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- Published:
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- (88) Date of publication of the international search report:
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- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEMS AND METHODS FOR CELL PRESERVATION

(57) Abstract: The present invention generally relates to devices and methods for the preservation of cells using drying, freezing, and other related techniques. In one set of embodiments, the invention allows for the preservation of cells in a dried state. In another set of embodiments, the invention allows for the preservation of cells within a glass or other non-viscous, non-frozen media. In some embodiments, the invention allows for the preservation of cells at temperatures below the freezing point of water, and in some cases at cryogenic temperatures, without inducing ice formation. The cells, in certain embodiments, may be preserved in the presence of intracellular and/or extracellular carbohydrates (which may be the same or different), for example, trehalose and sucrose. Carbohydrates may be transported intracellularly by any suitable technique, for example, using microinjection, or through non-microinjected methods such as through pore-forming proteins, electroporation, heat shock, etc. In certain instances, the glass transition temperature of the cells may be raised, e.g., by transporting a carbohydrate intracellularly. In some cases, the cells may be dried and/or stored, for example, in a substantially moisture-saturated environment or a desiccating environment. The cells may also be stored in a vacuum or a partial vacuum. The cells may be protected from oxygen, moisture, and/or light during storage. In certain cases, an inhibitor, such as a cell death inhibitor, a protease inhibitor, an apoptosis inhibitor, and/or an oxidative stress inhibitor may be used during preservation of the cells. The cells may be stored for any length of time, then recovered to a viable state, e.g., through rehydration, for further use.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/23553

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A01N1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 127 177 A (RUSSO MICHAEL ET AL) 3 October 2000 (2000-10-03) claims column 2, line 55 - line 67 column 4, line 10 - column 6, line 50 -----	1,2,4-34
X	US 2002/076445 A1 (TABLIN FERN ET AL) 20 June 2002 (2002-06-20) claims paragraph [0012] paragraph [0096] - paragraph [0113] -----	1-34
X	WO 98/34478 A (GRANDAGE LYNDA MARY ;QUADRANT HOLDINGS CAMBRIDGE (GB); MENYS VALEN) 13 August 1998 (1998-08-13) claims page 7, last paragraph -----	1-34
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

3 December 2003

Date of mailing of the international search report

22.03.04

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Decorte, D

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/23553

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 242 792 A (RUDOLPH ALAN S ET AL) 7 September 1993 (1993-09-07) column 3, line 48 - line 60 -----	1-34
A	WO 01/087062 A (GAMETE TECHNOLOGIES INC ;GEN HOSPITAL CORP (US)) 22 November 2001 (2001-11-22) cited in the application claims -----	1-34

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 03/23553

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-34

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-34

A method comprising inserting a non-permeating agent into a nucleated cell, drying the cell and storing the cell.

2. claims: 35-50

An article comprising a glass comprising a cell and a cell death inhibitor

3. claims: 51-59

An article comprising a dried cell and an oxygen resistant membrane in fluidic communication with the cell

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/US 03/23553

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