Title: ETHER AND ALKYL PHOSPHOLIPID COMPOUNDS FOR TREATING CANCER AND IMAGING AND DETECTION OF CANCER STEM CELLS

Abstract: Methods and compositions utilizing ether and alkyl phospholipid ether analog compounds for treating cancer and imaging, monitoring, and detecting cancer stem cells in humans.
**INTERNATIONAL SEARCH REPORT**

**International application No.**

PCT/US 10/38294

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - A61K 51/00 (2010.01)

USPC - 424/1.77; 424/1.85; 424/1.65

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)

USPC: 424/1.77; 424/1.85; 424/1.65

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

USPC: 558/169 558/169, 558/166, 424/1.81, 424/1.490 (keywords below)

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

PubWEST (USPT, PGBP, EPAB, JPAB), Google Patents/Scholar: phospholipid, phosphocholine, isotope, radioiodine, fluorescent, diazaborine, pyrrole

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 2007/0098633 A2 (Weichert et al.) 03 May 2007 (03.05.2007) para [0016], [0020]-[0021], [0070]-[0071], [0077], [0099], [0106], [0129], [0151], [0189]</td>
<td>1-1, 13-17, 19-20</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

* 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 application or patent 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**

27 October 2010 (27.10.2010)

**Date of mailing of the international search report**

04 Nov 2010

**Name and mailing address of the ISA/US**

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

**Authorized officer:** Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/2 10 (second sheet) (July 2009)
INTERNATIONAL SEARCH REPORT

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).

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:

Groups I-II: claims 1-20, drawn to a method comprising administering to a patient a radiolabeled phospholipid compound, restricted to a compound of Formula I or a compound of Formula II respectively.

The inventions listed as Groups I-II 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:

- Please see extra sheet for continuation -

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 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. X 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.: 1-20 restricted to formula I

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.

Form PCT/ISA/2.10 (continuation of first sheet (2)) (July 2009)
The inventions of Group I share the technical feature of administering to a patient a radiolabeled phospholipid compound. However, this shared technical feature does not represent a contribution over prior art. Specifically, US 2007/0098633 A2 to Weichert et al. discloses a method of treating cancer (para [0020]) comprising administering to a patient in need thereof a therapeutically effective amount (para [0077]) of a radiolabeled ether or alkyl phospholipid compound of Formula I (para [0129], NM-404); where X is an isotope of iodine; n is an integer between 12 and 30; and Y is N+(R)3 and R is an alkyl (para [0129], NM-404); wherein said therapeutically effective amount of said radiolabeled ether or alkyl phospholipid compound is sufficient to penetrate into said cancer stem cells (para [0070], ...intercalation into a membrane) and wherein a population of said cancer stem cells is reduced (para [0189]). As said agent was known at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the groups.

Another technical feature of the inventions listed as Groups I-II is the specific phospholipid compound recited therein. The inventions do not share a special technical feature, because Weichert et al. discloses a phospholipid compound of Formula I (para [0129], NM-404); where X is an isotope of iodine; n is an integer between 12 and 30; and Y is N+(R)3 and R is an alkyl (para [0129], NM-404). Without a shared special technical feature, the inventions lack unity with one another.

Groups I-II therefore lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.