

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL SEARCH REPORT**

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 3817-040PC03	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/IB2017/057588	International filing date ( <i>day/month/year</i> ) 1 December 2017 (01-12-2017)	(Earliest) Priority Date ( <i>day/month/year</i> ) 1 December 2016 (01-12-2016)
Applicant  TAKEDA PHARMACEUTICAL COMPANY LIMITED		

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 7 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:

CYCLIC PURINE DINUCLEOTIDES AS STING (STIMULATOR OF INTEFERON GENES) AGONISTS

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

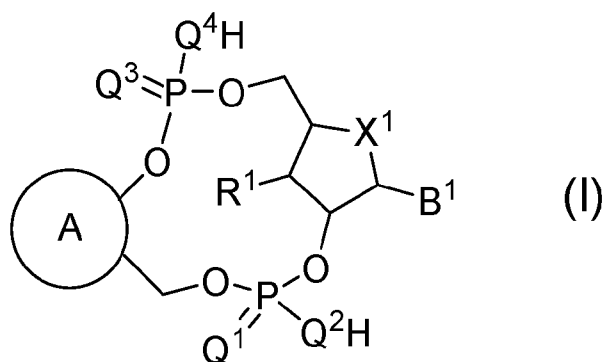
6. With regard to the **drawings**,

- 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

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

The present disclosure provides a compound having a STING (stimulator of interferon genes) agonistic activity, which may be expected to be useful as an agent for the prophylaxis or treatment of STING-related diseases, such as cancer.

The present disclosure relates to a compound represented by the formula (I):



wherein each symbol is as defined in the description, or a salt thereof.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB2017/057588

## 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/IB2017/057588

A. CLASSIFICATION OF SUBJECT MATTER  
INV. C07H21/00 C07H21/02 A61K31/7084 A61P35/00  
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)  
C07H  
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	WO 2014/189805 A1 (AURO BIOTECH INC [US]; UNIV CALIFORNIA [US]) 27 November 2014 (2014-11-27) cited in the application	1-31
A	figure 2A; compounds 9a-9f claim 1	32-100, 144-200
X	WO 2014/179335 A1 (SLOAN KETTERING INST CANCER [US]; UNIV ROCKEFELLER [US]; UNIV RUTGERS) 6 November 2014 (2014-11-06) cited in the application	1-31
A	claims 1, 33	32-100, 144-200
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Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search <b>17 May 2018</b>	Date of mailing of the international search report <b>06/06/2018</b>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <b>Mezzato, Stefano</b>
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/IB2017/057588

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	WO 2017/027646 A1 (MERCK SHARP & DOHME [US]; ALTMAN MICHAEL D [US]; ANDRESEN BRIAN [US];) 16 February 2017 (2017-02-16) cited in the application page 388, last line; claim 22 page 389, line second; claim 22 -----	1-31
X,P	WO 2017/161349 A1 (IMMUNE SENSOR LLC [US]; UNIV TEXAS [US]) 21 September 2017 (2017-09-21) page 291; claim 10; compounds 2-3 page 292; claim 10; compounds 1-3 page 293; claim 10; compounds 1, 3 page 294; claim 10; compound 1 page 299; claim 10; compound 3 claims 28-31, 37 -----	1-31
X	WO 2016/096174 A1 (INVIVOGEN [FR]) 23 June 2016 (2016-06-23) cited in the application	101-141
A	claims 1-2 -----	32-100, 142-200
X	YAN H ET AL: "Synthesis and immunostimulatory properties of the phosphorothioate analogues of cdiGMP", BIOORGANIC & MEDICINAL CHEMISTRY LETTERS, PERGAMON, AMSTERDAM, NL, vol. 18, no. 20, 15 October 2008 (2008-10-15), pages 5631-5634, XP025562123, ISSN: 0960-894X, DOI: 10.1016/J.BMCL.2008.08.088 [retrieved on 2008-08-29]	101-104, 106,110, 121-125, 129-141
A	page 5632; compounds 7a, 7b -----	32-100, 144-200

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No

PCT/IB2017/057588

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014189805	A1	27-11-2014	AU 2014268836 A1 24-09-2015
			BR 112015028341 A2 25-07-2017
			CA 2904536 A1 27-11-2014
			CL 2015002522 A1 30-12-2016
			CN 105228450 A 06-01-2016
			CR 20150616 A 19-04-2016
			CU 20150158 A7 30-05-2016
			DO P2015000281 A 29-02-2016
			EP 2996473 A1 23-03-2016
			HK 1219024 A1 24-03-2017
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			JP 2016520085 A 11-07-2016
			KR 20160009039 A 25-01-2016
			PE 00802016 A1 21-02-2016
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			US 2015056224 A1 26-02-2015
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			CA 2908154 A1 06-11-2014
			CL 2015003088 A1 15-04-2016
			CN 105358158 A 24-02-2016
			CR 20150592 A 04-04-2016
			CU 20150149 A7 29-07-2016
			DO P2015000269 A 29-02-2016
			EA 201592074 A1 29-02-2016
			EP 2991655 A1 09-03-2016
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			HK 1221652 A1 09-06-2017
			JP 2016524593 A 18-08-2016
			KR 20160024850 A 07-03-2016
			PE 01672016 A1 21-04-2016
			PH 12015502388 A1 22-02-2016
			SG 10201708821R A 28-12-2017
			SG 11201508165V A 27-11-2015
US 2016068560 A1 10-03-2016			
US 2018118777 A1 03-05-2018			
US 2018127454 A1 10-05-2018			
WO 2014179335 A1 06-11-2014			
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WO 2017027646	A1	16-02-2017	AU 2016304899 A1 01-02-2018
			CA 2995365 A1 16-02-2017
			KR 20180030926 A 26-03-2018
			PE 6882018 A1 23-04-2018
			TW 201718619 A 01-06-2017
			US 2017044206 A1 16-02-2017
			WO 2017027645 A1 16-02-2017
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WO 2016096174	A1	23-06-2016	CN 107148424 A 08-09-2017
			EP 3233882 A1 25-10-2017
			US 2016362441 A1 15-12-2016
			WO 2016096174 A1 23-06-2016
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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

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

1. claims: 1-31

Compounds of formula (I)

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2. claims: 32-100

Compounds of formula (XIV)

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3. claims: 101-143

Compounds of formula (XL)

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4. claims: 144-200

Compounds of formula (XLI)

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