CLAIMS

1. An *in vitro* mammalian oocyte maturation medium when used for increasing maturation of a mammalian oocyte, the medium comprising species-specific granulocyte macrophage-colony stimulating factor (GM-CSF), wherein the level of maturation is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF, and wherein an embryo derived from the oocyte cultured in the oocyte maturation medium has improved development.

2. The medium of claim 1, wherein the GM-CSF increases developmental competence of the oocyte, and wherein the level of developmental competence is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF.

3. The medium of claim 1 or claim 2, wherein an embryo derived from the oocyte cultured in the medium has one or more of an increased on time blastocyst development, an increased blastocyst inner cell mass number, increased blastocyst rate, increased trophectoderm cell number, increased blastocyst total cell number, and increased viability.

4. The medium of any one of claims 1 to 3, wherein a blastocyst derived from the oocyte cultured in the medium has decreased DNA damage.

5. The medium of any one of claims 1 to 4, wherein one or more of implantation, pregnancy rate, and development to term, in a recipient following transfer of an embryo derived from the oocyte cultured in the medium to the recipient, is increased.

6. The medium of any one of claims 1 to 5, wherein the mammalian oocyte is selected from the group consisting of a human oocyte, a bovine oocyte, a porcine oocyte, an equine oocyte, a canine oocyte, a feline oocyte, a murine oocyte, an ovine oocyte, and a non-human primate oocyte.

7. The medium of any one of claims 1 to 6, wherein the mammalian oocyte is from an aged and/or obese subject.

8. The medium any one of claims 1 to 7, wherein the amount of GM-CSF present in the medium is about 0.1 ng/ml to about 100 ng/ml.

9. A method of *in vitro* maturation of a mammalian oocyte, the method comprising culturing the oocyte *in vitro* in a medium of any one of claims 1 to 8.

10. A method of increasing maturation of a mammalian oocyte *in vitro*, the method comprising culturing the oocyte *in vitro* in a mammalian oocyte maturation medium comprising species-specific granulocyte macrophage-colony stimulating factor (GM-CSF), wherein the level of maturation is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF, and wherein an embryo derived from the oocyte cultured in the oocyte maturation medium has improved development.

11. The method of claim 10, wherein the GM-CSF increases developmental competence of the oocyte, and wherein the level of developmental competence is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF.

12. The method of claim 10 or claim 11, wherein an embryo derived from the oocyte cultured in the medium has one or more of an increased on time blastocyst development, an increased blastocyst inner cell mass number, increased blastocyst rate, increased trophectoderm cell number, increased blastocyst total cell number, and increased viability.

13. The method of any one of claims 10 to 12, wherein a blastocyst derived from the oocyte cultured in the medium has decreased DNA damage.

14. The method of any one of claims 10 to 13, wherein one or more of implantation, pregnancy rate, and development to term, in a recipient following transfer of an embryo derived from the oocyte cultured in the medium to the recipient, is increased.

15. The method of any one of claims 10 to 14, wherein the mammalian oocyte is selected from the group consisting of a human oocyte, a bovine oocyte, a porcine oocyte, an equine oocyte, a canine oocyte, a feline oocyte, a murine oocyte, an ovine oocyte, and a non-human primate oocyte.

16. The method of any one of claims 10 to 15, wherein the mammalian oocyte is from an aged and/or obese subject.

17. The method of any one of claims 10 to 16, wherein the amount of GM-CSF present in the medium is about 0.1 ng/ml to about 100 ng/ml.

18. A method of increasing developmental competence of a mammalian oocyte *in vitro*, the method comprising culturing the oocyte *in vitro* in a mammalian oocyte maturation medium comprising species-specific granulocyte macrophage-colony stimulating factor (GM-CSF), wherein the level of developmental competence is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF, and wherein an embryo derived from the oocyte cultured in the oocyte maturation medium has improved development.

19. The method of claim 18, wherein an embryo derived from the oocyte cultured in the medium has one or more of an increased on time blastocyst development, an increased blastocyst inner cell mass number, increased blastocyst rate, increased trophectoderm cell number, increased blastocyst total cell number, and increased viability.

20. The method of claim 18 or claim 19, wherein a blastocyst derived from the oocyte cultured in the medium has decreased DNA damage.

21. The method of any one of claims 18 to 20, wherein one or more of implantation, pregnancy rate, and development to term, in a recipient following transfer of an embryo derived from the oocyte cultured in the medium to the recipient, is increased.

22. The method of any one of claims 18 to 21, wherein the mammalian oocyte is selected from the group consisting of a human oocyte, a bovine oocyte, a porcine oocyte, an equine oocyte, a canine oocyte, a feline oocyte, a murine oocyte, an ovine oocyte, and a non-human primate oocyte.

23. The method of any one of claims 18 to 22, wherein the mammalian oocyte is from an aged and/or obese subject.

24. The method of any one of claims 18 to 23, wherein the amount of GM-CSF present in the medium is about 0.1 ng/ml to about 100 ng/ml.

25. Granulocyte macrophage-colony stimulating factor (GM-CSF) when used in a culture medium when used for increasing maturation of a mammalian oocyte *in vitro* or when used for increasing developmental competence of a mammalian oocyte *in vitro*, wherein the GM-CSF is species-specific, wherein the level of maturation or developmental competence is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF, and wherein an embryo derived from the oocyte cultured in the culture medium has improved development.

26. The GM-CSF of claim 25, wherein an embryo derived from a mammalian oocyte cultured in the medium has one or more of an increased on time blastocyst development, an increased blastocyst inner cell mass number, increased blastocyst rate, increased trophectoderm cell number, increased blastocyst total cell number, and increased viability.

27. The GM-CSF of claim 25 or claim 26, wherein a blastocyst derived from a mammalian oocyte cultured in the medium has decreased DNA damage.

28. The GM-CSF of claim 25, wherein one or more of implantation, pregnancy rate, and development to term, in a recipient following transfer of an embryo derived from a mammalian oocyte cultured in the medium to the recipient, is increased.

29. The GM-CSF of any one of claims 25 to 28, wherein the mammalian oocyte is selected from the group consisting of a human oocyte, a bovine oocyte, a porcine oocyte, an equine oocyte, a canine oocyte, a feline oocyte, a murine oocyte, an ovine oocyte, and a non-human primate oocyte.

30. The GM-CSF of any one of claims 25 to 29, wherein the mammalian oocyte is from an aged and/or obese subject.

31. The GM-CSF of any one of claims 25 to 30, wherein the amount of GM-CSF present in the medium is about 0.1 ng/ml to about 100 ng/ml.

32. A combination product when used for increasing maturation of a mammalian oocyte *in vitro* or when used for increasing developmental competence of a mammalian oocyte *in vitro*, the combination product comprising:

(i) a culture medium;

(ii) granulocyte macrophage-colony stimulating factor (GM-CSF) which is species-specific for the mammalian oocyte to be cultured in the culture medium; and optionally

(iii) instructions for culturing the mammalian oocyte in the medium together with the GM-CSF,

wherein the level of maturation or developmental competence is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF, and wherein an embryo derived from the mammalian oocyte cultured in the culture medium with the GM-CSF has improved development.

33. The combination product of claim 32, wherein an embryo derived from the mammalian oocyte cultured in the medium with the GM-CSF has one or more of an increased on time blastocyst development, an increased blastocyst inner cell mass number, increased blastocyst rate, increased trophectoderm cell number, increased blastocyst total cell number, and increased viability.

34. The combination product of claim 32 or claim 33, wherein a blastocyst derived from a mammalian oocyte cultured in the medium with the GM-CSF has decreased DNA damage.

35. The combination product of claim 32, wherein one or more of implantation, pregnancy rate, and development to term, in a recipient following transfer of an embryo derived from the mammalian oocyte cultured in the medium with the GM-CSF to the recipient, is increased.

36. The combination product of any one of claims 32 to 35, wherein the mammalian oocyte is selected from the group consisting of a human oocyte, a bovine oocyte, a porcine oocyte, an equine oocyte, a canine oocyte, a feline oocyte, a murine oocyte, an ovine oocyte, and a non-human primate oocyte.

37. The combination product of any one of claims 32 to 36, wherein the mammalian oocyte is from an aged and/or obese subject.

38. A combination product when used for increasing maturation of a mammalian oocyte *in vitro* or when used for increasing developmental competence of a mammalian oocyte *in vitro*, the combination product comprising:

(i) a mammalian oocyte maturation medium comprising species-specific granulocyte macrophage-colony stimulating factor (GM-CSF); and

(ii) instructions for culturing the mammalian oocyte in the medium,

wherein the level of maturation or developmental competence is greater than that of a mammalian oocyte of the same species when cultured in a medium which does not comprise GM-CSF, and wherein an embryo derived from the mammalian oocyte cultured in the medium has improved development.

39. The combination product of claim 38, wherein an embryo derived from the mammalian oocyte cultured in the medium has one or more of an increased on time blastocyst development, an increased blastocyst inner cell mass number, increased blastocyst rate, increased trophectoderm cell number, increased blastocyst total cell number, and increased viability.

40. The combination product of claim 38 or claim 39, wherein a blastocyst derived from the mammalian oocyte cultured in the medium has decreased DNA damage.

41. The combination product of claim 38, wherein one or more of implantation, pregnancy rate, and development to term, in a recipient following transfer of an embryo derived from the mammalian oocyte cultured in the medium to the recipient, is increased.

42. The combination product of any one of claims 38 to 41, wherein the mammalian oocyte is selected from the group consisting of a human oocyte, a bovine oocyte, a porcine oocyte, an equine oocyte, a canine oocyte, a feline oocyte, a murine oocyte, an ovine oocyte, and a non-human primate oocyte.

43. The combination product of any one of claims 38 to 42, wherein the mammalian oocyte is from an aged and/or obese subject.