

CLAIMS

1. An enriched integrin $\alpha 10^{\text{high}}$ population of Mesenchymal Stem Cells (MSC) for use in the prevention and/or treatment of subchondral bone sclerosis, traumatic joint injuries, and/or degenerative joint disease (DJD), wherein at least 60% of the cells of the population of MSCs express integrin $\alpha 10$ subunit, wherein the MSCs are MHCII negative and CD45 negative, and wherein said MSC is selected from the group consisting of a mesenchymal stem cell, a mesenchymal progenitor cell, and a mesenchymal stromal cell.
2. Use of an enriched integrin $\alpha 10^{\text{high}}$ population of Mesenchymal Stem Cells (MSC) in the manufacture of a medicament for prevention and/or treatment of subchondral bone sclerosis, traumatic joint injuries, and/or degenerative joint disease (DJD), wherein at least 60% of the cells of the population of MSCs express integrin $\alpha 10$ subunit, wherein the MSCs are MHCII negative and CD45 negative, and wherein said MSC is selected from the group consisting of a mesenchymal stem cell, a mesenchymal progenitor cell, and a mesenchymal stromal cell.
3. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to claim 1 or the use according to claim 2, wherein the traumatic joint injury comprises sport injuries.
4. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to claim 1 or claim 3 or the use according to claim 2 or claim 3, wherein the degenerative joint disease (DJD) is selected from a group consisting of subchondral bone disease, cartilage degeneration, post-traumatic osteoarthritis, inflammatory arthritis, and congenital malformation and/or deformation of the musculoskeletal system; and wherein the traumatic joint injury is selected from a group consisting of osteochondral damage, tendon damage, ligament damage, and muscle damage.
5. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1, 3 or 4 or the use according to any one of claims 2-4, wherein the osteochondral damage comprises articular cartilage damage and/or bone damage.

6. A method of promoting or inducing fracture healing, said method comprising administration of an enriched integrin $\alpha 10^{\text{high}}$ population of MSCs , wherein at least 60% of the cells of the population of MSCs express integrin $\alpha 10$ subunit, wherein the MSCs are MHCII negative and CD45 negative, and wherein said MSC is selected from the group consisting of a mesenchymal stem cell, a mesenchymal progenitor cell, and a mesenchymal stromal cell.
7. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-5 or the use according to any one of claims 2-5 or the method according to claim 6, wherein at least 65%, such as at least 70%, such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as 100% of the total cells comprised in the population express integrin $\alpha 10$ subunit.
8. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-7 or the use according to any one of claims 2-7 or the method according to claim 6 or claim 7, wherein said population is an *in vitro* cell culture.
9. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-8 or the use according to any one of claims 2-8 or the method according to any one of claims 6-8, wherein the cells that express integrin $\alpha 10$ are isolated with an anti-integrin $\alpha 10$ antibody.
10. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-9 or the use according to any one of claims 2-9 or the method according to any one of claims 6-9, wherein the anti-integrin $\alpha 10$ antibody is a monoclonal antibody.
11. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-10 or the use according to any one of claims 2-10 or the method according to any one of claims 6-10, wherein the MSCs are further characterized by the presence of CD44, CD90 and CD105.
12. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-11 or the use according to any one of claims 2-11 or the method according to any one of claims 6-11, wherein the cells are derived from adipose tissue,

bone marrow, synovial membrane, peripheral blood, cord blood, umbilical cord blood, Wharton's jelly, or amniotic fluid.

13. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-12 or the use according to any one of claims 2-12 or the method according to any one claims 6-12, wherein the osteochondral damage, cartilage damage or injury is a break, sprain, bruise, tear, fracture or rupture, a cartilage fissure, a cartilage microfracture, a chondral defect, a tendon rupture, a ligament rupture, or a bone fracture, and/or wherein the osteochondral damage, cartilage damage or injury in the joint is in a muscle, tendon, bone, ligament, cartilage, or meniscus.
14. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-13 or the use according to any one of claims 2-13 or the method according to any one of claims 6-13, wherein the MSCs are allogeneic or autologous.
15. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-14 or the use according to any one of claims 2-14 or the method according to any one of claims 6-14, wherein the MSCs are administered into a joint cavity.
16. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-15 or the use according to any one of claims 2-15 or the method according to any one of claims 6-15, wherein the population of MSCs is administered via injection.
17. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-16 or the use according to any one of claims 2-16 or the method according to any one of claims 6-16, wherein the population of MSCs is administered in a cell suspension with a pharmaceutically acceptable excipient.
18. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-17 or the use according to any one of claims 2-17 or the method according to any one of claims 6-17, wherein the population of MSCs is formulated into a cell aggregate prior to administration.

19. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-18 or the use according to any one of claims 2-18 or the method according to any one of claims 6-18, wherein the population of MSCs is administered at the same time as setting a bone after a break.

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20. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-19 or the use according to any one of claims 2-19 or the method according to any one of claims 6-19, wherein the subject is a human, horse, pony, ox, donkey, mule, camelid, cat, dog, pig, or cow.

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21. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs for use according to any one of claims 1 or 3-20 or the use according to any one of claims 2-20 or the method according to any one of claims 6-20, wherein the administration results in increased collagen production, proteoglycan production, and/or lubricin at the site of administration.

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22. An enriched integrin $\alpha 10^{\text{high}}$ population of Mesenchymal Stem Cells (MSC) wherein at least 60% of the cells of the population of MSCs express integrin $\alpha 10$ subunit; wherein the MSCs are MHCII negative and CD45 negative; and wherein the MSC is selected from the group consisting of a mesenchymal stem cells, mesenchymal progenitor cells, and mesenchymal stromal cells.

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23. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to claim 22, wherein at least 65%, such as at least 70%, such as at least 75%, such as at least 80%, such as at least 85%, such as at least 90%, such as at least 95%, such as at least 96%, such as at least 97%, such as at least 98%, such as at least 99%, such as at least 100% of the total cells comprised in the population express integrin $\alpha 10$ subunit.

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24. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to claim 22 or claim 23, wherein the cells are induced to express integrin $\alpha 10$ subunit.

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25. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to any one of claims 22-24, wherein said population is an *in vitro* cell culture.

26. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to any one of claims 22-25, wherein said population further expresses at least one of CD44, CD90 or CD105.

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27. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to any one of claims 22-26, wherein the MSCs are substantially formed into cell aggregates.
- 5 28. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to any one of claims 22-27, wherein the MSCs are human, murine, canine or equine.
29. The enriched integrin $\alpha 10^{\text{high}}$ population of MSCs according to any one of claims 22-28, wherein the MSCs adhere to plastic culture dish.
- 10 30. A MSC isolated from the population of any one of claims 22-29 with an anti-integrin $\alpha 10$ antibody.
- 15 31. A method of manufacturing an enriched integrin $\alpha 10^{\text{high}}$ population of MSCs wherein at least 60% of the cells of the population of MSCs express integrin $\alpha 10$ subunit, the method comprising,
- 20 a. isolating a population of stem cells from adipose tissue, bone marrow, synovial membrane, cord blood, Wharton's jelly, or amniotic fluid;
- b. culturing the isolated cells in a plastic culture vessel;
- c. discarding non-adhered cells;
- d. inducing integrin $\alpha 10$ expression by adding culture media, wherein the culture media is a serum-free media or a media comprising mammalian serum, and wherein the culture media comprises platelet lysate;
- 25 e. selecting the cells that express integrin $\alpha 10$, and
- f. expanding the selected cells, thereby producing an enriched integrin $\alpha 10^{\text{high}}$ population of MSCs.
32. The method according to claim 31, wherein the culture media in step d. comprises the growth factors FGF2 and/or TGF β .