

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|                                                       |                                                                                                  |                                                                                  |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Applicant's or agent's file reference<br>56170-WO-PCT | <b>FOR FURTHER ACTION</b><br>see Form PCT/ISA/220<br>as well as, where applicable, item 5 below. |                                                                                  |
| International application No.<br>PCT/US2015/022011    | International filing date ( <i>day/month/year</i> )<br>23 March 2015 (23-03-2015)                | (Earliest) Priority Date ( <i>day/month/year</i> )<br>24 March 2014 (24-03-2014) |
| Applicant<br><br>NOVARTIS AG                          |                                                                                                  |                                                                                  |

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed  
☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6**bis**(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant  
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant  
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. \_\_\_\_\_  
☐ as suggested by the applicant  
☐ as selected by this Authority, because the applicant failed to suggest a figure  
☐ as selected by this Authority, because this figure better characterizes the invention
- b. ☐ none of the figures is to be published with the abstract

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2015/022011

## 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.:

### 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/US2015/022011

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>INV. C07D417/14 C07D487/04 A61P31/04 A61K31/427 A61K31/496<br>A61K31/4439 A61K31/454 A61K31/437<br>ADD.<br>According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                    |                                                                      |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------|-----------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|-------------------------------------------------------------------------------------------------------------------------|------|
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>C07D<br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>EPO-Internal, CHEM ABS Data, WPI Data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                    |                                                                      |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <table border="1"> <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>EP 0 093 376 A2 (TAKEDA CHEMICAL INDUSTRIES LTD [JP])<br/>9 November 1983 (1983-11-09)<br/>claims 1, 34, 35<br/>page 85, line 22 - page 87<br/>example 9</td> <td>1-7, 18,<br/>20, 22,<br/>26-36</td> </tr> <tr> <td>A</td> <td>WO 2012/073138 A1 (PFIZER [US]; BROWN MATTHEW FRANK [US]; MITTON-FRY MARK J [US]; HAN SEU) 7 June 2012 (2012-06-07)<br/>cited in the application<br/>claims 1, 15-17</td> <td>1-36</td> </tr> <tr> <td>A</td> <td>WO 2013/110643 A1 (AICURIS GMBH &amp; CO KG [DE]) 1 August 2013 (2013-08-01)<br/>cited in the application<br/>claims 1, 14-19</td> <td>1-36</td> </tr> </tbody> </table>                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                    |                                                                      | Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. | X | EP 0 093 376 A2 (TAKEDA CHEMICAL INDUSTRIES LTD [JP])<br>9 November 1983 (1983-11-09)<br>claims 1, 34, 35<br>page 85, line 22 - page 87<br>example 9 | 1-7, 18,<br>20, 22,<br>26-36 | A | WO 2012/073138 A1 (PFIZER [US]; BROWN MATTHEW FRANK [US]; MITTON-FRY MARK J [US]; HAN SEU) 7 June 2012 (2012-06-07)<br>cited in the application<br>claims 1, 15-17 | 1-36 | A | WO 2013/110643 A1 (AICURIS GMBH & CO KG [DE]) 1 August 2013 (2013-08-01)<br>cited in the application<br>claims 1, 14-19 | 1-36 |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Citation of document, with indication, where appropriate, of the relevant passages                                                                                 | Relevant to claim No.                                                |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | EP 0 093 376 A2 (TAKEDA CHEMICAL INDUSTRIES LTD [JP])<br>9 November 1983 (1983-11-09)<br>claims 1, 34, 35<br>page 85, line 22 - page 87<br>example 9               | 1-7, 18,<br>20, 22,<br>26-36                                         |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | WO 2012/073138 A1 (PFIZER [US]; BROWN MATTHEW FRANK [US]; MITTON-FRY MARK J [US]; HAN SEU) 7 June 2012 (2012-06-07)<br>cited in the application<br>claims 1, 15-17 | 1-36                                                                 |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | WO 2013/110643 A1 (AICURIS GMBH & CO KG [DE]) 1 August 2013 (2013-08-01)<br>cited in the application<br>claims 1, 14-19                                            | 1-36                                                                 |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                    |                                                                      |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| * Special categories of cited documents :<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"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)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"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<br>"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<br>"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<br>"&" document member of the same patent family |                                                                                                                                                                    |                                                                      |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| Date of the actual completion of the international search<br><br>19 May 2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                    | Date of mailing of the international search report<br><br>29/05/2015 |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |
| Name and mailing address of the ISA/<br>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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                    | Authorized officer<br><br>Brandstetter, T                            |           |                                                                                    |                       |   |                                                                                                                                                      |                              |   |                                                                                                                                                                    |      |   |                                                                                                                         |      |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2015/022011

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date          |
|-------------------------------------------|---------------------|----------------------------|------------------------------|
| EP 0093376                                | A2                  | 09-11-1983                 | AT 51223 T 15-04-1990        |
|                                           |                     | AU 564150 B2 06-08-1987    |                              |
|                                           |                     | AU 1344583 A 03-11-1983    |                              |
|                                           |                     | CS 8303053 A2 12-02-1990   |                              |
|                                           |                     | DD 212510 A5 15-08-1984    |                              |
|                                           |                     | DE 3381353 D1 26-04-1990   |                              |
|                                           |                     | DK 188983 A 31-10-1983     |                              |
|                                           |                     | EP 0093376 A2 09-11-1983   |                              |
|                                           |                     | ES 8505340 A1 01-09-1985   |                              |
|                                           |                     | ES 8607924 A1 16-11-1986   |                              |
|                                           |                     | ES 8609236 A1 16-12-1986   |                              |
|                                           |                     | ES 8800186 A1 01-01-1988   |                              |
|                                           |                     | FI 831457 A 31-10-1983     |                              |
|                                           |                     | FI 881563 A 05-04-1988     |                              |
|                                           |                     | GB 2124207 A 15-02-1984    |                              |
|                                           |                     | GB 2156350 A 09-10-1985    |                              |
|                                           |                     | GR 78189 A1 26-09-1984     |                              |
|                                           |                     | HU 194876 B 28-03-1988     |                              |
|                                           |                     | HU 199115 B 29-01-1990     |                              |
|                                           |                     | MC 1513 A 10-02-1984       |                              |
|                                           |                     | MX 155085 A 26-01-1988     |                              |
|                                           |                     | NO 831514 A 31-10-1983     |                              |
|                                           |                     | NO 870981 A 31-10-1983     |                              |
|                                           |                     | NZ 204039 A 08-01-1988     |                              |
|                                           |                     | NZ 215805 A 08-01-1988     |                              |
|                                           |                     | PH 22251 A 01-07-1988      |                              |
|                                           |                     | PT 76621 A 01-05-1983      |                              |
|                                           |                     | SU 1480763 A3 15-05-1989   |                              |
|                                           |                     | ZW 9283 A1 28-09-1983      |                              |
| WO 2012073138                             | A1                  | 07-06-2012                 | AR 084001 A1 17-04-2013      |
|                                           |                     |                            | AU 2011336209 A1 30-05-2013  |
|                                           |                     |                            | CA 2815821 A1 07-06-2012     |
|                                           |                     |                            | CN 103228652 A 31-07-2013    |
|                                           |                     |                            | EP 2646436 A1 09-10-2013     |
|                                           |                     |                            | JP 2013544276 A 12-12-2013   |
|                                           |                     |                            | KR 20130112054 A 11-10-2013  |
|                                           |                     |                            | SG 190007 A1 28-06-2013      |
|                                           |                     |                            | TW 201247661 A 01-12-2012    |
|                                           |                     |                            | US 2012302542 A1 29-11-2012  |
|                                           |                     |                            | US 2013252935 A1 26-09-2013  |
|                                           |                     |                            | UY 33754 A 29-06-2012        |
|                                           |                     |                            | WO 2012073138 A1 07-06-2012  |
| WO 2013110643                             | A1                  | 01-08-2013                 | AR 089796 A1 17-09-2014      |
|                                           |                     |                            | AU 2013211575 A1 24-07-2014  |
|                                           |                     |                            | CA 2862338 A1 01-08-2013     |
|                                           |                     |                            | CL 2014001956 A1 07-11-2014  |
|                                           |                     |                            | CN 104203237 A 10-12-2014    |
|                                           |                     |                            | CO 7101240 A2 31-10-2014     |
|                                           |                     |                            | EA 201400838 A1 30-12-2014   |
|                                           |                     |                            | EP 2806873 A1 03-12-2014     |
|                                           |                     |                            | JP 2015504907 A 16-02-2015   |
|                                           |                     |                            | KR 20140114390 A 26-09-2014  |
|                                           |                     |                            | PE 23452014 A1 09-01-2015    |
|                                           |                     |                            | PH 12014501671 A1 10-11-2014 |
|                                           |                     |                            | TW 201343643 A 01-11-2013    |
|                                           |                     |                            | US 2015045340 A1 12-02-2015  |

## INTERNATIONAL SEARCH REPORT

### Information on patent family members

International application No

PCT/US2015/022011

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
|                                           |                     | UY 34585 A                 | 02-09-2013          |
|                                           |                     | WO 2013110643 A1           | 01-08-2013          |
| -----                                     |                     |                            |                     |

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

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

1. claims: 1-36

compounds of formula I

1.1. claims: 8-13, 19, 25(completely); 1-7, 18, 20-24, 26-36(partially)

compounds of formula I, wherein Het is a 5-membered heteroaryl ring and subject-matter referring to them

1.2. claims: 14-17(completely); 1-7, 18, 20-24, 26-36(partially)

compounds of formula I, wherein Het is a ring substituted with oxo and subject-matter referring to them

1.3. claims: 1-7, 18, 20, 26-36(all partially)

compounds not falling within the 1st or 2nd invention and subject-matter referring to them

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