Claims

[Claim 1]

Use of a pharmaceutical composition in the manufacture of a medicament for treating a central nervous system disease by transnasal administration, the pharmaceutical composition comprising a purified extracellular vesicle product,

the purified extracellular vesicle product being obtained by a method for producing a purified extracellular vesicle product, the production method comprising (i) purification and (ii) membrane filtration:

(i) purifying a liquid to be treated, the liquid containing extracellular vesicles and an impurity, by bringing the liquid into contact with an exclusion and anion exchange carrier to obtain a treated liquid containing the extracellular vesicles; and

(ii) subjecting the treated liquid to membrane filtration to obtain a concentrate of the extracellular vesicles.

[Claim 2]

The use according to claim 1, wherein the central nervous system disease is hypoxic encephalopathy.

[Claim 3]

The use according to claim 2, wherein the hypoxic encephalopathy is global cerebral ischemia.

[Claim 4]

The use according to claim 2, wherein the pharmaceutical composition comprises the extracellular vesicles at an amount of 1×10^3 extracellular vesicles /μL or more.

[Claim 5]

The use according to claim 1, wherein the liquid to be treated is a culture supernatant of cells or a tissue thereof that secretes the extracellular vesicles.

[Claim 6]

The use according to claim 1, wherein the exclusion and anion carrier is a porous carrier having internally positively charged pores.

[Claim 7]

The use according to claim 1, wherein a membrane used for the membrane filtration has a molecular weight cutoff of from 100000 to 1000000.

[Claim 8]

The use according to claim 1, wherein a membrane used for the membrane filtration has a γ-globulin permeability of from 10% to 80%.

[Claim 9]

The use according to claim 1, wherein a membrane used for the membrane filtration has a pure water permeation flow rate at 0.1 MPa of from 500 to 1500 $L/m^2/Hr$.

[Claim 10]

The use according to claim 1, wherein a membrane used for the membrane filtration is a cellulose-based hydrophilic membrane.

[Claim 11]

The use according to claim 1, wherein a membrane used for the membrane filtration is a hollow fiber membrane.

[Claim 12]

The use according to claim 1, wherein the membrane filtration is tangential flow filtration.

[Claim 13]

The use according to claim 1, wherein a membrane surface velocity in the membrane filtration is from 0.3 m/sec to 2 m/sec.

[Claim 14]

The use according to claim 1, wherein a concentration of the extracellular vesicles contained in the concentrate of the extracellular vesicles is 10 or more times a concentration of the extracellular vesicles contained in the treated liquid.

[Claim 15]

The use according to claim 1, wherein a concentration of total protein contained in the concentrate of the extracellular vesicles is 0.3 or less times a concentration of total protein contained in the liquid to be treated.

[Claim 16]

A method for producing a pharmaceutical composition for transnasal administration for treating global cerebral ischemia, the production method comprising:

(i) purifying a liquid to be treated, the liquid containing extracellular vesicles and an impurity, by bringing the liquid into contact with an exclusion and anion exchange carrier to obtain a treated liquid containing the extracellular vesicles; and

(ii) subjecting the treated liquid to membrane filtration to obtain a concentrate of the extracellular vesicles.