number when being passed through a step of digestion and further that neutrophil elastase released from these neutrophils damages the pancreas. Accordingly, the present inventors have focused on the point that the damage of the pancreas can be efficiently suppressed by inhibiting the action of the neutrophil elastase, thereby accomplishing the present invention.

[0012]

The present invention relates to the followings.

[1] A method for isolating islets, comprising:

a digestion step of breaking down an excised pancreas to provide pancreatic tissue, and

a purification step of immersing the pancreatic tissue in a purification solution to provide islets,

wherein the digestion step comprises:

an enzyme injection step of injecting an enzyme solution containing a digestive enzyme into the inside of the pancreas;

a digestion initiation step of activating the digestive enzyme;

a digestion termination step of inactivating the digestive enzyme; and

a collection step of collecting the broken down pancreatic tissue,

wherein sivelestat is added before the digestion initiation step so that sivelestat is present in the inside of the pancreas at the time point of starting the digestion initiation step.

[2] The method for isolating islets according to [1], further comprising before the digestion step an injection step of injecting a preservation solution into the pancreatic duct of an excised pancreas and/or a preservation step of immersing the pancreas in an immersion fluid for preservation.

[3] The method for isolating islets according to [1] or [2], wherein the addition of sivelestat is performed by adding sivelestat to the enzyme solution.

[4] The method for isolating islets according to [1] or [2], wherein the addition of sivelestat is performed by adding sivelestat to the enzyme solution and the purification solution.

[5] The method for isolating islets according to [2], wherein the addition of sivelestat is performed by adding sivelestat to all of the preservation solution, the immersion fluid, the enzyme solution, and the purification solution.

[6] The method for isolating islets according to any one of [3] to [5], wherein the concentrations of sivelestat in the preservation solution, the immersion fluid, the enzyme solution, and the purification solution are 2 to 200 μM.

[7] A protective solution for protecting the pancreatic tissue from the action of elastase released from neutrophils having infiltrated into pancreatic tissue, when used in the method as described herein, wherein the protective solution comprises sivelestat.

[8] The protective solution according to [7], wherein the concentration of sivelestat in the protective solution is 2 to 200 μM.

[0013]

As used herein, the protective solution means a preservation solution, an immersion fluid, an enzyme solution, a purification solution, or the like used in the method for isolating islets according to the present invention, added with a neutrophil elastase inhibitor.

Effect of the Invention

[0014]

According to the present invention, islets of shapes and sizes suitable for transplantation can be obtained in high yields by the method for isolating the islets.

Brief Description of Drawings

[0015]

[Figure 1] Figure 1 is a series of photographs ((a) to (d)) showing degrees of infiltration of neutrophils into pancreas.

[Figure 2] Figure 2 is a graph showing neutrophil elastase activity in each step of islet isolation.

[Figure 3] Figure 3 is a graph showing the optimal concentration of a neutrophil elastase inhibitor.

[Figure 4] Figure 4 is a graph showing neutrophil elastase activity in each step of the islet isolation method described in Example and Comparative Examples.

[Figure 5] Figure 5 is a graph showing IEQ (islet equivalent) of the islets obtained.

CLAIMS

1. A method for isolating islets, comprising:

a digestion step of breaking down an excised pancreas to provide pancreatic tissue, and

a purification step of immersing the pancreatic tissue in a purification solution to provide islets,

wherein the digestion step comprises:

an enzyme injection step of injecting an enzyme solution containing a digestive enzyme into the inside of the pancreas;

a digestion initiation step of activating the digestive enzyme;

a digestion termination step of inactivating the digestive enzyme; and

a collection step of collecting the broken down pancreatic tissue,

wherein sivelestat is added before the digestion initiation step so that sivelestat is present in the inside of the pancreas at the time point of starting the digestion initiation step.

2. The method for isolating islets according to claim 1, further comprising before the digestion step an injection step of injecting a preservation solution into the pancreatic duct of an excised pancreas and/or a preservation step of immersing the pancreas in an immersion fluid for preservation.

3. The method for isolating islets according to claim 1 or 2, wherein the addition of sivelestat is performed by adding sivelestat to the enzyme solution.

4. The method for isolating islets according to claim 1 or 2, wherein the addition of sivelestat is performed by adding sivelestat to the enzyme solution and the purification solution.

5. The method for isolating islets according to claim 2, wherein the addition of sivelestat is performed by adding sivelestat to all of the preservation solution, the immersion fluid, the enzyme solution, and the purification solution.

6. The method for isolating islets according to any one of claims 3 to 5, wherein the concentrations of sivelestat in the preservation solution, the immersion fluid, the enzyme solution, and the purification solution are 2 to 200 μM.

7. A protective solution for protecting the pancreatic tissue from the action of elastase released from neutrophils having infiltrated into pancreatic tissue, when used in the method of any one of claims 1 to 6, wherein the protective solution comprises sivelestat.

8. The protective solution according to claim 7, wherein the concentration of sivelestat in the protective solution is 2 to 200 μM.