

CLAIMS**WHAT IS CLAIMED IS:**

1. A system for treating hearing loss, comprising:
a cochlear implant; and
a gene therapeutic construct, wherein the gene therapeutic construct comprises an expression vector for h-TMPRSS3.
2. The system of claim 1, wherein the expression vector further comprises an initial vector, an enhancer, a promoter, a bGH poly(A) signal, and a closing vector.
3. The system of claim 1, wherein the expression vector is an adeno-associated viral vector or a synthetic version of an adeno associated viral vector serotype.
4. The system of claim 3, wherein the expression vector of claim 2, wherein the adeno-associated viral vector is selected from the group consisting of AAV2, AAV2/Anc80, AAV5, AAV6, AAV6.2, AAV7, AAV8, AAV9, AAVrh8, AAVrh10, AAVrh39, AAVrh43, AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, Anc80, or a synthetic version of an adeno associated viral vector serotype
5. The system of claim 1, wherein the promoter is selected from the group consisting of: TMPRSS3 promoters, Myo7a promoters, human cytomegalovirus

(HCMV) promoters, cytomegalovirus/chicken beta-actin (CBA) promoters and Pou4f3 promoters.

6. The system of claim 1, wherein the enhancer is selected from the group consisting of: TMPRSS3 enhancers and human cytomegalovirus (HCMV) enhancers.

7. The system of claim 1, wherein the cochlear implant comprises:
a microphone, the microphone configured to receive sound;
a speech processor, the speech processor configured to select and/or arrange sounds received up by the microphone;
a transmitter and a receiver/stimulator, wherein the transmitter and the receiver/stimulator are configured to receive signals from the speech processor and convert them into electric impulses; and
an electrode.

8. A pharmaceutical composition for use in a method for the treatment or prevention of hearing loss said composition comprising an expression vector comprising an initial vector, an enhancer, a promoter, a bGH poly(A) signal, and a closing vector.

9. The pharmaceutical composition of claim 8, wherein the expression vector is an adeno-associated viral vector or a synthetic version of an adeno associated viral vector serotype.

10. The pharmaceutical composition of claim 9, wherein the adeno-associated viral vector is selected from the group consisting of AAV2, AAV2/Anc80, AAV5, AAV6, AAV6.2, AAV7, AAV8, AAV9, AAVrh8, AAVrh10, AAVrh39, AAVrh43, AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, Anc80, or a synthetic version of an adeno associated viral vector serotype

11. The pharmaceutical composition of claim 8, wherein the promoter is selected from the group consisting of: TMPRSS3 promoters, Myo7a promoters, human cytomegalovirus (HCMV) promoters, cytomegalovirus/chicken beta-actin (CBA) promoters and Pou4f3 promoters.

12. The pharmaceutical composition of claim 8, wherein the enhancer is selected from the group consisting of: TMPRSS3 enhancers and human cytomegalovirus (HCMV) enhancers.

13. A cell transfected with an expression for the treatment or prevention of hearing loss said expression vector comprising an initial vector, an enhancer, a promoter, a bGH poly(A) signal, and a closing vector.

14. The cell of claim 13, wherein the expression vector is an adeno-associated viral vector or a synthetic version of an adeno associated viral vector serotype

15. The cell of claim 14, wherein the adeno-associated viral vector is selected from the group consisting of AAV2, AAV2/Anc80, AAV5, AAV6, AAV6.2,

AAV7, AAV8, AAV9, AAVrh8, AAVrh10, AAVrh39, AAVrh43, AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, Anc80, or a synthetic version of an adeno associated viral vector serotype

16. The cell of claim 13, wherein the promoter is selected from the group consisting of: TMPRSS3 promoters, Myo7a promoters, human cytomegalovirus (HCMV) promoters, cytomegalovirus/chicken beta-actin (CBA) promoters and Pou4f3 promoters.

17. The cell of claim 13, wherein the cell is a stem cell.

18. The cell of claim 17, wherein the stem cell is an induced pluripotent stem cell.

19. A method for treating or preventing hearing loss in a subject in need thereof, comprising the steps of:

administering to the subject an effective amount of an expression vector comprising an initial vector, an enhancer, a promoter, a bGH poly(A) signal, and a closing vector; and

implanting a cochlear implant in the subject.

20. The method of claim 19, wherein the administration of the expression vector is performed prior to the implantation of the cochlear implant.

21. The method of claim 19, wherein the administration of the expression vector is performed subsequent to the implantation of the cochlear implant.

22. The method of claim 19, wherein the administration of the expression vector and the cochlear implant are performed concurrently.

23. The method of claim 19, wherein the expression vector is an adeno-associated viral vector or a synthetic version of an adeno associated viral vector serotype

24. The method of claim 23, wherein the adeno-associated viral vector is selected from the group consisting of AAV2, AAV2/Anc80, AAV5, AAV6, AAV6.2, AAV7, AAV8, AAV9, AAVrh8, AAVrh10, AAVrh39, AAVrh43, AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, Anc80 or a synthetic version of an adeno associated viral vector serotype

25. The method of claim 19, wherein the promoter is selected from the group consisting of: TMPRSS3 promoters, Myo7a promoters, human cytomegalovirus (HCMV) promoters, cytomegalovirus/chicken beta-actin (CBA) promoters and Pou4f3 promoters.

26. The method of claim 19, wherein the expression vector is administered by injection into the inner ear of the subject.

27. The method of claim 26, wherein the injection method is selected from the group consisting of cochleostomy, round window membrane, endolymphatic sac, scala media, canalostomy, scala media via the endolymphatic sac, or any combination thereof.

28. The method of claim 19, wherein the subject has one or more genetic risk factors associated with hearing loss.

29. The method of claim 28, wherein one of the genetic risk factors is selected from the group consisting of a mutation in the *TMPRSS3* gene or a mutation in the *LOXHD1* gene.

30. The method of claim 28, wherein the subject does not exhibit any clinical indicators of hearing loss.