CLAIMS

What is claimed is:

1. A growth medium for culturing mesenchymal stem cells comprising:

    a) a serum from 0.1 percent to 50 percent by volume;

    b) a fibroblast growth factor from 1 pg/ml to 100 ng/ml; and

    c) either:

        i) an L-cysteine from 1 nM to 100 mM;

        ii) a glutathione from 1 nM to 100 mM; or

        iii) an N-acetyl cysteine from 1 nM to 100 mM; and

    wherein the growth medium is adapted for mesenchymal stem cells to be cultured within the growth medium without morphological or functional changes.

2. The growth medium of claim 1, further comprising at least one component comprising:

    a) an epidermal growth factor;

    b) a hydrocortisone;

    c) a calcium chloride;

    d) an insulin;

    e) a pituitary extract;

    f) a selenium;

    g) a stromal-derived factor;

    h) a sodium pyruvate;

    i) a transferrin; or

j) a serum-free medium.

3. The growth medium of claim 2, wherein the growth medium comprises the at least one component if present in the following amounts:

a) epidermal growth factor from 1 pg/mL to 100 ng/mL;

b) hydrocortisone from 1 pg/mL to100 µg/mL;

c) calcium chloride from 1 nM to 100 mM;

d) insulin from 1 ng/mL to 100 mg/mL;

e) pituitary extract from 1 pg/mL to 100 mg/mL;

f) selenium from 1 pg/mL to 100 mg/mL;

g) stromal-derived factor from 1 pg/mL to 100 ng/mL;

h) sodium pyruvate from 1 ng/mL to 100 mg/mL;

i) transferrin from about from 1 ng/mL to 100 mg/mL; and

j) serum free medium balanced to 100 percent volume.

4. The growth medium of claim 1, wherein the growth medium comprises components in the following amounts:

a) serum from 1 percent to 10 percent by volume;

b) fibroblast growth factor from 1 ng/mL to 10 ng/mL; and

c) L-cysteine, or glutathione, or N-acetyl cysteine from 0.5 mM to 5 mM.

5. The growth medium of claim 2, wherein the growth medium comprises the at least one component if present in the following amounts:

a) epidermal growth factor from 1 ng/mL to 10 ng/mL;

b) hydrocortisone from 10 ng/mL to100 ng/mL;

c) calcium chloride from 0.01 mM to 0.1 mM;

d) insulin from 0.5 mg/mL to 5 mg/mL;

e) pituitary extract from 10 µg/mL to 100 µg/mL;

f) selenium from 0.1 µg/mL to 1 µg/mL;

g) stromal-derived factor from 1 ng/mL to 10 ng/mL;

h) sodium pyruvate from 2 mg/mL to 20 mg/mL;

i) transferrin from about from 0.1 mg/mL to 1 mg/mL; and

j) serum free medium balanced to 100 percent volume.

6. An attachment medium for culturing mesenchymal stem cells comprising:

a) a minimum essential medium;

b) a fibroblast growth factor; and

c) either:

i) an L-cysteine;

ii) a glutathione; or

iii) an N-acetyl cysteine,

wherein the attachment medium is adapted for mesenchymal stem cells to be cultured within the attachment medium without morphological or functional changes.

7. The attachment medium of claim 6, further comprising at least one of:

a) an insulin;

b) a selenium;

c) a sodium pyruvate; or

d) a transferrin.

8. The attachment medium of claim 7, wherein the attachment medium comprises components, if present, in the following amounts:

a) insulin from 1 ng/mL to 100 mg/mL;

b) selenium from 1 pg/mL to 100 mg/mL;

c) sodium pyruvate from 1 ng/mL to 100 mg/mL; and

d) transferrin from 1 ng/mL to 100 mg/mL.

9. The attachment medium of claim 7, wherein the attachment medium comprises components, if present, in the following amounts:

a) insulin from 0.5 mg/mL to 5 mg/mL;

b) selenium from 0.1 µg/mL to 1 µg/mL;

c) sodium pyruvate from 2 mg/mL to 20 mg/mL; and

d) transferrin from 0.1 mg/mL to 1 mg/mL.