Title: THE N-DOMAIN OF CARCINOEMBRYONIC ANTIGEN AND COMPOSITIONS, METHODS AND USES THEREOF

Abstract: The present disclosure provides immunogenic compositions comprising the N-domain of carcinoembryonic antigen (CEA). These compositions are useful for inducing or enhancing an immune response, for inhibiting tumor cell growth and for treating cancer.
A. CLASSIFICATION OF SUBJECT MATTER
IPC: A61K 39/00 (2006.01), A61P 35/00 (2006.01), A61P 37/04 (2006.01)
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: A61K 39/00 (2006.01), A61P 35/00 (2006.01), A61P 37/04 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

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

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Databases: EPOQUE/EPDOC/TXTE/XPTK, USPTO/WEST, ESPACENET, LEXISNEXIS/TOTAL PATENT, STN/CAPLUS, PUBLMED, Keywords: carcinoembryonic antigen, CEA, N-domain, tumour, MC38, homophilic interaction, cell adhesion/adherence, luciferase, bioluminescent, inhibitor; GENOME QUEST: SEQ ID NOs 1-7, and 14.

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>CN 1,634,982 A (TAN, Y. et al.) 6 July 2005 (06-07-2005)</td>
<td>1-10, and 13-24</td>
</tr>
</tbody>
</table>

[ ] Further documents are listed in the continuation of Box C. [X] See patent family annex.

Date of the actual completion of the international search
9 September 2011 (09-09-2011)

Date of mailing of the international search report
19 September 2011 (19-09-2011)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
Place du Portage I, C114 - 1st Floor, Box PCT
50 Victoria Street
Gatineau, Quebec K1A 0C9
Facsimile No.: 001-819-953-2476

Authorized officer
Qianfa Chen (819) 994-1374

Form PCT/ISA/210 (second sheet) (July 2009)
**Box No. II**  
Observations where certain claims were found unsearchable (Continuation of item 2 of the 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. [X] Claim Nos.: 25-29  
   because they relate to subject matter not required to be searched by this Authority, namely:

   Claims 25-29, which encompass a method of treatment of the human/animal body, are not required to be searched by this Authority under Rule 39.1 (iv) of the PCT. Regardless, a search has been carried out and based on the alleged effects of the products defined.

2. [ ] Claim 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. [ ] Claim 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:

This international Search Authority found multiple inventions (groups) in this international application as follows:

Group 1: Claims 1-29 are directed to a composition comprising an N-domain of carcinoembryonic antigen (CEA) or a nucleic acid encoding the N-domain, the immunotherapeutic use of the N-domain.

[Continuation in Extra Sheet]

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [X] 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 claim 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 claim Nos.:

**Remark on Protest**

[X] 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.
Continued form Box NO III

Group 2: Claim 30 is directed to an *in vitro* method for identifying inhibitor of CEA-mediated homophilic interaction.

The requirements of the unity of invention are not fulfilled in that there is no technical relationship among the inventions as they do not involve one or more of the same or corresponding technical features. The expression "special technical features" means those features which define a contribution which each of the claimed inventions considered as a whole makes over the prior art.
<table>
<thead>
<tr>
<th>Patent Document Cited in Search Report</th>
<th>Publication Date</th>
<th>Patent Family Member(s)</th>
<th>Publication Date</th>
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<tbody>
<tr>
<td>CN1634982 A</td>
<td>06 July 2005 (06-07-2005)</td>
<td>None</td>
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<td></td>
<td></td>
<td>WO03059379A3</td>
<td>04 December 2003 (04-12-2003)</td>
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