Claims:

1. Genetically modified mesenchymal stem cells for the treatment of a subject afflicted with a tumor, wherein each genetically modified mesenchymal stem cell comprises an exogenous nucleic acid comprising (i) a cytotoxic protein-encoding region operably linked to (ii) a promoter or promoter/enhancer combination, whereby the cytotoxic protein is selectively expressed when the genetically modified mesenchymal stem cells come into proximity with the tumor's stromal tissue when a therapeutically effective number of the stem cells is introduced into the subject's bloodstream~~.~~; and wherein the promoter is the RANTES promoter.

2. The genetically modified mesenchymal stem cells of claim 1, wherein the subject is human.

3. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the tumor is metastatic.

4. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the tumor is vascularized.

5. The genetically modified mesenchymal stem cells of any of the claims 1 to 3, wherein the tumor is not vascularized.

6. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the genetically modified mesenchymal stem cells are $CD34^-$ stem cells.

7. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the genetically modified mesenchymal stem cells are allogenic with respect to the subject.

8. The genetically modified mesenchymal stem cells of any of the claims 1 to 6, wherein the genetically modified mesenchymal stem cells are autologous with respect to the subject.

9. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the tumor's stromal tissue comprises fibroblast-like cells.

10. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the introduction of the genetically modified mesenchymal stem cells is not preceded, accompanied or followed by myeloablation.

11. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the tumor is selected from the group consisting of a prostate tumor, a breast tumor, a pancreatic tumor, a squamous cell carcinoma, ~~a breast tumor,~~ a melanoma, a basal cell carcinoma, a hepatocellular carcinoma, testicular cancer, a neuroblastoma, a glioma or a malignant astrocytic tumor such as glioblastma multiforme, a

colorectal tumor, an endometrial carcinoma, a lung carcinoma, an ovarian tumor, a cervical tumor, an osteosarcoma, a rhabdo/leiomyosarcoma, a synovial sarcoma, an angiosarcoma, an Ewing sarcoma/PNET and a malignant lymphoma.

12. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the tumor is a pancreatic tumor.

~~13. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the promoter is the RANTES promoter.~~

~~14.~~13. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the cytotoxic protein is Herpes simplex viral thymidine kinase, and the subject is treated with ganciclovir in a manner permitting the Herpes simplex viral thymidine kinase to render the ganciclovir cytotoxic.

~~15.~~14. The genetically modified mesenchymal stem cells of any of the preceding claims, wherein the therapeutically effective number of genetically modified mesenchymal stem cells is from about 1×10^5 to about 1×10^9 cells/kg body weight.

~~16.~~15. The modified mesenchymal stem cells of any of the preceding claims, wherein the therapeutically effective number of genetically modified mesenchymal

stem cells is from about 1 x 10^6 to about 1 x 10^8 cells/kg body weight.

~~17.~~16. The modified mesenchymal stem cells of claim ~~16~~15, wherein the therapeutically effective number of genetically modified mesenchymal stem cells is from about 5 x 10^6 to about 2 x 10^7 cells/kg body weight.

~~18.~~17. Genetically modified $CD34^-$ stem cells for treating a human subject afflicted with a pancreatic tumor; wherein the stem cells are to be introduced into the subject's bloodstream from about 5 x 10^6 to about 2 x 10^7 cells/kg body weight of the genetically modified $CD34^-$ stem cells, wherein (a) each genetically modified $CD34^-$ stem cell contains an exogenous nucleic acid comprising (i) a Herpes simplex viral thymidine kinase-encoding region operably linked to (ii) a RANTES promoter, (b) the subject is treated with ganciclovir in a manner permitting the Herpes simplex viral thymidine kinase to render the ganciclovir cytotoxic, and (c) the introduction of the genetically modified mesenchymal stem cells is not preceded, accompanied or followed by myeloablation.

~~19.~~18. The genetically modified $CD34^-$ stem cells of claim ~~18~~17, wherein the tumor is metastatic.

~~20.~~19. The genetically modified $CD34^-$ stem cells of any of the claims ~~18~~17 or ~~19~~18, wherein the tumor is vascularized.

~~21.~~20. The genetically modified $CD34^-$ stem cells of claim ~~19~~18, wherein the tumor is not vascularized.

~~22.~~21. The genetically modified CD34⁻ stem cells of any of the claims ~~18~~17 to ~~21~~20, wherein the genetically modified mesenchymal stem cells are allogenic with respect to the subject.

~~23.~~22. The genetically modified CD34⁻ stem cells of any of the claims ~~18~~17 to ~~21~~20, wherein the genetically modified mesenchymal stem cells are autologous with respect to the subject.

~~24.~~23. A genetically modified mesenchymal stem cell comprising an exogenous nucleic acid comprising (i) a cytotoxic protein-encoding region operably linked to (ii) a promoter or promoter/enhancer combination, whereby the cytotoxic protein is selectively expressed when the genetically modified mesenchymal stem cell comes into proximity with a tumor's stromal tissue; and wherein the promoter is the RANTES promoter.

~~25.~~24. The stem cell of claim ~~24~~23, wherein the stem cell is a human stem cell.

~~26.~~25. The stem cell of any of the claims ~~24~~23 or ~~25~~24, wherein the stem cell is a CD34⁻ stem cell.

~~27. The stem cell of any of the claims 24 to 26, wherein the promoter or promoter/enhancer combination is inducible by inflammatory mediators.~~

~~28. The stem cell of the preceding claim, wherein the promoter or promoter/enhancer combination is inducible by cytokines.~~

~~29. The stem cell of any of the claims 24 to 28, wherein the promoter is the RANTES promoter.~~

~~30.~~26. The stem cell of any of the claims ~~24~~23 to ~~29~~25, further comprising a (iii) selection marker gene operably linked to (iv) a constitutive promoter or promoter/enhancer combination.

~~31.~~27. The stem cell of claim ~~30~~26, wherein the selection marker gene comprises an antibiotic resistance gene or a gene encoding a surface marker protein.

~~32.~~28. The stem cell of any of the claims ~~30~~26 or ~~31~~27, further comprising an (v) insulator sequence located between the cytotoxic protein-encoding region and the surface marker gene.

~~33.~~29. The stem cell of any of the claims ~~24~~23 to ~~32~~28, wherein the cytotoxic protein-encoding region operably linked to the promoter or promoter/enhancer combination is integrated into the stem cell genome.

~~34.~~30. The stem cell of any of the claims ~~30~~26 to ~~32~~28, wherein the selection marker gene operably linked to the constitutive promoter or promoter/enhancer combination is integrated into the stem cell genome.

~~35.~~31. The stem cell of any of the claims ~~33~~29 or ~~34~~30, further comprising a proviral sequence integrated into the stem cell genome, wherein the cytotoxic protein-encoding region operably linked to the promoter or promoter/enhancer combination and the selection marker gene operably linked to the constitutive promoter or promoter/enhancer combination are a part of the proviral sequence.

~~36.~~32. The stem cell of claim ~~35~~31, wherein the proviral sequence is a lentiviral, alpha-retroviral or gamma-retroviral sequence.

~~37.~~33. The stem cell of any of the claims ~~24~~23 to ~~36~~32, wherein the cytotoxic protein is Herpes simplex viral thymidine kinase or cytosine deaminase.

~~38.~~34. A retroviral packaging cell comprising:

- a retroviral vector including (i) a cytotoxic protein-encoding region operably linked to (ii) a promoter or promoter/enhancer combination, inducible by inflammatory mediators, and
- a gene encoding a viral surface protein providing a tropism for mesenchymal or CD34- stem cells; wherein the promoter is the RANTES promoter.

~~39. The retroviral packaging cell according to the previous claim, wherein the promoter or promoter/enhancer combination is inducible by cytokines.~~

~~40. The retroviral packaging cell according to the previous claims 38 or 39, wherein the promoter is the RANTES promoter.~~

~~41.~~35. A genetically modified human $CD34^-$ stem cell comprising an exogenous nucleic acid comprising (i) a Herpes simplex viral thymidine kinase-encoding region operably linked to (ii) a RANTES promoter.