Use of rare sugars in cell, tissue, and organ preservation solutions

(Keywords: D-Allose, Anti-active oxygen effect, Cell and organ preservation solutions)

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Outline of technology

When cells or tissues are exposed to hypoxia (ischemia) and then are supplied with sufficient oxygen (reperfusion), a large amount of active oxygen is produced. Rare sugars are considered to have an antioxidative activity (inhibitory effect on active oxygen production) and to prevent or improve such a state. The effects of rare sugars on cell cryopreservation were evaluated using human cells in culture. When D-Allose was added to the culture medium, the cell survival rate was highest among more than 20 rare sugars examined.

Also, adhesion and proliferation abilities of cells after thawing were higher in the cells preserved in the presence of D-Allose than in those preserved without D-Allose, suggesting that D-Allose may also preserve cell functions.

This cell preserving effect of D-Allose was similar to, or higher than, that of trehalose, which is reported to have a cell preserving effect, in 5 cell lines used (Figure). D-Allose may be used to develop better preservation methods or preservation solutions for weak cells that must be frozen for preservation but the functions of which are lost by freezing (sperms, ova, fertilized ova, stem cells, etc.).

Also, organs and cells may have to be preserved at a low temperature as well as by freezing. D-Allose may also be used, for example, to preserve organs to be transplanted or platelets, which must not be frozen, without impairing their activities.

Sales points

- D-Allose is effective for the preservation of organs and cells because of its inhibitory effect on active oxygen production.

Expected application fields and products

(1) Organ preservation solutions
(2) Preservation solutions for platelet preparations
(3) Preservation solutions for human and animal sperms
(4) Cell preserving solutions

Comparison with existing products

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<tr>
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<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td></td>
<td>Cell preserving effect</td>
<td>Organ preserving effect</td>
</tr>
<tr>
<td>D-Allose</td>
<td>High</td>
<td>High</td>
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<tr>
<td>Cell banker cell preservation solution</td>
<td>Very high</td>
<td>None</td>
</tr>
<tr>
<td>University Wisconsin solution</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Trehalose</td>
<td>High</td>
<td>High</td>
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References, patents, etc.

- Related industrial property rights: PCT/JP2005/009691

Other matters to note

(Developer’s comment)
D-Allose is a material applicable to the preservation of both cells and organs.

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