The fibrin hydrogel layer can comprise from about 2 U of thrombin per mL to about 1500 U of thrombin per mL. The fibrin hydrogel layer can comprise from about 0.1 U of plasminogen per mL to about 40 U of plasminogen per mL or from about 0.001 U of plasminogen per mL to about 40 U of plasminogen per mL. In some cases, the fibrin hydrogel monolayer can be obtained autologously.

In another example, this document features a method for making a retinal implant. The method comprises culturing retinal epithelial cells on a fibrin basal support substrate in a medium comprising a protease inhibitor or an anti-fibrinolytic agent. In one aspect, the present disclosure refers to a method for making a retinal implant, wherein said method comprises culturing retinal epithelial cells directly on a fibrin basal support substrate comprising a fibrin hydrogel layer in a medium comprising a protease inhibitor or an anti-fibrinolytic agent to form a retinal pigment epithelium monolayer having an apical surface and a basal surface, wherein said basal surface is closer to said fibrin basal support substrate than said apical surface, wherein said apical surface is free of said fibrin basal support substrate, wherein said retinal implant lacks patches of degraded fibrin hydrogel within said fibrin hydrogel layer, wherein said fibrin hydrogel layer degrades when said retinal implant is implanted into an eye of a mammal, and wherein said retinal pigment epithelium monolayer is a flat, wrinkle-free monolayer. The medium can comprise the protease inhibitor, and the protease inhibitor can be aprotinin. The medium can comprise from about 5 U of aprotinin per mL to about 500 U of aprotinin per mL. The medium can comprise the anti-fibrinolytic agent, and the antifibrinolytic agent can be transexamic acid or aminocaproic acid. The medium can further comprise plasminogen. The medium can comprise from about 0.1 U of plasminogen per mL to about 40 U of plasminogen per mL or from about 0.001 U of plasminogen per mL to about 40 U of plasminogen per mL. The fibrin basal support substrate can comprise endothelial cells. The endothelial cells can be obtained from a source selected from the group consisting of iPSC-derived endothelial cells, blood outgrowth endothelial cells (BOEC), endothelial colony-forming cells (ECFCs), endothelial progenitor cells (EPCs), and umbilical vein endothelial cells (UVEC). The fibrin basal support substrate can comprise a coating. The coating can comprise basement membrane proteins, matrigel, or geltrex. The coating can be present prior to culturing the retinal epithelial cells on the fibrin basal support substrate. The fibrin basal support substrate can comprise sub-RPE tissue cell populations. The sub-RPE tissue cell populations can comprise melanocytes, pericytes, or fibroblasts. In some cases, the fibrin basal support substrate can be obtained autologously.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present disclosure, suitable methods and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety. In

WHAT IS CLAIMED IS:

1. A retinal implant comprising (a) a retinal pigment epithelium monolayer having an apical surface and a basal surface and that is a flat, wrinkle-free monolayer, and (b) a fibrin hydrogel layer directly attached to said basal surface of said monolayer, wherein said apical surface is free of a fibrin hydrogel layer, wherein said retinal implant lacks patches of degraded fibrin hydrogel within said fibrin hydrogel layer, and wherein said fibrin hydrogel layer degrades when said retinal implant is implanted into an eye of a mammal.

2. The implant of claim 1, wherein said fibrin hydrogel layer is from 20 μm to 400 μm thick.

3. The implant of claim 1, wherein said implant comprises plasminogen.

4. The implant of claim 1, wherein said implant comprises from 0.1 U of plasminogen per mL to 40 U of plasminogen per mL or from 0.001 U of plasminogen per mL to 40 U of plasminogen per mL.

5. A method for making a retinal implant, wherein said method comprises culturing retinal epithelial cells directly on a fibrin basal support substrate comprising a fibrin hydrogel layer in a medium comprising a protease inhibitor or an anti-fibrinolytic agent to form a retinal pigment epithelium monolayer having an apical surface and a basal surface, wherein said basal surface is closer to said fibrin basal support substrate than said apical surface, wherein said apical surface is free of said fibrin basal support substrate, wherein said retinal implant lacks patches of degraded fibrin hydrogel within said fibrin hydrogel layer, wherein said fibrin hydrogel layer degrades when said retinal implant is implanted into an eye of a mammal, and wherein said retinal pigment epithelium monolayer is a flat, wrinkle-free monolayer.

6. The method of claim 5, wherein said medium comprises said protease inhibitor, and said protease inhibitor is aprotinin.

7. The method of claim 6, wherein said medium comprises from 5 U of aprotinin per mL to 500 U of aprotinin per mL.

8. The method of claim 5, wherein said medium comprises said anti-fibrinolytic agent, and said antifibrinolytic agent is transexamic acid or aminocaproic acid.

9. The method of claim 5, wherein said medium further comprises plasminogen.

10. The method of claim 9, wherein said medium comprises from 0.1 U of plasminogen per mL to 40 U of plasminogen per mL or from 0.001 U of plasminogen per mL to 40 U of plasminogen per mL.

11. The method of claim 5, wherein said method further comprises culturing endothelial cells on said fibrin basal support substrate.

12. The method of claim 11, wherein said endothelial cells were obtained from a source selected from the group consisting of iPSC-derived endothelial cells, blood outgrowth endothelial cells (BOEC), endothelial colony-forming cells (ECFCs), endothelial progenitor cells (EPCs), and umbilical vein endothelial cells (UVEC).

13. The method of claim 5, wherein said method further comprises culturing sub-RPE tissue cell populations on said fibrin basal support substrate.

14. The method of claim 13, wherein said sub-RPE tissue cell populations comprise melanocytes, pericytes, or fibroblasts.