progenitor cell, a retinal tissue or a retinal layer-specific neural cell, the cell or tissue being produced by the method according to any one of claims 1 to 9.

13. Use of an aggregate in which not less than 85% of the cells are RAX positive, wherein the aggregate contains a retinal progenitor cell, a retinal tissue or a retinal layer-specific neural cell produced by the method according to any one of claims 1 to 9 in the manufacture of a medicament for treating a disease due to a disorder of a retinal tissue, wherein an effective amount of the medicament is to be transplanted to a subject in need of the transplantation.

14. An aggregate in which not less than 85% of the cells are RAX positive, wherein the aggregate contains a retinal progenitor cell, a retinal tissue or a retinal layer-specific neural cell produced by the method according to any one of claims 1 to 9, for use in the treatment of a disease due to a disorder of a retinal tissue.