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Published:

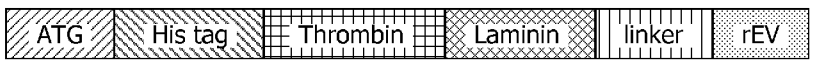
— *with international search report (Art. 21(3))*

— *with sequence listing part of description (Rule 5.2(a))*

(88) Date of publication of the international search report:
10 May 2013

(54) Title: TARGETING THE NEUROMUSCULAR JUNCTION FOR TREATMENT

FIG. 1



(57) Abstract: Compositions and methods for targeting therapeutic agents to neuromuscular junctions are disclosed. Also disclosed are methods for treating diseases and conditions affecting the neuromuscular junction. Compositions include a neuromuscular junction targeting peptide coupled to a therapeutic agent. Compositions may further include a linker peptide. Methods for targeting therapeutic agents to neuromuscular junctions and treating diseases and conditions affecting the neuromuscular junction include administering a composition including a neuromuscular junction targeting peptide coupled to a therapeutic agent.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 12/43172

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61K 47/00; 31/00 (2012.01)
USPC - 514/773, 514/1
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: 514/773, 514/1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 514/773, 514/1
(keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST (PGPB,USPT,USOC,EPAB,JPAB); Google; PubMed
Search terms: neuromuscular junction, targeting, peptide, AchR, acetylcholine receptor, complement, inhibitor, rEV576, conjugate, antibody, immunoconjugate, immunotoxin, SEQ ID NO:4, SEQ ID NO:26

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 2006/0013809 A1 (VINCENT et al.) 19 January 2006 (19.01.2006) abstract; para [0079], [0104]	1, 2, 6 ---------- 3-5, 7
Y	BRACCI et al. "Molecular mimicry between the rabies virus glycoprotein and human immunodeficiency virus-1 GP120: cross-reacting antibodies induced by rabies vaccination"; Blood; 1 November 1997 (01.11.1997); Vol. 90, No. 9; pages 3623-3628; pg 3623, para 1, 5; pg 3625, para 2; Fig. 7	3
Y	US 2009/0209459 A1 (HAMER et al.) 20 August 2009 (20.08.2009) para [0007], [0024], 0035], [0067]-[0071]	4-5
Y	US 2003/0226155 A1 (SADEGHI et al.) 4 December 2003 (04.12.2003) para [0389], [0398]; SEQ ID NO: 33	7
X	US 2005/0107601 A1 (LOEB) 19 May 2005 (19.05.2005) para [0035], [0157], [0223], [0224], [0230]	1, 6

☐ 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	Date of mailing of the international search report
2 January 2013 (02.01.2013)	22 JAN 2013
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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 12/43172

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:
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: claims 1-7, directed to a composition comprising a neuromuscular junction targeting peptide coupled to a therapeutic agent.

Group II: claims 8-20, directed to a method of delivering a therapeutic agent to the neuromuscular junction, the method comprising administering a composition comprising a neuromuscular junction targeting peptide coupled to a therapeutic agent.

- 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. ☒ 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.:
1-7

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.
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Continuation of Box III: Lack of Unity of Invention

The inventions listed as Groups I and 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:

The special technical feature of the claims of Groups I and II are indicated in the Group descriptions, above.

The common technical elements shared by the above groups is that they are related to a composition comprising a neuromuscular junction targeting peptide coupled to a therapeutic agent. These common technical elements do not represent an improvement over the prior art of US 2005/0107601 A1 to Loeb, which discloses a composition (para [0223], [0224]) comprising a neuromuscular junction targeting peptide coupled to a therapeutic agent. (a hybrid or fusion polypeptide that includes at least two domains or peptidic structures: (1) a first "targeting polypeptide whose role is to target the fusion polypeptide, and (2) a fusion partner referred to herein as a "targeted" polypeptide or 'P.sub.trg'. The targeting domain is preferably an animal N-HBD"; para [0035], "In myasthenia gravis, the preferred P.sub.trg is NGF delivered to any appropriate target organ, such as cholinergic neuromuscular junctions; para [0230]). (Note: Instant application, para [0045] indicates wherein "As used herein, the term "therapeutic agent" refers to any type of drug, medicine, pharmaceutical, hormone, antibiotic, protein, gene, growth factor, bioactive material, etc., used for treating, controlling, or preventing diseases or medical conditions"). Loeb further teaches a method of delivering a therapeutic agent to the neuromuscular junction, the method comprising administering a composition comprising a neuromuscular junction targeting peptide coupled to a therapeutic agent (a method for treating a disease or condition in a subject treatable by the action of the P.sub.trg, comprising administering to the subject an effective amount of the above pharmaceutical composition; para [0083]).

Therefore, the inventions of Groups I-II lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature.