human mesenchymal stem cells of bone allograft or autograft tissues, human mesenchymal stem cells of dental pulp, human pericytes, human myoblasts, and human chondrocytes, human osteoprogenitor cells, urine stem cells, or their respective progenitor cells such as stem cell isolated from amniotic fluid or cord blood, embryonic stem cells, and induced pluripotent stem cells.

5. The composition of claims 1-3 wherein the calcium phosphate matrix is a tricalcium phosphate ceramic or is osteoinductive.

6. The compositions of any one of claims 1-3 further comprising a calcium phosphate matrix, wherein the compound is covalently associated onto the calcium phosphate matrix.

7. The compositions of any one of claims 1-3 further comprising a calcium phosphate matrix, wherein the compound is non-covalently associated onto the calcium phosphate matrix.

8. The composition of claim 2 wherein the compound is *cis*-1-acetyl-2,6-dimethyl-*N*-(*p*-methylphenyl)-1,2,3,4-tetrahydroquinolin-4-amine, the isolated cells are human bone marrow-derived mesenchymal stem cells, and the calcium phosphate matrix is a tricalcium phosphate ceramic or is osteoinductive.

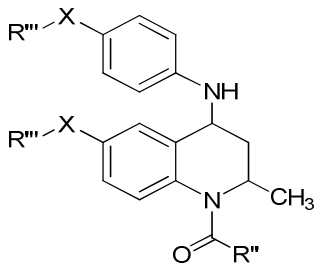
9. The composition of claim 8wherein the compound is covalently associated with the calcium phosphate matrix.

10. The composition of claim 8wherein the compound is non-covalently associated with the calcium phosphate matrix.

11. The composition of claim 80 further comprising bone morphogenetic proteins, fibroblast growth factors, platelet-derived growth factors, Wnt proteins, transforming growth factors, stromal derived factor-1, parathyroid growth hormone, vitamin D, 1,25-dihydroxy vitamin D, deoxycholic acid, teriparatide, ascorbic acid, ascorbic acid 2-phosphate, beta-glycerol phosphate, dexamethasone, or their respective salts, pro-drugs, or a combination thereof, wherein the prodrug readily undergo chemical or metabolism-mediated changes under physiological conditions to provide the compound when placed with cells or matrix or bioadhesive for implantation by slow biological or spontaneous chemical conversion with water.

12. A compound of Formula IIa:

sealable tube, and



IIa

,

wherein R" is independently cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, tetrahydrofuran-2-yl, tetrahydrofuran-3-yl, tetrahydrothien-2-yl or tetrahydrothien-3-yl;

X is sulfur; and

each R"' is independently cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl.

13. A compound having the structure of Formula II of claim 2 for use in inducing bone formation by treating isolated cells capable of differentiating into bone cells to be used for administrating the treated cells to a subject.

14. The compound of claim 13, further to be used in the step (a') of seeding the cells from step (a) onto a calcium phosphate matrix prior to said administration of step (b).

15. A bone graft material prepared by combining isolated cells capable of differentiating into bone cells, a calcium phosphate matrix, and a compound having the structure of Formula II of claim 2 into a surgical cage.

16. A method for increasing adherence of cells to calcium phosphate materials by treatment of cells in the presence of a calcium phosphate material with a compound of Formula II of claim 2.

17. A combination of the compositions according to any one of claims 1-13 with a bioadhesive to be used for inducing bone formation by (a) administering said combination of the compositions to a subject, or

(b) adding said combination of the compositions to a surgical cage suitable for implantation in a subject.

18. A method of cryopreserving the compositions of any one claims 1-11 comprising:

(a) combining the compositions of any one claims 1-11 with a cryopreservative in a sealable tube, and

(b) freezing the tube in liquid nitrogen, and

(c) maintaining the tube in liquid nitrogen.