WHAT IS CLAIMED IS:

1. A method for preparing a mammalian cell responsive to visual signals, comprising increasing the biological activity, in a retinal neuron cell, of one or more genes selected from the group consisting of:

   POU class 4 homeobox 2 (Brn3B)
   SRY-box transcription factor 4 (Sox4)
   Atonal BHLH Transcription Factor 7 (Atoh7),
   SRY-Box Transcription Factor 11 (Sox11), and
   ISL LIM homeobox 1 (Ils1).

2. The method of claim 1, wherein the one or more genes comprise Brn3B and Sox4.

3. The method of claim 2, wherein the one or more genes further comprise Atoh7.

4. The method of any one of claims 1-3, wherein the retinal neuron cell is a retinal interneuron cell selected from the group consisting of an amacrine cell, a horizontal cell, and a bipolar cell, or is a degenerated, damaged, or aged retinal ganglion cell (RGC).

5. The method of any one of claims 1-4, wherein the retinal neuron cell is a $Lgr5^+$ amacrine cell.

6. The method of any one of claims 1-4, wherein the retinal neuron cell is a $Prokr2^+$ displaced amacrine cell.

7. A method for improving the function of a retinal ganglion cell (RGC), comprising increasing the biological activity, in the RGC, of one or more genes selected from the group consisting of Atoh7, Brn3B, Sox4, Sox11, and Ils1.

8. The method of claim 7, wherein the RGC is a degenerated, damaged, aged, or normal retinal ganglion cell (RGC).

9. The method of any one of claims 1-8, wherein increasing the biological activity of the one or more genes comprises introducing to the retinal neuron cell one or more polynucleotide encoding the genes.

10. The method of claim 9, wherein the one or more polynucleotide is cDNA.

11. The method of claim 10, wherein the one or more polynucleotide is provided in a plasmid or viral vector.

12. The method of claim 11, wherein the viral vector is an adeno-associated viral (AAV) vector.

13. The method of claim 9, wherein the one or more polynucleotide is mRNA.

14. The method of any one of claims 1-8, wherein increasing the biological activity of the genes comprises introducing to the retinal neuron cell the corresponding proteins.

15. The method of any one of claims 1-8, wherein increasing the biological activity of the genes comprises activating the expression of the endogenous genes in the retinal neuron cell.

16. The method of any one of claims 1-15, wherein the retinal neuron cell is *in vivo* in a subject having visual impairment.

17. The method of any one of claims 1-15, wherein the retinal neuron cell is *in vitro*.

18. The method of claim 17, further comprising implanting the prepared mammalian cell that is responsive to visual signals to a subject having visual impairment.

19. Use of an agent that is capable of increasing the biological activity of one or more genes selected from the group consisting of Atoh7, Brn3B, Sox4, Sox11, and Ils1 for the preparation of a medicament to treat visual impairment or blindness.

20. A method for treating visual impairment or blindness in a subject in need thereof, comprising administering to the retina of the subject an agent capable of increasing the biological activity of one or more genes selected from the group consisting of Brn3B, Sox4, Atoh7, Sox11, and Ils1.

21. The use of claim 19 or the method of claim 20, wherein the one or more genes comprise Brn3B and Sox4.

22. The use of claim 19 or 20 or the method of claim 19 or 21, wherein the visual impairment or blindness is caused by degenerated retinal ganglion cells (RGCs).

23. The use or method of claim 22, wherein the visual impairment or blindness is associated with a condition selected from the group consisting of optic neuropathy, including glaucoma, hereditary optic neuropathy, and disorders caused by toxins, nutritional defects and trauma.

24. The use or method of claim 22, wherein the agent comprises one or more polynucleotide encoding the one or more genes.

25. The method of claim 20, wherein the administration is via intravitreal injection.

26. A nucleic acid construct comprising coding sequences encoding the Brn3B and Sox4 proteins, and a promoter associated with each coding sequence, wherein each promoter is active in retinal neuron cells.

27. The nucleic acid construct of claim 26, wherein at least one of the promoter is a promoter for the Pax6, Tcfap2b, Gad1, GlyT1, RBPMS, or Prox1 gene.

28. The nucleic acid construct of claim 26, wherein at least one of the promoter is a synapsin 1 promoter.

29. The nucleic acid construct of any one of claims 26-28, further comprising an expression vector which is a plasmid vector or viral vector.

30. The nucleic acid construct of claim 29, wherein the expression vector is an AAV vector.

31. The nucleic acid construct of claim 30, wherein the AAV is selected from the group consisting of AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9, AAV10, AAV11 and AAV12.

32. The nucleic acid construct of claim 30, wherein the AAV is of serotype AAV2.

33. The nucleic acid construct of claim 30, wherein the AAV is AAV2.7m8 or AAV7m8.

34. A cell transfected by the nucleic acid construct of any one of claims 26-33.

35. The cell of claim 34, which is a retinal neuron cell.

36. The cell of claim 35, which is responsive to visual signals.

37. A mammalian cell responsive to visual signals, prepared by increasing the biological activity of one or more genes selected from the group consisting of Brn3B, Sox4, Atoh7, Sox11, and Ils1 in a retinal neuron cell.

38. The mammalian cell of claim 37, which is prepared *in vitro*.

39. The mammalian cell of claim 37 or 38, which is a regenerated or rejuvenated retinal ganglion cell (RGC).