

b) wherein said cryoprotectant has a weight average molecular weight (M_w) of between 300 and 9,500 Da,
for cryopreserving a sample, and wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.

In one aspect, there is provided the use of a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

b) wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 300 and 9,500 Da, and

wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant; for cryopreserving a sample, and wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.

In one aspect, there is provided a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof, which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, or

b) wherein said cryoprotectant has a weight average molecular weight (M_w) of between 300 and 9,500 Da.

In one aspect, there is provided a cryoprotecting agent comprising a cryoprotectant selected from the group consisting of isomaltooligosaccharide and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, oxidised isomaltooligosaccharide, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl oxidised isomaltooligosaccharide and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide, having a weight average molecular weight (M_w) of between 300 and 1,650 Da; and
wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant.

In one aspect, there is provided a cryoprotecting agent comprising a cryoprotectant selected from the group consisting of isomaltooligosaccharide and derivatives thereof which derivative is selected from the

group consisting of hydrogenated isomaltooligosaccharide, oxidised isomaltooligosaccharide, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl oxidised isomaltooligosaccharide and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide, having a weight average molecular weight (M_w) of between 300 and 1,650 Da.

In one aspect, there is provided cryopreservation composition comprising a cryoprotecting agent as described herein, and which cryopreservation composition further comprises a sample to be cryopreserved, wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.

In one aspect, there is provided the use of a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

b) wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 300 and 9,500 Da,

for cryopreserving a sample, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells, or wherein said sample is blood cells, or wherein said sample is ovarian tissue.

So, in a first embodiment the present disclosure relates to a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof, and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof, or

b) wherein said cryoprotectant has a weight average molecular weight (M_w) of between 300 and 9,500 Da such as between 300 and 7,500 Da or,

- c) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and said cryoprotectant has a weight average molecular weight (M_w) of between 300 and 9,500 Da.

In one aspect, there is provided a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof, which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

b) wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 300 and 9,500 Da,

and wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant.

In a further embodiment, the present disclosure relates to a cryoprotecting agent comprising a cryoprotectant selected from the group consisting of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da, such as between 850 and 1,650 Da.

In a further embodiment, the present disclosure relates to the use of a cryoprotectant as described herein for cryopreserving a sample, wherein said sample is selected from the group consisting of organs, cells and tissues.

In a further embodiment, the present disclosure relates to a cryopreservation composition comprising a cryoprotecting agent as described herein, which cryopreservation composition further comprises a sample to be cryopreserved, wherein said sample is selected from the group consisting of organs, cells and tissues.

In a further embodiment, the present disclosure relates to a cryopreserved composition comprising a cryoprotecting agent as described herein, which cryopreserved composition

further comprises a sample which has been cryopreserved, wherein said sample is selected from the group consisting of organs, cells and tissues.

In a further aspect, the present disclosure relates to a method of cryopreserving a sample, comprising the steps of bringing a sample to be cryopreserved into contact with a cryoprotecting agent as described herein to obtain a cryopreservation composition and subsequently reducing the temperature of the cryopreservation composition to a cryopreservation temperature, wherein said sample is selected from the group consisting of organs, cells and tissues.

In a further embodiment, the present disclosure relates to a method of cryopreserving a cryopreservation composition as described herein by bringing the composition to a cryopreservation temperature.

CLAIMS

1. Use of a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof
5 which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and
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- a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent,
15 or
- b) wherein said cryoprotectant has a weight average molecular weight (M_w) of between 300 and 9,500 Da,
for cryopreserving a sample, and wherein said sample is selected from the group consisting
20 of mammalian organs, mammalian cells, and mammalian tissues.
2. The use according to claim 1, wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of
25 dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent.
3. The use according to any one of claims 1-2, wherein said cryoprotectant has a weight average molecular weight (M_w) of between 500 and 3,500 Da.
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4. The use according to any one of claims 1-3, wherein said cryoprotectant is selected from the group consisting of isomaltooligosaccharide and derivatives thereof and has a weight average molecular weight (M_w) of between 850 and 1,650 Da.
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5. The use according to any one of claims 1-4, wherein said cryoprotectant has a polydispersity of ≥ 1 and ≤ 5 .

6. The use according to any one of claims 1-5, wherein said cryoprotectant is isomaltooligosaccharide having a weight average molecular weight (M_w) of between 850 and 1,150 Da.
- 5 7. The use according to any one of claims 1-6, wherein said cryoprotectant is hydrogenated isomaltooligosaccharide having a weight average molecular weight (M_w) of between 850 and 1,150 Da.
8. The use according to any one of claims 6-7, wherein the weight fraction of
10 isomaltooligosaccharides having less than 3 glucose units is less than 15% w/w and/or
wherein the weight fraction of isomaltooligosaccharides having more than 9 glucose units is less than 20 % w/w.
- 15 9. The use according to any one of claims 1-8, wherein said isomaltooligosaccharides and derivatives thereof are dextran-based.
10. The use according to any one of claims 1-9, wherein said agent is in the form of a powder or in the form of a solution.
- 20 11. The use according to any one of claims 1-10, wherein said agent comprises from 30% to 70% w/w of said cryoprotectant.
12. The use according to any one of claims 1-11, wherein said agent comprises at least
25 one additional cryoprotectant selected from the group consisting of acetamide, agarose, alginate, 1-analine, albumin, ammonium acetate, butanediol, chondroitin sulfate, chloroform, choline, diethylene glycol, dimethyl acetamide, dimethyl formamide, dimethyl sulfoxide (DMSO), erythritol, ethanol, ethylene glycol, formamide, glucose, glycerol, a-glycerophosphate, glycerol monoacetate, glycine, hydroxyethyl starch, inositol, lactose,
30 magnesium chloride, magnesium sulfate, maltose, mannitol, mannose, methanol, methyl acetamide, methylformamide, methyl ureas, phenol, pluronic polyols, polyethylene glycol, polyvinylpyrrolidone, proline, propylene glycol, pyridine N-oxide, ribose, serine, sodium bromide, sodium chloride, sodium iodide, sodium nitrate, sodium sulfate, sorbitol, sucrose, trehalose, triethylene glycol, trimethylamine acetate, urea, valine and xylosen.
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13. The use according to any one of claims 1-12, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells.
- 5 14. A cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof, which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-
10 isomaltooligosaccharide; and
- a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent,
15 or
- b) wherein said cryoprotectant has a weight average molecular weight (M_w) of between 300 and 9,500 Da.
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15. A cryoprotecting agent comprising a cryoprotectant selected from the group consisting of isomaltooligosaccharide and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, oxidised isomaltooligosaccharide, DEAE-
25 isomaltooligosaccharides, carboxyC₁₋₁₀alkyl oxidised isomaltooligosaccharide and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide, having a weight average molecular weight (M_w) of between 300 and 1,650 Da.
16. The cryoprotecting agent according to any one of claims 14-15, wherein the
30 cryoprotectant is as further defined in any one of claims 1-12.
17. A cryopreservation composition comprising a cryoprotecting agent as defined in any one of claims 1-12, and which cryopreservation composition further comprises a sample to be cryopreserved, wherein said sample is selected from the group consisting of mammalian
35 organs, mammalian cells, and mammalian tissues.

18. The cryopreservation composition according claim 17, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells.
- 5 19. The cryopreservation composition according to any one of claims 17-18, comprising said cryoprotectant in an amount from 1 to 50 % w/w.
20. A method of cryopreserving a sample, comprising the steps of bringing a sample to be cryopreserved into contact with a cryoprotecting agent as defined in any one of claims 1-13
10 to obtain a cryopreservation composition and subsequently reducing the temperature of the cryopreservation composition to a cryopreservation temperature, wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.
- 15 21. The method according to claim 20, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells.

CLAIMS

1. Use of a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof which derivative is selected from the group consisting of hydrogenated

5 isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

10 a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

15 b) wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 300 and 9,500 Da, and

wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant;

20 for cryopreserving a sample, and wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.

2. The use according to claim 1, wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent.

3. The use according to any one of claims 1-2, wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 500 and 3,500 Da.

4. The use according to any one of claims 1-3, wherein said cryoprotectant(s) is selected from the group consisting of isomaltooligosaccharide and derivatives thereof and has a weight average molecular weight (M_w) of between 850 and 1,650 Da.

5. The use according to any one of claims 1-4, wherein said cryoprotectant(s) has a polydispersity of ≥ 1 and ≤ 5 .

6. The use according to any one of claims 1-5, wherein said cryoprotectant(s) is isomaltooligosaccharide having a weight average molecular weight (M_w) of between 850 and 1,150 Da.

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7. The use according to any one of claims 1-6, wherein said cryoprotectant(s) is hydrogenated isomaltooligosaccharide having a weight average molecular weight (M_w) of between 850 and 1,150 Da.

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8. The use according to any one of claims 6-7, wherein the weight fraction of isomaltooligosaccharides having less than 3 glucose units is less than 15% w/w and/or wherein the weight fraction of isomaltooligosaccharides having more than 9 glucose units is less than 20 % w/w.

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9. The use according to any one of claims 1-8, wherein said isomaltooligosaccharides and derivatives thereof are dextran-based.

10. The use according to any one of claims 1-9, wherein said agent is in the form of a powder or in the form of a solution.

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11. The use according to any one of claims 1-10, wherein said agent comprises from 30% to 70% w/w of said cryoprotectant(s).

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12. The use according to any one of claims 1-11, wherein said agent comprises at least one additional cryoprotectant selected from the group consisting of acetamide, agarose, alginate, 1-aniline, albumin, ammonium acetate, butanediol, chondroitin sulfate, chloroform, choline, diethylene glycol, dimethyl acetamide, dimethyl formamide, erythritol, ethanol, ethylene glycol, formamide, glucose, α -glycerophosphate, glycerol monoacetate, glycine, hydroxyethyl starch, inositol, lactose, magnesium chloride, magnesium sulfate, maltose, mannitol, mannose, methanol, methyl acetamide, methylformamide, methyl ureas, phenol, pluronic polyols, polyethylene glycol, polyvinylpyrrolidone, proline, propylene glycol, pyridine N-oxide, ribose, serine, sodium bromide, sodium chloride, sodium iodide, sodium nitrate, sodium sulfate, sorbitol, sucrose, trehalose, triethylene glycol, trimethylamine acetate, urea, valine and xylosen.

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13. Use of a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran,

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DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

b) wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 300 and 9,500 Da,

for cryopreserving a sample, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells, or wherein said sample is blood cells, or wherein said sample is ovarian tissue.

14. The use according to any one of the preceding claims, wherein the concentration of said cryoprotectant(s) in a cryoprotectant composition comprising said cryoprotecting agent and said sample is at least 4% (w/w).

15. The use according to any one of the preceding claims, wherein said dextrin, dextran, isomaltooligosaccharide, or a derivative thereof is the only cryoprotectant in the cryoprotectant agent.

16. A cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextrin, dextran, isomaltooligosaccharide, and derivatives thereof, which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextrin, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextrin, DEAE-dextrin, DEAE-dextran, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl-dextrin, carboxyC₁₋₁₀alkyl-dextran, and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide; and

a) wherein said cryoprotecting agent comprises at least 1% w/w of one or more of isomaltooligosaccharide and derivatives thereof having a weight average molecular weight (M_w) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

b) wherein said cryoprotectant(s) has a weight average molecular weight (M_w) of between 300 and 9,500 Da,

and wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant.

17. A cryoprotecting agent comprising a cryoprotectant selected from the group consisting of isomaltooligosaccharide and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, oxidised isomaltooligosaccharide, DEAE-isomaltooligosaccharides, carboxyC₁₋₁₀alkyl oxidised isomaltooligosaccharide and carboxyC₁₋₁₀alkyl-isomaltooligosaccharide, having a weight average molecular weight (Mw) of between 300 and 1,650 Da; and
- 10 wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant.

18. The cryoprotecting agent according to any one of claims 16-17, wherein the cryoprotectant(s) is as further defined in any one of claims 1-15.

- 15 19. A cryopreservation composition comprising a cryoprotecting agent as defined in any one of claims 1-15, and which cryopreservation composition further comprises a sample to be cryopreserved, wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.

- 20 20. The cryopreservation composition according claim 19, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells.

21. The cryopreservation composition according to any one of claims 19-20, comprising said cryoprotectant(s) in an amount from 4 to 50 % w/w.
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22. A method of cryopreserving a sample, comprising the steps of bringing a sample to be cryopreserved into contact with a cryoprotecting agent as defined in any one of claims 1-15 to obtain a cryopreservation composition and subsequently reducing the temperature of the cryopreservation composition to a cryopreservation temperature, wherein said sample is selected from the group consisting of mammalian organs, mammalian cells, and mammalian tissues.
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23. The method according to claim 22, wherein said sample is cells selected from the group consisting of hematopoietic stem cells, mesenchymal stem cells, embryonic stem cells and IPS cells.
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