

What Is Claimed Is:

1. A modified ligand gated ion channel (LGIC) comprising at least one modified LGIC subunit, said modified LGIC subunit comprising:
a human alpha 7 nicotinic acetylcholine receptor ($\alpha 7$ -nAChR) ligand binding domain (LBD) comprising a L131G amino acid substitution, a Q139L amino acid substitution, and/or a Y217F amino acid substitution, and an ion pore domain (IPD), wherein the IPD is an IPD from a receptor selected from the group consisting of a serotonin 3 receptor (5HT3) IPD, a glycine receptor (GlyR) IPD, a gamma-aminobutyric acid (GABA) receptor IPD, and an alpha 7 nicotinic acetylcholine receptor ($\alpha 7$ -nAChR) IPD.
2. The modified LGIC of claim 1, wherein an exogenous LGIC ligand activates the modified LGIC, and wherein the exogenous LGIC ligand is selected from the group consisting of compound 815, compound 816, and compound 817.
3. The modified LGIC of claim 1, wherein the modified LGIC subunit further comprises an endoplasmic reticulum export sequence.
4. The modified LGIC of claim 3, wherein the endoplasmic reticulum export sequence comprises the amino acid sequence set forth in SEQ ID NO:16.
5. The modified LGIC of claim 4, wherein the modified LGIC subunit comprises the amino acid sequence set forth in SEQ ID NO:13.
6. The modified LGIC of claim 1, wherein the modified LGIC subunit further comprises a CHRNB4 signal sequence.
7. The modified LGIC of claim 6, wherein the CHRNB4 signal sequence

comprises the amino acid sequence set forth in SEQ ID NO:17.

8. The modified LGIC of claim 7, wherein the modified LGIC subunit comprises the amino acid sequence set forth in SEQ ID NO:14.

9. The modified LGIC of claim 1, wherein the modified LGIC subunit further comprises a KCNB1 somatic targeting sequence.

10. The modified LGIC of claim 9, wherein the KCNB1 somatic targeting sequence comprises the amino acid sequence set forth in SEQ ID NO:18.

11. The modified LGIC of claim 10, wherein the modified LGIC subunit comprises the amino acid sequence set forth in SEQ ID NO:15.

12. The modified LGIC of claim 1, wherein said IPD is a human IPD.

13. A ligand gated ion channel (LGIC) comprising at least one chimeric LGIC subunit comprising:

 a human alpha 7 nicotinic acetylcholine receptor ($\alpha 7$ -nAChR) ligand binding domain (LBD),

 an ion pore domain (IPD), wherein the IPD is an IPD from a receptor selected from the group consisting of a serotonin 3 receptor (5HT3) IPD, a glycine receptor (GlyR) IPD, and a gamma-aminobutyric acid (GABA) receptor IPD; and

 an endoplasmic reticulum export sequence.

14. The LGIC of claim 13, wherein the endoplasmic reticulum export sequence comprises the amino acid sequence set forth in SEQ ID NO:16.

15. The LGIC of claim 14, wherein the chimeric LGIC subunit comprises

the amino acid sequence set forth in SEQ ID NO:13.

16. A ligand gated ion channel (LGIC) comprising at least one chimeric LGIC subunit comprising:

a human alpha 7 nicotinic acetylcholine receptor (α 7-nAChR) ligand binding domain (LBD),

an ion pore domain (IPD), wherein the IPD is an IPD from a receptor selected from the group consisting of a serotonin 3 receptor (5HT3) IPD, a glycine receptor (GlyR) IPD, and a gamma-aminobutyric acid (GABA) receptor IPD; and

a CHRNA4 signal sequence.

17. The LGIC of claim 16, wherein the CHRNA4 signal sequence comprises the amino acid sequence set forth in SEQ ID NO:17.

18. The LGIC of claim 17, wherein the chimeric LGIC subunit comprises the amino acid sequence set forth in SEQ ID NO:14.

19. A ligand gated ion channel (LGIC) comprising at least one chimeric LGIC subunit comprising:

a human alpha 7 nicotinic acetylcholine receptor (α 7-nAChR) ligand binding domain (LBD),

an ion pore domain (IPD), wherein the IPD is an IPD from a receptor selected from the group consisting of a serotonin 3 receptor (5HT3) IPD, a glycine receptor (GlyR) IPD, and a gamma-aminobutyric acid (GABA) receptor IPD;

and a KCNA1 somatic targeting sequence.

20. The LGIC of claim 19, wherein the KCNA1 somatic targeting sequence comprises the amino acid sequence set forth in SEQ ID NO:18.

21. The LGIC of claim 20, wherein the chimeric LGIC subunit comprises the amino acid sequence set forth in SEQ ID NO:15.