CLAIMS

1. A method for assessing phagocytosis activity comprising

incubating test cells with photoreceptor outer segments (POS) for a time and temperature sufficient for the cells to phagocytose the POS, wherein the POS are labeled with a fluorescent label that fluoresces more at an acidic pH than at a higher pH, and

detecting fluorescence intensity of the test cells after incubation, wherein an increase in fluorescence intensity compared to a control indicates phagocytosis of the POS by the test cells,

wherein the test cells are incubated with the POS at a temperature ranging from 25-40°C, and

wherein the control is control cells incubated with the POS at a temperature ranging from 10-16°C.

2. The method of claim 1, wherein the test cells are incubated with the POS at a temperature ranging from 34-40°C.

3. The method of claim 2, wherein the test cells are incubated with the POS at about 37ºC.

4. The method of any one of claims 1 to 3, wherein the test and control cells are incubated with the POS for 16-20 hours.

5. The method of any one of claims 1 to 4, wherein the POS are labeled with pH-sensitive rhodamine-based dye.

6. The method of any one of claims 1 to 5, wherein the control is control cells incubated with the POS at a temperature ranging from 12-15 ºC.

7. The method of any one of claims 1 to 6, wherein the POS are labeled with the fluorescent label having an increased fluorescence signal when internalized by phagocytosis into a low pH compartment in a cell relative to the fluorescence signal when present extracellularly; and

wherein the method comprises detecting an increased fluorescence, if any, in the test cells after incubation with the labeled POS relative to control, and quantifying the phagocytosis activity of the test cells therefrom.

8. A method for measuring phagocytosis activity comprising

measuring a test fluorescence in a first aliquot of a cell population incubated with a pH-sensitive rhodamine-based labeled component, at a temperature ranging from 25-40 °C, or 34-40 ºC, or about 37 ºC to obtain a test fluorescence, and

measuring a control fluorescence in a second aliquot of the cell population incubated with a pH-sensitive rhodamine-based labeled component, at a temperature ranging from 10-16 ºC or 12-15 ºC to obtain a control fluorescence,

wherein the pH-sensitive rhodamine-based labeled component comprises

pH-sensitive rhodamine-based labeled photoreceptor outer segments (POS),

pH-sensitive rhodamine-based labeled bacterial fragments, or

pH-sensitive rhodamine-based labeled photoreceptor outer segments (POS) and pH-sensitive rhodamine-based labeled bacterial fragments; and

wherein a test fluorescence that is greater than a control fluorescence indicates phagocytosis activity of the cell population.

9. The method of claim 8, wherein the first and second aliquots are incubated with pH-sensitive rhodamine-based labeled POS.

10. The method of claim 8, wherein the first and second aliquots are incubated with pH-sensitive rhodamine-based labeled bacterial fragments.

11. The method of claim 8, wherein the first and second aliquots are incubated with pH-sensitive rhodamine-based labeled POS and pH-sensitive rhodamine-based labeled bacterial fragments.

12. The method of any one of claims 8 to 11, wherein the first and second aliquots are incubated with pH-sensitive rhodamine-based labeled component for 16-20 hours.

13. The method of any one of claims 10 to 12, wherein the pH-sensitive rhodamine-based labeled bacterial fragments are pH-sensitive rhodamine-based bioparticles.

14. The method of any one of claims 8 to 13, wherein the first aliquot of the cell population is incubated with the pH-sensitive rhodamine-based labeled component at a temperature ranging from 34-40ºC.

15. The method of any one of claims 8 to 13, wherein the first aliquot of the cell population is incubated with the pH-sensitive rhodamine-based labeled component at a temperature of about 37ºC.

16. The method of any one of claims 8 to 15, wherein the second aliquot of the cell population is incubated with the pH-sensitive rhodamine-based labeled component at a temperature ranging from 12-15ºC.

17. The method of any one of claims 1 to 16, wherein the cells are enzyme digested prior to use or the cell population is enzyme digested prior to use.

18. The method of any one of claims 1 to 17, wherein the POS are fragmented POS, or are sonicated POS.

19. The method of any one of claims 1 to 18, wherein the cells are retinal pigment epithelium (RPE) cells; or the cell population is an RPE cell population.

20. The method of any one of claims 1 to 18, wherein the cells are photoreceptor progenitor cells; or the cell population is a photoreceptor progenitor cell population.

21. The method of any one of claims 1 to 20, wherein the cells are human cells; or the cell population is a human cell population.

22. The method of any one of claims 1 to 21 wherein the cells are provided as a cell culture, optionally an adherent cell culture; or the cell population is provided as a cell culture, optionally an adherent cell population.

23. The method of any one of claims 1 to 22, wherein the cells are provided as a confluent cell culture; or the cell population is provided as a confluent cell culture.

24. The method of any one of claims 1 to 23, wherein the cells are produced by *in vitro* differentiation of pluripotent stem cells; or the cell population is produced by *in vitro* differentiation of pluripotent stem cells.

25. The method of any one of claims 1 to 24, wherein fluorescence, fluorescence intensity, or fluorescence signal is detected or measured using a plate reader, or by flow cytometry.