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(54) Title: HUMAN CANCER STEM CELLS

(57) Abstract: This invention discloses isolated populations of human cancer stem cells. Methods for characterizing, isolating and culturing human cancer stem cells are also disclosed. Uses for human cancer stem cells are provided.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US08/51730

A. CLASSIFICATION OF SUBJECT MATTER

IPC: C12N 5/00(2006.01),5/02(2006.01),5/08(2006.01)

USPC: 435/325,372

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)

U.S. : 435/325,372

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 practicable, search terms used)
WEST, STN, MEDLINE, CAPLUS, BIOSIS, SCISEARCH, LIFESCI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	COLLINS et al. Prospective Identification of Tumorigenic Prostate Cancer Stem Cells, Cancer Research, 2005, Vol. 65, No. 23, pages 10946-10951, entire document, especially abstract.	1-3
X	HUNTLY et al. Leukaemia Stem Cells and the Evolution of Cancer-Stem-Cell Research, Nature Reviews/Cancer, 2005, Vol. 5, pages 311-321, entire document, especially abstract, page 314, Table 1.	1-4

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US08/51730

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation 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 additional fees, this Authority did not invite payment of any additional fees.
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.: 1-4

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US08/51730

BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-4, drawn to a population of human cancer stem cells that are isolated from human tumor tissue.

Group II, claim(s) 5, drawn to a method of isolating a population of human cancer stem cells comprising dissociating a source of human cancer stem cells, growing said cells in nutrient media to optimize growth, and subculturing said cells to obtain a substantially pure population of human cancer stem cells.

Group III, claim(s) 6-7, drawn to a cancer cell vaccine comprising a human cancer stem cell, and a method of providing a source of immunogen to a heterologous recipient.

Group IV, claim(s) 8, drawn to a method of providing a source of human cancer stem cell-specific biological components for pharmaceutical development of at least one drug.

Group V, claim(s) 9, drawn to a method of providing a source of human cancer stem cells in a development of bioassays.

Group VI, claim(s) 10, drawn to a method of providing a source of human cancer stem cells in a xenograft model comprising using said human cancer stem cells as one or more principle components in the xenograft model.

Group VII, claim(s) 11-13, drawn to a pharmaceutical composition comprising a human cancer stem cell in a pharmaceutically acceptable formulation, and a method of treating cancer in a subject by using said human cancer stem cells.

The inventions listed as Groups I-VII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The putative special technical feature common to groups I-VII is a human cancer stem cell isolated from a human tumor tissue. Collins et al., 2005 (Cancer Research, Vol. 65, No. 23, p. 10946-10951) discloses identification and characterization of a cancer stem cell population from human prostate tumors, which possess a significant capacity for self-renewal. The isolated cancer stem cells are able to regenerate the phenotypically mixed populations of nonclonogenic cells and have CD44+/CD133+ phenotype (e.g. abstract). Therefore, there is no special technical feature contributed by the instant invention over the prior art. Thus, Groups I-VII do not relate to a single general inventive concept under PCT Rule 13.1.