

Claims

1. Use of a marker comprising an integrin alpha10 subunit expressed by a neural cell as a marker for mammalian neural stem cells and mammalian neural progenitor cells, wherein the integrin alpha 10 subunit is expressed on the cell surface of the mammalian neural stem cell and/or neural progenitor cell.
2. A method for identifying a mammalian neural stem cell and/or a mammalian neural progenitor cell, the method comprising the steps of:
 - a) providing a sample comprising neural tissue;
 - b) detecting expression of an integrin alpha10 subunit by a cell comprised in the sample of a);
 - c) scoring the integrin alpha10 subunit expression of b); and
 - d) identifying the mammalian neural stem cell and/or the neural progenitor cell according to the scoring in c),

wherein said scoring comprises comparing the measurement with a measurement done in a reference cell population expressing the integrin alpha10 subunit, as well as to a cell population not expressing the integrin alpha10 subunit, and wherein the integrin alpha 10 subunit is expressed on the cell surface of the mammalian neural stem cell and/or neural progenitor cell.

3. A method for isolating a mammalian neural stem cell and/or a mammalian neural progenitor cell, the method comprising the steps of:
 - a) providing a sample comprising neural tissue;
 - b) detecting expression of an integrin alpha10 subunit by a cell comprised in the sample of a);
 - c) scoring the integrin alpha10 subunit expression of b); and
 - d) selecting the mammalian neural stem cell and/or the mammalian neural progenitor cell according to the scoring in c),

wherein said scoring comprises comparing the measurement with a measurement done in a reference cell population expressing the integrin alpha10 subunit, as well as to a cell population not expressing the integrin alpha10 subunit, and wherein the integrin alpha 10 subunit is expressed on the cell surface of the mammalian neural stem cell and/or neural progenitor cell, thereby obtaining an isolated neural stem cell and/or neural progenitor cell.

4. The method or the use according to any one of the preceding claims, further comprising a step of contacting the sample with an antibody which specifically binds integrin alpha10 subunit prior to the detection of b).
5. The method according to any one of claims 2 to 4, wherein the method is performed *in vitro*.
6. The method according to any one of claims 2 to 5, wherein the neural tissue is obtained or derived from brain tissue, such as wherein the neural tissue is adult brain tissue or fetal brain tissue, and wherein the neural tissue is selected from the group consisting of human, canine, equine, bovine, feline, murine, ovine and swine neural tissue.
7. The method according to any one of claims 2 to 6, wherein the neural tissue is derived from the subventricular zone (SVZ) or from the subgranular zone (SGZ) or from the meninges.
8. The method according to any one of claims 2 to 7, wherein the detection of expression of an integrin alpha10 subunit by a cell is determined by measuring integrin alpha10 protein expression by measuring integrin alpha10 mRNA expression.
9. The method according to any one of claims 2 to 8, wherein the antibody is:
 - a) a monoclonal antibody, produced by the hybridoma cell line deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583; or
 - b) an antibody which competes for binding to the same epitope as the epitope bound by the monoclonal antibody produced by the hybridoma deposited at the Deutsche Sammlung von Microorganismen und Zellkulturen GmbH under the accession number DSM ACC2583; or
 - c) a fragment of a) or b), wherein said fragment is capable of binding specifically to the extracellular I-domain of the integrin alpha10 subunit chain.
10. A method for manufacturing an isolated population of mammalian cells *in vitro* which are enriched for neural stem cells and/or neural progenitor cells relative to a reference population, the method comprising the steps of:

- a) providing at least a portion of a population of cells comprising a neural stem cell and/or a neural progenitor cell;
- b) introducing into the population of cells in a) above a compound identifying an integrin alpha10 subunit expressed by the neural stem cell and/or neural progenitor cell; and
- c) selecting and isolating, or isolating and selecting, or isolating, or selecting, the neural stem cells and/or the neural progenitor cells from the population of cells in step b) above,

thereby producing a population of cells enriched for neural stem cells and/or neural progenitor cells.

11. An *in vitro* cell culture of undifferentiated mammalian cells, wherein the cells are derived from neural tissue, comprising at least 90% mammalian neural stem cells expressing an integrin alpha10 subunit, wherein the integrin alpha10 subunit is expressed on the cell surface of the undifferentiated mammalian cell and wherein:

- a) cells in the culture have the capacity to differentiate into neurons and/or oligodendrocytes and/or astrocytes when differentiated in a culture medium substantially free of both serum and a proliferation-inducing growth factor as defined in (b) to produce a cell culture of at least 10% neurons and/or oligodendrocytes and/or astrocytes;
- b) the cell culture divides in a culture medium containing a serum replacement such as B27 and at least one proliferation-inducing growth factor; and
- c) cells in the culture differentiate into neurons and/or oligodendrocytes and/or astrocytes upon withdrawal of both the serum replacement and the proliferation inducing growth factor.

12. An *in vitro* cell culture comprising:

- a) a culture medium containing a serum replacement such as B27 and at least one proliferation-inducing growth factor; and
- b) undifferentiated mammalian cells derived from the central nervous system of a mammal, wherein the undifferentiated mammalian cell is a neural stem cell or a neural progenitor cell, wherein at least 90% of the cells express an integrin alpha10 subunit, and wherein the integrin alpha10 subunit is expressed on the cell surface of the undifferentiated mammalian cell.

13. A suspension culture of mammalian undifferentiated cells, wherein at least 90% of said cells express an integrin alpha10 subunit, wherein said cells are derived from neural tissue, wherein the undifferentiated mammalian cell is a neural stem cell or a neural progenitor cell, wherein the integrin alpha10 subunit is expressed on the cell surface of the undifferentiated mammalian cell, wherein said cells are formed into cell aggregates, and wherein the cell aggregates are maintained in a culture medium containing a proliferation-inducing growth factor.
14. The cell culture or the suspension culture according to any one of claims 11 to **Error! Reference source not found.**3, wherein the cells in the culture are obtained or derived from the subventricular zone (SVZ) or from the subgranular zone (SGZ) or from the meninges of a mammalian brain.
15. The cell culture or the suspension culture according to any one of claims 11 to 14, wherein the cells in the culture are murine or human.
16. An *in vitro* method for determining the characteristics of a damaged or diseased area of the CNS in a patient in need thereof, the method comprising the steps of:
 - a) administering an anti-integrin alpha10 subunit antibody to a sample of a damaged or diseased area of the CNS of the patient;
 - b) detecting expression of integrin alpha10 subunit in the sample of the damaged or diseased area of the CNS of the subject; and
 - c) determining characteristics such as location and size of the damaged or diseased area of the CNS.
17. The method according to claim 16 wherein, the neural tissue comprises neural stem cells and/or neural progenitor cells.
18. An integrin alpha10 chain subunit marker for mammalian neural stem cells and/or mammalian neural progenitor cells, for use in a method of diagnosing and/or characterizing a disease or damage of the nervous system, wherein the marker is an integrin alpha10 chain subunit expressed on the cell surface by the neural stem cell and/or neural progenitor cells.

19. A composition comprising an isolated population of mammalian neural stem cells and/or mammalian neural progenitor cells for use in a method of treatment of disease or damage of the nervous system wherein the isolated population is enriched for mammalian neural stem cells and/or mammalian neural progenitor cells expressing an integrin alpha10 subunit, and wherein the integrin alpha10 subunit is expressed on the cell surface of the mammalian neural stem cell and/or neural progenitor cell.
20. The method, the marker for use, or the composition for use according to any one of the preceding claims, wherein the disease or damage of the nervous system is an injury of the central or peripheral nervous system or a neurodegenerative disease, such as an injury of the nervous system selected from a group consisting of spinal cord injuries (SCI), traumatic brain injuries (TBI), peripheral nerve injuries, stroke and brain cancer; such as a neurodegenerative disease selected from a group consisting of Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis (ALS), Huntington's Disease (HD), multiple sclerosis (MS) and multiple system atrophy.