CLAIMS

1. A hollow three-dimensional retinal tissue unit comprising, organized around an inner cavity, at least one layer of differentiated living human retinal pigment epithelium cells, with the basal side of each retinal pigment epithelium cell pointing outwards and the apical side pointing towards the inner cavity.

2. A retinal tissue unit according to Claim 1, characterized in that it also comprises an outer layer of extracellular matrix located on the basal side of the retinal pigment epithelium cells.

3. A retinal tissue unit according to Claim 1 or 2, characterized in that it is in the form of a hollow ovoid, a hollow cylinder, a hollow spheroid or a hollow sphere.

4. A retinal tissue unit according to Claim 1, 2 or 3, characterized in that its largest dimension is between 100 and 1,000 μm.

5. A retinal tissue unit according to any preceding claim, characterized in that its smallest dimension is between 10 and 1,000 μm.

6. A retinal tissue unit according to any preceding claim, characterized in that the juxtaposed retinal pigment epithelium cells are connected to one another on their lateral sides by tight junctions.

7. A retinal tissue unit according to any preceding claim, characterized in that it also comprises, on the apical side of the retinal pigment epithelium cells, organized around the inner cavity, at least one layer of differentiated living human retinal cells other than retinal pigment epithelium cells.

8. A retinal tissue unit according to any preceding claim, characterized in that the differentiated living human retinal cells other than retinal pigment epithelium cells are selected from rods, cones, ganglion cells, amacrine cells, bipolar cells and horizontal cells.

9. A retinal tissue unit according to any preceding claim, characterized in that it contains from 10 to 100,000 retinal cells.

10. A retinal tissue unit according to any preceding claim, characterized in that the retinal pigment epithelium cells and/or any other retinal cells were obtained from induced pluripotent stem cells (IPS).

11. A retinal tissue unit according to any preceding claim, characterized in that it is encapsulated in a hydrogel capsule.

12. A method for preparing a retinal tissue unit according to any preceding claim, comprising the steps of:

producing a cellular microcompartment comprising, within a hydrogel capsule:

optionally at least extracellular matrix elements, secreted by the cells or added;

cells capable of differentiating into at least retinal pigment epithelium cells or at least differentiated retinal pigment epithelium cells;

if the cells introduced into the microcompartment are cells capable of differentiating into at least retinal pigment epithelium cells: inducing cell differentiation within the cellular microcompartment, so as to obtain at least retinal pigment epithelium cells and possibly other retinal cells; and

removing the hydrogel capsules in order to recover the retinal pigment epithelium cells and any other retinal cells in the form of a hollow three-dimensional retinal tissue unit.

13. A method according to any preceding claim, characterized in that it comprises a step of amplifying the retinal pigment epithelium cells.

14. A method according to Claim 12 or 13, characterized in that the cells capable of differentiating into at least retinal pigment epithelium cells are pluripotent stem cells.

15. A method according to any preceding claim, characterized in that the pluripotent stem cells are induced pluripotent stem cells (IPS).

16. A method for preparing a retinal tissue unit according to Claim 13, 14 or 15, characterized in that it comprises a further step of loading said tissue unit into a surgical implantation device suitable for injection into the eye.

17. A kit for implanting tissue units according to any of Claims 1 to 11 into the eye, characterized in that the kit comprises:

between 1 and 10,000 tissue units according to any of Claims 1 to 11; and

a surgical implantation device capable of implanting said tissue unit(s) into a human eye.

18. A kit for implanting tissue units according to Claim 11 into the eye, characterized in that the kit comprises:

between 1 and 10,000 tissue units according to Claim 11;

hydrogel capsule removal means; and

a surgical implantation device capable of implanting said tissue unit(s) into a human eye.