

CLAIMS

1. A method of recovering an organ harvested from a donor, for example from a circulation arrest donor (DCD), comprising:

5 retrieving the organ from the donor at least two hours after the donor had circulation arrest;

providing lys-plasminogen to the organ after harvesting, wherein the lysplasminogen is comprised in a first hyperoncotic solution;

10 providing a tissue plasminogen activator (tPA) simultaneously or after providing lys-plasminogen, wherein the tissue plasminogen activator is comprised in a second hyperoncotic solution;

in a first restoration step, circulating through the organ a third hyperoncotic fluid comprising albumin and electrolytes at a low temperature of between 5°C and 25°C;

15 in a second restoration step, circulating through the organ a fourth hyperoncotic fluid comprising oxygenated red blood cells (RBC) at a temperature of between 28°C to 37°C; evaluating the organ by conventional criteria.

2. The method according to claim 1, wherein said first restoration step comprises:

20 circulating said third hyperoncotic fluid through the organ, wherein said third hyperoncotic fluid comprises albumin at a concentration of between 50 g/L and 120 g/L, whereby a circulation pressure is increased, for example from about 20 mmHg to 90 mmHg, during 30 to 75 minutes, for example in steps of 5 mmHg per 5 minutes.

25 3. The method according to claim 1 or 2, wherein said second restoration step comprises:

circulating said second hyperoncotic fluid through the organ, wherein said fourth hyperoncotic fluid comprises albumin at a concentration of between 50 g/L and 120 g/L, whereby a circulation pressure is increased, for example from about 20 mmHg to 90 mmHg, during 30 to 75 minutes, for example in steps of 5 mmHg per 5 minutes.

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4. The method according to any one of the previous claims, further comprising:

storing the organ at a low temperature of between 4°C and 16°C while circulating a preservation fluid through the organ at a pressure below 30 mmHg, during a time of between one hour and 7 hours.

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5. The method according to claim 4, whereby the storing step is performed after the second restoration step or between the restoration steps.

6. The method according to any one of the previous claims, wherein at least one of the first and second hyperoncotic fluids comprises electrolytes in physiological concentrations and albumin.

5 7. The method according to claim 6, wherein the first and second hyperoncotic fluid comprises albumin in a concentration of between 50 g/L and 120 g/L.

8. The method according to any one of the previous claims, wherein at least one of the first, second, third and fourth hyperoncotic fluids further comprises at least one of: a
10 coagulation inhibitor, such as antithrombin III; a direct thrombin inhibitors, such as argatroban; protein C; protein S; and a platelet inhibitor such as abciximab.

9. The method according to any one of the previous claims, wherein the at least one of the third and fourth hyperoncotic fluids is circulated through a leucocyte-filter.
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10. The method according to any one of the previous claims, wherein at least one of the third and fourth hyperoncotic fluids is contacted by a cytokine adsorber, such as Cytosorbent, for adsorption of cytokines.

20 11. The method according to any one of the previous claims, wherein at least one of the third and fourth hyperoncotic fluids is contacted by an endotoxin adsorber, such as LPS Adsorber, for adsorption of endotoxins.

12. The method according to any one of the previous claims, further comprising:
25 retrieval of the organ from the donor after the donor had circulation arrest for at least three hours, wherein the at least three hours included no more than two hours of topical cooling by cold saline, ice or ice slush installed in the abdomen of the donor.

13. A method of recovering an organ harvested from a donor, for example from a
30 cardiac arrest donor (DCD), comprising:
 retrieving the organ from the donor, at least four hours after the donor had circulation arrest;
 providing lys-plasminogen to the organ after harvesting, wherein the lysplasminogen is comprised in a first hyperoncotic solution comprising albumin at a concentration of
35 between 50 g/L and 70 g/L and a coagulation inhibitor, such as antithrombin III;
 providing a tissue plasminogen activator (tPA) to the organ simultaneously or after providing lys-plasminogen, wherein the tissue plasminogen activator is comprised in a

second hyperoncotic solution comprising albumin at a concentration of between 50 g/L and 70 g/L and a coagulation inhibitor, such as antithrombin III;

in a first restoration step, circulating through the organ a third hyperoncotic fluid comprising albumin at a concentration of between 50 g/L and 120 g/L and electrolytes and a coagulation inhibitor, such as antithrombin III, at a low temperature of between 5°C and 25°C while the pressure is increased from 20 mmHg to between 70 mmHg and 90 mmHg;

in a second restoration step, circulating through the organ a fourth hyperoncotic fluid comprising read blood cells (RBC), albumin at a concentration of between 50 g/L and 120 g/L and electrolytes and a coagulation inhibitor, such as antithrombin III, at a temperature of between 30°C to 37°C;

evaluating the organ by conventional criteria.

14. A device for recovering an organ harvested from a donor at least two hours after the donor had circulation arrest, constructed for performing the method according to any one of claims 1 to 13.

15. A device according to claim 14, constructed for:

providing lys-plasminogen to the organ after harvesting, wherein the lysplasminogen is comprised in a first hyperoncotic solution;

providing a tissue plasminogen activator (tPA) simultaneously or after providing lys-plasminogen, wherein the tissue plasminogen activator is comprised in a second hyperoncotic solution;

in a first restoration step, circulating through the organ a third hyperoncotic fluid comprising albumin and electrolytes at a low temperature of between 5°C and 25°C;

in a second restoration step, circulating through the organ a fourth hyperoncotic fluid comprising read blood cells (RBC) at a temperature of between 28°C to 37°C.

16. A device according to claim 14 or 15, comprising:

a container (31) for containing an organ to be treated;

a connector (32) for connection to an artery of the organ having a vein open;

a circulation pump (43) connected between the container and said connector (32) for circulating fluid present in the container through the organ;

a drain (41) connected to the container via a drain valve (42);

at least one bag (50, 51, 52, 53, 54) connected to the container (31) via fluid valves

(55, 56, 57, 58, 59) for providing fluids to the container;

an oxygenator (47) for oxygenating fluid pumped by the pump (43);

a heater/cooler (48) for controlling a temperature of the fluid pumped by the pump;

a leucocyte filter (49) for removing leucocytes in the fluid pumped by the pump;

an endotoxin adsorber (95) arranged to remove endotoxins in the fluid of the container;

a cytokine adsorber (96) arranged to remove cytokines in the fluid of the container;

and

5 a leucocyte filter (98) arranged to remove leucocytes in the fluid of the container.

17. A fluid for performing any one of the methods according to claims 1 to 13, comprising lys-plasminogen; tPA; electrolytes; and albumin at a concentration of between 50 g/L and 120 g/L.

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18. A kit for recovering an organ harvested from a donor at least two hours after the donor had circulation arrest, comprising:

a container including an oxygenator and a tube set for containing an organ to be treated;

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at least one canula for connection to the organ;

an endotoxin adsorber constructed to remove endotoxins in the fluid of the container;

a cytokine adsorber constructed to remove cytokines in the fluid of the container,

the kit being constructed for performing the method according to any one of claims 1 to 13.