Abstract:

(a) Field of the invention

The invention is related to pharmaceutical compositions comprising a sodium chloride modulating agent for modulating neurodegenerative diseases.

(b) Background of the invention

Neurodegenerative diseases are characterized by the progressive loss of neurons leading to clinical syndromes such as Alzheimer’s disease, Parkinson’s disease, ataxia telangiectasia, ataxia, and amyotrophic lateral sclerosis. The disease progression is associated with the accumulation of protein aggregates and the overproduction of reactive oxygen species. The loss of neurons may also result in atrophy, i.e., the loss of neurites and synaptic connections. Neurodegenerative diseases are associated with the atrophy of brain structures such as the cerebral cortex and hippocampus.

(c) Summary of the invention

In one embodiment, the invention provides a method of modulating the immune system in a subject in need thereof. Described herein are methods of administration and treatment.
INTERNATIONAL SEARCH REPORT

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 attached 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 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. 1-10

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 16/59915

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61K 32/20; C01B 11/10; A61P 25/28 (2017.01)
CPC - A61K33/20; C01B 11/10

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

<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 2012/0134929 A1 (McGrath) 31 May 2012 (31.05.2012) abstract, para [0004], [0012], [0013], [0030], [0064], [0077], [0143], [0166], [0443], [0445],</td>
<td>1-4, 8, 9</td>
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<td>5-7, 10</td>
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<tr>
<td>Y</td>
<td>US 2014/0178420 A1 (Goldberg et al.) 26 June 2014 (26.06.2014) para [0017], [0055]</td>
<td>10</td>
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</tbody>
</table>

* 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

"G" document member of the same patent family

Date of the actual completion of the international search
17 March 2017

Date of mailing of the international search report
17 APR 2017

Name and mailing address of the ISA/US
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Form PCT/ISA/2 10 (second sheet) (January 2015)
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:

Group I: Claims 1-10, directed to a method of treating a childhood neurodegenerative disease comprising administering to a subject an effective amount of a pharmaceutically acceptable chlorite composition.

Group II: Claims 11-24, directed to a method of treating frontotemporal dementia (FTD) comprising administering to a subject an effective amount of a pharmaceutically acceptable chlorite composition.

Group III: Claims 25-36, directed to a method of treating Parkinson's disease comprising administering to a subject an effective amount of a pharmaceutically acceptable chlorite composition.

Group IV: Claims 37-45, directed to a method of treating a subject for Duchenne's muscular dystrophy (DMD) comprising administering to a subject an effective amount of a pharmaceutically acceptable chlorite composition.

Group V: Claims 46-68, directed to a method of preventing or delaying an onset of a symptom of a neurodegenerative disease, comprising administering a chlorite composition to a subject in need thereof, wherein the subject harbors a mutation in a gene, wherein the mutation in the gene is associated with the neurodegenerative disease, and wherein a level of a marker of the neurodegenerative disease is altered in a biological sample of the subject relative to a level of the marker in a control biological sample of a control subject.

The group of inventions listed above 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:

Group I includes the technical feature of a method of treating a childhood neurodegenerative disease, not required by Groups II-V.

Group II includes the technical feature of a method of treating frontotemporal dementia (FTD), not required by Groups I and III-V.

Group III includes the technical feature of a method of treating Parkinson's disease, not required by Groups I-II and IV-V.

Group IV includes the technical feature of a method of treating a subject for Duchenne's muscular dystrophy (DMD), not required by Groups III and V.

Group V includes the technical feature of a method of preventing or delaying an onset of a symptom of a neurodegenerative disease in a subject harboring a mutation in a gene associated with said neurodegenerative disease, not required by Groups I-IV.

Common technical features:

Groups I-V share the technical feature of a method of administering an effective amount of a pharmaceutically acceptable chlorite composition.

Groups I-IV further share the technical feature of a method of treating a neurodegenerative disease in a subject in need thereof, effective amount of a pharmaceutically acceptable chlorite composition.

These shared technical features, however, do not provide a contribution over the prior art as being anticipated by US 2012/0134929 A1 to McGrath (hereinafter 'McGrath') which discloses a method of treating a neurodegenerative disease comprising administering to a subject in need thereof an effective amount of a pharmaceutical composition comprising a pharmaceutically acceptable chlorite composition (para [0012]-[0014]; [0440], [0441]).

As said method was known in the art at the time of the invention, these cannot be considered special technical features which would, otherwise unify the inventions of Groups I-V.

The inventions of Groups I-V, thus, lack unity under PCT Rule 13.