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(88) Date of publication of the international search report:
26 March 2015

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(54) Title: METHODS FOR THE SYNTHESIS OF SPHINGOMYELINS AND DIHYDROSPHINGOMYELINS

(57) Abstract: The present invention includes methods for the synthesis of sphingomyelins and dihydrosphingomyelins. The present invention also includes methods for the synthesis of sphingosines and dihydrosphingosines. The present invention further includes methods for the synthesis of ceramides and dihydroceramides.

# INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/000494

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07F9/10
ADD.

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)
C07F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 2007/027071 A1 (HOLLOWAY M K [US] ET AL HOLLOWAY M KATHARINE [US] ET AL) 1 February 2007 (2007-02-01) page 11 - page 13 | 1,2, 22-25 |
| X | EP 2 133 335 A1 (OTSUKA CHEMICAL CO LTD [JP]) 16 December 2009 (2009-12-16) paragraph [0399] | 26 |

☐ 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

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"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 |
|---|---|
| 12 August 2014 | 19/12/2014 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Bourghida, E |

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Information on patent family members

International application No
PCT/IB2014/000494

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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# INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2014/000494

**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:

see additional 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 an 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, 2, 22-25(completely); 26(partially)

**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.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2, 22-25(completely); 26(partially)

   a process for the preparation of D-erythro-sphingosine and intermediates used in the process.

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2. claims: 3(completely); 26(partially)

   a process for the preparation of N-palmitoyl-D-erythro-sphingosine and intermediates used in the process.

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3. claims: 4, 6, 8-10(completely); 26(partially)

   a process for the preparation of N-acyl-D-erythro-sphingomyelin and intermediates used in the process.

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4. claims: 5, 7(completely); 26(partially)

   a process for the preparation of D-erythro-3-O-benzoyl-ceramide and intermediates used in the process.

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5. claims: 11-14(completely); 26(partially)

   a process for the preparation of N-acyl-D-erythro-sphingomyelin and intermediates used in the process.

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6. claims: 15(completely); 26(partially)

   a process for the preparation of N-acyl-D-erythro-dihydrosphingomyelin and intermediates used in the process.

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7. claims: 16, 17, 19(completely); 26(partially)

   a process for the preparation of N-palmitoyl-D-erythro-sphingomyelin and intermediates used in the process.

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8. claims: 18(completely); 26(partially)

   a process for the preparation of N-palmitoyl-D-erythro-dihydrosphingomyelin and intermediates

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/** 210

used in the process.

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9. claims: 20, 21(completely); 26(partially)

a process for the preparation of N-acyl-D-erythro-sphingomyelin and intermediates used in the process.

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