CLAIMS

1. A reference standard for evaluating or determining the quality of cells of interest, the reference standard comprising a rapidly expanding mesenchymal stem cell population characterized by using, as an indicator, the positivity or negativity of at least one marker selected from LNGFR (CD271) and Thy-1 (CD90).

2. The reference standard according to claim 1, wherein characteristics of the cell population are selected from any of the following information (a) to (d):

(a) at least one piece of cell information selected from the group consisting of cell size, degree of spreading, contour complexity, pattern, and brightness of individual cells within the cell population, and image information thereof;

(b) information obtained by integrating the cell information of (a) across multiple cells within the cell population and statistically processing it; preferably the statistically processed information is at least one selected from the group consisting of mean value, standard deviation, and distribution shape;

(c) combination information obtained by acquiring the information of (b) for multiple cell populations; and

(d) information of (a) to (c) acquired over time;

optionally the quality is at least one selected from the group consisting of cell proliferation rate, cell recovery number, degree of undifferentiation, degree of differentiation, amount of produced factors, and cell heterogeneity,

optionally the cells of interest are stem cells, or

optionally the stem cells of interest are mesenchymal stem cells.

3. A method for providing information for evaluating the quality of a stem cell population of interest, or evaluating the quality of a stem cell population of interest, the method comprising the steps of:

(a) characterizing individual cells of a rapidly expanding mesenchymal stem cell population by using, as an indicator, the positivity or negativity of at least one marker selected from LNGFR (CD271) and Thy-1 (CD90), and acquiring image data (reference image information) of the individual cells, or acquiring parameter information (reference parameter information) representing characteristics of the cell population from the reference image information;

(b) acquiring image data (image information of interest) of individual cells of a stem

cell population of interest provided by a user, or acquiring parameter information (parameter information of interest) representing characteristics of the stem cell population of interest from the image information of interest;

(c) comparing the image information of interest or parameter information of interest with the reference image information or reference parameter information; and

(d) providing to the user all or part of the information obtained by the comparison for evaluating the quality of the stem cell population of interest.

4. A system for providing information for evaluating the quality of a stem cell population of interest, or evaluating the quality of a stem cell population of interest, the system comprising:

(a) a unit configured to characterize individual cells of a rapidly expanding mesenchymal stem cell population by using, as an indicator, the positivity or negativity of at least one marker selected from LNGFR (CD271) and Thy-1 (CD90), and acquire image data (reference image information) of the individual cells, or acquire parameter information (reference parameter information) representing characteristics of the cell population from the reference image information;

(b) a unit configured to acquire image data (image information of interest) of individual cells of a stem cell population of interest provided by a user, or acquire parameter information (parameter information of interest) representing characteristics of the stem cell population of interest from the image information of interest;

(c) a unit configured to compare the image information of interest or parameter information of interest with the reference image information or reference parameter information; and

(d) a unit configured to provide to the user all or part of the information obtained by the comparison for evaluating the quality of the stem cell population of interest.

5. The system according to claim 4, wherein characteristics of the cell population are selected from any of the following information (a) to (d):

(a) at least one piece of cell information selected from the group consisting of cell size, degree of spreading, contour complexity, pattern, and brightness of individual cells within the cell population, and image information thereof;

(b) information obtained by integrating the cell information of (a) across multiple cells within the cell population and statistically processing it; preferably the statistically processed information is at least one selected from the group consisting of mean value,

standard deviation, and distribution shape;

(c) combination information obtained by acquiring the information of (b) for multiple cell populations; and

(d) information of (a) to (c) acquired over time,

optionally the quality is at least one selected from the group consisting of cell proliferation rate, cell recovery number, degree of undifferentiation, degree of differentiation, amount of produced factors, and cell heterogeneity, or

optionally the stem cells of interest are mesenchymal stem cells.

6. A program for providing information for evaluating the quality of a stem cell population of interest, or evaluating the quality of a stem cell population of interest, the program causing a computer to function as:

(a) a unit configured to characterize individual cells of a rapidly expanding mesenchymal stem cell population by using, as an indicator, the positivity or negativity of at least one marker selected from LNGFR (CD271) and Thy-1 (CD90), and acquire image data (reference image information) of the individual cells, or acquire parameter information (reference parameter information) representing characteristics of the cell population from the reference image information;

(b) a unit configured to acquire image data (image information of interest) of individual cells of a stem cell population of interest provided by a user, or acquire parameter information (parameter information of interest) representing characteristics of the stem cell population of interest from the image information of interest;

(c) a unit configured to compare the image information of interest or parameter information of interest with the reference image information or reference parameter information; and

(d) a unit configured to provide to the user all or part of the information obtained by the comparison for evaluating the quality of the stem cell population of interest.

7. The program according to claim 6, wherein characteristics of the cell population are selected from any of the following information (a) to (d):

(a) at least one piece of cell information selected from the group consisting of cell size, degree of spreading, contour complexity, pattern, and brightness of individual cells within the cell population, and image information thereof;

(b) information obtained by integrating the cell information of (a) across multiple cells within the cell population and statistically processing it; preferably the statistically

processed information is at least one selected from the group consisting of mean value, standard deviation, and distribution shape;

(c) combination information obtained by acquiring the information of (b) for multiple cell populations; and

(d) information of (a) to (c) acquired over time,

optionally the quality is at least one selected from the group consisting of cell proliferation rate, cell recovery number, degree of undifferentiation, degree of differentiation, amount of produced factors, and cell heterogeneity, or

optionally the stem cells of interest are mesenchymal stem cells.

8. A computer-readable recording medium storing the program according to claim 6.

9. An image processing method for rapidly expanding mesenchymal stem cells, the method comprising the steps of:

(a) acquiring image data of the reference standard according to claim 1; and

(b) removing noise from the acquired image data and/or normalizing the image data.

10. A method for providing image data processed by the method according to claim 9 for machine learning by a computer.

11. A method for predicting the quality of cells of interest by comparing image data processed by the method according to claim 9 with image data of the cells of interest.