

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.

In one aspect, there is provided a cryopreservation composition comprising a cryoprotecting agent comprising one or more cryoprotectants selected from the group consisting of dextran, dextran, isomaltooligosaccharide, and derivatives thereof which derivative is selected from the group consisting of hydrogenated isomaltooligosaccharide, hydrogenated dextran, hydrogenated dextran, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextran, DEAE-dextran, 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, 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 a method of cryopreserving a sample, comprising the steps of bringing a sample to be cryopreserved into contact with 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 dextran, oxidised isomaltooligosaccharide, oxidised dextran, oxidised dextran, DEAE-dextran, 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 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.

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 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.

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

3. The use according to claim 1, wherein said cryoprotectant(s) is isomaltooligosaccharide having a weight average molecular weight (M_w) of between 850 and 1,650 Da.

4. The use according to claim 1, wherein said hydrogenated isomaltooligosaccharide 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.
- 5 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.
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.
9. The use according to any one of claims 1-8, wherein said isomaltooligosaccharides and
15 hydrogenated isomaltooligosaccharides 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(s).
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,
25 alginate, 1-analine, 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,
30 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 xylose.
- 35 13. The use according to claim 1, 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 claim 1, wherein said sample is hematopoietic stem cells.

15. 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).

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16. The use according to any one of the preceding claims, wherein said isomaltooligosaccharide or hydrogenated isomaltooligosaccharide is the only cryoprotectant in the cryoprotectant agent.

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17. 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

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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 (Mw) of between 300 and 1,650 Da based on the total weight of dextrin, dextran, isomaltooligosaccharide and derivatives thereof in said cryoprotecting agent, and

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

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

18. The cryoprotecting agent according to claim 17, wherein said cryoprotectant(s) is isomaltooligosaccharide having a weight average molecular weight (M_w) of between 850 and 1,150 Da and 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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19. A cryopreservation composition comprising 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, 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. 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; or wherein said sample is blood cells, or wherein said sample is ovarian tissue.

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.

22. A method of cryopreserving a sample, comprising the steps of bringing a sample to be cryopreserved into contact with 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

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

10 wherein said cryoprotecting agent does not comprise DMSO or glycerol as a cryoprotectant 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 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; or wherein said sample is blood cells, or wherein said sample is ovarian tissue.