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(54) Title: PEPTIDES FOR ANGIOGENIC THERAPY

(57) Abstract: Provided herein are compositions including peptide or nucleic acids encoding peptides and related methods for the treatment of angiogenic conditions such as cancer, vascular disorders such as cardiovascular disorders, and infectious disease.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 19/15210

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C12Q 1/48; C12N 5/09; A61K 38/00; A61K 48/00; C07K 19/00 (2019.01)

CPC - C12Q 1/485; C07K 14/4747; G01N 2510/00; A61K 38/00; A61K 48/00; C07K 2319/01

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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 2002/0019040 A1 (NOTEBORN et al.) 14 February 2002 (14.02.2002). Especially para [0008]; [0049-0050], [0058]; claims 6, 10; SEQ ID NO: 10	1, 4, (5-7)/(1,4), 15-18 ----- 2, (5-7)/2
Y	CHADA et al. Apoptin studies illuminate intersection between lipidomics and tumor suppressors. Mol Ther, January 2007, Vol 15, No 1, Pages 7-9. Especially pg 8 col 3 para 3 continued to pg 9 col 1 para 2.	2, (5-7)/2

☐ 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

"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

24 May 2019

Date of mailing of the international search report

23 JUL 2019

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 19/15210

Box No. I Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*. 1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☒ furnished subsequent to the international filing date for the purposes of international search only:

☒ in the form of an Annex C/ST.25 text file (Rule 13*ter*. 1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*. 1(b) and Administrative Instructions, Section 713).

2. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

GenCore ver 6.4.1 SEQ ID NO: 1

INTERNATIONAL SEARCH REPORT

International application No.

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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.: 8-14, 19-29
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:
-----Go to 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. ☒ 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.:
Claims 1,2, 4-7, 15-18 limited to peptide SEQ ID NO: 1

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/US 19/15210

Continuation of Box III: Observations where Unity of Inventions 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 searched, the appropriate additional search fees must be paid.

Group I+: Claims 1-7, 15-18, drawn to a pharmaceutical composition comprising a peptide or a viral vector comprising a nucleic acid encoding a peptide that alters apoptosis or angiogenesis.

The composition will be searched to the extent that the peptide is the first named peptide, SEQ ID NO: 1, or a fragment thereof that induces apoptosis or alters angiogenesis, or a peptide having the length of and at least 85% amino acid sequence identity to the sequence SEQ ID NO: 1. It is believed that claims 1, 2, 4-7, 15-18 read on this first named invention and thus these claims will be searched without fee to the extent that they encompass SEQ ID NO: 1 or a fragment thereof that induces apoptosis or alters angiogenesis, or a peptide having the length of and at least 85% amino acid sequence identity to the sequence. Additional peptides will be searched upon payment of additional fees. Applicant must specify the claims that encompass any additional elected peptides. Applicants must further indicate, if applicable, the claims which read on the first named invention if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched/examined. An exemplary election would be: SEQ ID NO: 4, or a fragment thereof that induces apoptosis or alters angiogenesis, or a peptide having the length of and at least 85% amino acid sequence identity to SEQ ID NO: 4 (claims 1-7, 15-18).

The inventions listed as Groups I+ 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:

Special Technical Features:

Among the inventions listed as Groups I+ are the specific polypeptide sequences recited therein. The inventions do not share a special technical feature, because no significant structural similarities can readily be ascertained among amino acid sequences.

Common Technical Features:

1. Group I+ inventions share the common technical feature of a pharmaceutical composition comprising a polypeptide that alters apoptosis or angiogenesis.
2. Group I+ inventions share the common technical feature of a viral vector construct or virus comprising a nucleic acid sequence encoding a polypeptide that alters apoptosis or angiogenesis.

However, said common technical features do not represent a contribution over the prior art, and are disclosed by US 2002/0019040 A1 to Noteborn et al. (hereinafter "Noteborn"), in view of US 8,715,645 B2 to Bellgrau et al. (hereinafter "Bellgrau")

As to common technical feature #1, Noteborn discloses (claim 1; "1. An isolated or recombinant nucleic acid of SEQ ID NO 1 or SEQ ID NO 9 or a functional equivalent or functional fragment thereof, said functional equivalent or functional fragment thereof encoding an Apoptin-associating proteinaceous substance capable of causing apoptosis in a cell to which said isolated or recombinant nucleic acid or Apoptin-associating proteinaceous substance has been delivered."; para [0022]; "Such use as provided by the invention is particularly useful from a therapeutic viewpoint. The invention provides herewith, a pharmaceutical composition comprising a nucleic acid, vector, host cell, or proteinaceous substance according to the invention.).

As to common technical feature #2, Bellgrau discloses (Claim 1; "1. A method of treating cancer in a mammal, comprising: (a) introducing into the mammal a recombinant viral vector that expresses Fas ligand, wherein the mammal has metastasized cancer and wherein the recombinant viral vector is introduced directly into, or adjacent to, a tumor and (b) allowing the expression of Fas ligand to induce apoptosis in cells of the metastasized cancer")

As the common technical features were known in the art at the time of the invention, they cannot be considered common special technical features that would otherwise unify the groups. The inventions lack unity with one another.

Therefore, Group I+ lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature.

Note concerning item 4: Claims 8-14, 19-29 are multiple dependent claims and are not drafted according to the second and third sentences of PCT Rule 6.4(a).