What is claimed is:

1. A pharmaceutical composition for use in treating malignant glioma, comprising an oligonucleotide targeting miR-138.

2. The pharmaceutical composition of claim 1, wherein the amount of the oligonucleotide is effective in suppressing glioma stem cell proliferation or inducing apoptosis in glioma stem cells.

3. The pharmaceutical composition of claim 1 or claim 2, wherein the oligonucleotide is a hairpin oligonucleotide.

4. The pharmaceutical composition of any of claims 1-3, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

5. The pharmaceutical composition of any of claims 1-4, wherein the oligonucleotide comprises the nucleotide sequence of 5' CGGCCTGATTCACAACACC AGCT-3' (SEQ ID NO: l).

6. The pharmaceutical composition of claim 5, wherein the oligonucleotide comprises the nucleotide sequence of 5'-GAGCTGGTATTGTGAATCAAGCAGCTT CCTGTCAGCGGCCTGATTCACAACACCAGCTTTTTT3' (SEQ ID NO:2).

7. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for treating malignant glioma in a subject in need thereof.

8. The use of claim 7, wherein the amount of the oligonucleotide is effective in suppressing glioma stem cell proliferation.

9. The use of claim 7, wherein the amount of the oligonucleotide is effective in inducing apoptosis in glioma stem cells.

10. The use of any of claims 7-9, wherein the subject is a human subject suffering from, suspected of having, or at risk for malignant glioma.

11. The use of any of claims 7-10, wherein the oligonucleotide is a hairpin oligonucleotide.

12. The use of any of claims 7-11, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

13. The use of any of claims 7-12, wherein the oligonucleotide comprises the nucleotide sequence of 5 '-CGGCCTGATTCACAACACCAGCT-3' (SEQ ID NO: 1).

14. The use of claim 13, wherein the oligonucleotide comprises the nucleotide sequence of 5 'GAGCTGGTATTGTGAATCAAGCAGCTTCCTGTCAGCGGCCTGATTC ACAACACCAGCTTTTTT3' (SEQ ID NO:2).

15. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for inhibiting glioma stem cell growth, where in the medicament is to be contacted with the glioma stem cells.

16. The use of claim 15, wherein the contacting step is to be performed by administering the oligonucleotide to a subject in need thereof.

17. The use of claim 16, wherein the subject is a human subject suffering from, suspected of having, or at risk for malignant glioma.

18. The use of any of claims 15-17, wherein the amount of the oligonucleotide is effective in suppressing proliferation of the glioma stem cells.

19. The use of any of claims 15-18, wherein the amount of the oligonucleotide is effective in inducing apoptosis in the glioma stem cells.

20. The use of any of claims 15-19, wherein the oligonucleotide is a hairpin oligonucleotide.

21. The use of any of claims 15-20, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

22. The use of any of claims 15-21, wherein the oligonucleotide comprises the nucleotide sequence of 5'-CGGCCTGATTCACAACACCAGCT-3' (SEQ ID NO:l).

23. The use of claim 22, wherein the oligonucleotide comprises the nucleotide sequence of 5'GAGCTGGTATTGTGAATCAAGCAGCTTCCTGTCAGCGGCCTGATTCA CAACACCAGCTTTTTT3' (SEQ ID NO:2).

24. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for prolonging survival of a subject suffering from malignant glioma.

25. The use of claim 24, wherein the amount of the oligonucleotide is effective in suppressing glioma stem cell proliferation.

26. The use of claim 24 or 25, wherein the amount of the oligonucleotide is effective in inducing apoptosis in glioma stein cells.

27. The use of any of claims 24-26, wherein the subject is a human malignant glioma patient.

28. The use of claim 27, wherein the human patient has undergone or is in the course of one or more additional malignant glioma treatments.

29. The use of claim 28, wherein the one or more additional malignant glioma treatments are surgery, radiotherapy, and/or chemotherapy.

30. The use of any of claims 24-29, wherein the oligonucleotide is a hairpin oligonucleotide.

31. The use of any of claims 24-30, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

32. The use of any of claims 24-31, wherein the oligonucleotide comprises the nucleotide sequence of 5'-CGGCCTGATTCACAACACCAGCT-3' (SEQ ID NO: 1).

33. The use of claim 32, wherein the oligonucleotide comprises the nucleotide sequence of 5'-GAGCTGGTATTGTGAATCAAGCAGCTTCCTGTCAGCGGCCTGATTC ACAACACCAGCTTTTTT-3' (SEQ ID NO:2).

34. A method for monitoring tumor progress in a malignant glioma patient, comprising:

quantifying levels of miR-138 in samples containing glioma stem cells that have been obtained from the patient at multiple time points, and

assessing whether malignant glioma progresses in the subject, wherein an increase in miR-138 levels over time indicates progress of malignant glioma.

~~35. The method of claim 34, wherein the malignant glioma patient is a human patient.~~

36. The method of claim 34, wherein the malignant glioma patient is a laboratory animal.

37. The method of any of claims 34-36, wherein the quantifying step is performed by quantitative real-time PCR or in situ hybridization.

38. A method for assessing efficacy of a malignant glioma treatment in a malignant glioma patient, the method comprising:

quantifying levels of miR-138 in samples containing tumor cells that have been obtained from the patient before, during, and/or after the treatment, and

assessing efficacy of the treatment based on the levels of miR-138,

wherein no change or a decrease in the levels of miR-138 after the treatment or along the course of the treatment indicates that the treatment is effective.

39. The method of claim 38, wherein the samples are obtained before and after the treatment and no change or a decrease in the level of miR-138 after the treatment indicates that the treatment is effective.

40. The method of claim 38, wherein the samples are obtained at multiple intervals during the treatment and no change or a decrease in the levels of miR-138 along the course of the treatment indicates that the treatment is effective.

41. The method of any of claims 38-40, wherein the malignant glioma patient is a human patient.

42. The method of any of claims 38-40, wherein the malignant glioma patient is a laboratory animal.

43. The method of any of claims 40-42, wherein the quantifying step is performed by quantitative real-time PCR or in situ hybridization.

44. A method for identifying glioma stem cells, comprising:

quantifying the level of miR-138 in a sample suspected of containing glioma stem cells, and

determining whether the sample contains glioma stem cells based on the level of miR-138,

wherein an elevated miR-138 level and/or a decreased level in the sample as compared to a predetermined standard indicates presence of glioma stem cells in the sample.

45. The method of claim 44, wherein the predetermined standard is the level of miR-138 in non-tumor cells.

46. The method of claim 45, wherein the non-tumor cells are neural stem cells.

47. The method of claim 44, wherein the sample is one that has been obtained from a human subject.

48. The method of claim 47, further comprising assessing whether the human subject is suspected of having or at risk for malignant glioma, wherein presence of glioma stem cells in the sample indicates that the human subject is suspected of having or at risk for malignant glioma.

49. The method of claim 47, wherein the human subject is a malignant glioma patient and the method further comprises assessing the risk of tumor progression or tumor metastasis in the patient, presence of glioma stem cells in the sample being indicative of an increased risk for malignant glioma progression or metastasis.

50. The method of any of claims 44-49, wherein the quantifying step is performed by quantitative real-time PCR or in situ hybridization.

What is claimed is:

1. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for treating malignant glioma in a subject in need thereof.

2. The use of claim 1, wherein the amount of the oligonucleotide is effective in suppressing glioma stem cell proliferation.

3. The use of claim 1, wherein the amount of the oligonucleotide is effective in inducing apoptosis in glioma stem cells.

4. The use of any of claims 1-3, wherein the subject is a human subject suffering from, suspected of having, or at risk for malignant glioma.

5. The use of any of claims 1-4, wherein the oligonucleotide is a hairpin oligonucleotide.

6. The use of any of claims 1-5, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

7. The use of any of claims 1-6, wherein the oligonucleotide comprises the nucleotide sequence of 5 '-CGGCCTGATTCACAACACCAGCT-3 ' (SEQ ID NO: 1).

8. The use of claim 7, wherein the oligonucleotide comprises the nucleotide sequence of 5 'GAGCTGGTATTGTGAATCAAGCAGCTTCCTGTCAGCGGCCTGATTC ACAACACCAGCTTTTTT3' (SEQ ID NO:2).

9. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for inhibiting glioma stem cell growth, wherein the medicament is to be contacted with the glioma stem cells.

10. The use of claim 9, wherein the contacting step is to be performed by administering the oligonucleotide to a subject in need thereof.

11. The use of claim 10, wherein the subject is a human subject suffering from, suspected of having, or at risk for malignant glioma.

12. The use of any of claims 9-11, wherein the amount of the oligonucleotide is effective in suppressing proliferation of the glioma stem cells.

13. The use of any of claims 9-12, wherein the amount of the oligonucleotide is effective in inducing apoptosis in the glioma stem cells.

14. The use of any of claims 9-13, wherein the oligonucleotide is a hairpin oligonucleotide.

15. The use of any of claims 9-14, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

16. The use of any of claims 9-15, wherein the oligonucleotide comprises the nucleotide sequence of 5'-CGGCCTGATTCACAACACCAGCT-3' (SEQ ID NO:l).

17. The use of claim 16, wherein the oligonucleotide comprises the nucleotide sequence of 5'GAGCTGGTATTGTGAATCAAGCAGCTTCCTGTCAGCGGCCTGATTCA CAACACCAGCTTTTTT3' (SEQ ID NO:2).

18. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for prolonging survival of a subject suffering from malignant glioma.

19. The use of claim 18, wherein the amount of the oligonucleotide is effective in suppressing glioma stem cell proliferation.

20. The use of claim 18 or 19, wherein the amount of the oligonucleotide is effective in inducing apoptosis in glioma stem cells.

21. The use of any of claims 18-20, wherein the subject is a human malignant glioma patient.

22. The use of claim 21, wherein the human patient has undergone or is in the course of one or more additional malignant glioma treatments.

23. The use of claim 22, wherein the one or more additional malignant glioma treatments are surgery, radiotherapy, and/or chemotherapy.

24. The use of any of claims 18-23, wherein the oligonucleotide is a hairpin oligonucleotide.

25. The use of any of claims 18-24, wherein one or more of the nucleotides in the oligonucleotide are modified by a 2'-O-methoxy group, a 2'-O-methoxyethyl group, or a phosphorothioate group.

26. The use of any of claims 18-25, wherein the oligonucleotide comprises the nucleotide sequence of 5'-CGGCCTGATTCACAACACCAGCT-3' (SEQ ID NO: 1).

27. The use of claim 26, wherein the oligonucleotide comprises the nucleotide sequence of 5'-GAGCTGGTATTGTGAATCAAGCAGCTTCCTGTCAGCGGCCTGATTC ACAACACCAGCTTTTTT-3' (SEQ ID NO:2).

28. A method for monitoring tumor progress in a malignant glioma patient, comprising:

quantifying levels of miR-138 in samples containing glioma stem cells that have been obtained from the patient at multiple time points, and

assessing whether malignant glioma progresses in the subject, wherein an increase in miR-138 levels over time indicates progress of malignant glioma.

29. The method of claim 28, wherein the malignant glioma patient is a human patient.

30. The method of claim 28, wherein the malignant glioma patient is a laboratory animal.

31. The method of any of claims 28-30, wherein the quantifying step is performed by quantitative real-time PCR or in situ hybridization.

32. A method for assessing efficacy of a malignant glioma treatment in a malignant glioma patient, the method comprising:

quantifying levels of miR-138 in samples containing tumor cells that have been obtained from the patient before, during, and/or after the treatment, and

assessing efficacy of the treatment based on the levels of miR-138,

wherein no change or a decrease in the levels of miR-138 after the treatment or along the course of the treatment indicates that the treatment is effective.

33. The method of claim 32, wherein the samples are obtained before and after the treatment and no change or a decrease in the level of miR-138 after the treatment indicates that the treatment is effective.

34. The method of claim 32, wherein the samples are obtained at multiple intervals during the treatment and no change or a decrease in the levels of miR-138 along the course of the treatment indicates that the treatment is effective.

35. The method of any of claims 32-34, wherein the malignant glioma patient is a human patient.

36. The method of any of claims 32-34, wherein the malignant glioma patient is a laboratory animal.

37. The method of any of claims 34-36, wherein the quantifying step is performed by quantitative real-time PCR or in situ hybridization.

38. A method for identifying glioma stem cells, comprising:

quantifying the level of miR-138 in a sample suspected of containing glioma stem cells, and

determining whether the sample contains glioma stem cells based on the level of miR-138,

wherein an elevated miR-138 level and/or a decreased level in the sample as compared to a predetermined standard indicates presence of glioma stem cells in the sample.

39. The method of claim 38, wherein the predetermined standard is the level of miR-138 in non-tumor cells.

40. The method of claim 39, wherein the non-tumor cells are neural stem cells.

41. The method of claim 38, wherein the sample is one that has been obtained from a human subject.

42. The method of claim 41, further comprising assessing whether the human subject is suspected of having or at risk for malignant glioma, wherein presence of glioma stem cells in the sample indicates that the human subject is suspected of having or at risk for malignant glioma.

43. The method of claim 41, wherein the human subject is a malignant glioma patient and the method further comprises assessing the risk of tumor progression or tumor metastasis in the patient, presence of glioma stem cells in the sample being indicative of an increased risk for malignant glioma progression or metastasis.

44. The method of any of claims 38-43, wherein the quantifying step is performed by quantitative real-time PCR or in situ hybridization.

45. Use of an oligonucleotide targeting miR-138 in the manufacture of a medicament for treating cancer in a subject in need thereof.

46. The use of any one of claims 1-5, 9-14 or 18-24, wherein one or more of the nucleotides in the oligonucleotide are modified by Locked nucleic acids (LNA).