

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 123429-08320	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2020/039359	International filing date (<i>day/month/year</i>) 24 June 2020 (24.06.2020)	Priority date (<i>day/month/year</i>) 27 June 2019 (27.06.2019)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant BIOGEN MA INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*. I(a).
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.
3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application
4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis*.2).

	Date of issuance of this report 28 December 2021 (28.12.2021)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Miki Kobayashi e-mail pct.team8@wipo.int

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2020/039359

International filing date (day/month/year)
24.06.2020

Priority date (day/month/year)
27.06.2019

International Patent Classification (IPC) or both national classification and IPC
INV. C07D471/04 C07D487/04 C07D519/00 A61P11/00 A61K31/437 A61K31/519 A61P17/00 A61P19/00
A61P25/00 A61P29/00

Applicant
BIOGEN MA INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Moriggi, J

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established 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)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed:
 - ☐ in the form of an Annex C/ST.25 text file.
 - ☐ on paper or in the form of an image file.
 - b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 - ☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>3-8, 10-19, 21, 23-35</u>
	No: Claims	<u>1, 2, 9, 20, 22, 36-40</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-40</u>
Industrial applicability (IA)	Yes: Claims	<u>1-40</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Item V.

Claims 38-40 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 39.1(iv) PCT. The patentability can be dependent upon the formulation of the claims. The EPO, for example, does not recognise as patentable claims to the use of a compound in medical treatment, but may allow claims to a product, in particular substances or compositions for use in a first or further medical treatment. Nevertheless, the present application deals with the subject-matter of said claims 38-40.

1. Reference

Reference is made to the following documents:

D1: WO 03/070732

D2: WO 2018/234343

D3: US 2017/305901

D4: Expert Opinion on Therapeutic Patents, 2019, 29:4, 243-259

2. Novelty

Formula I of claim 1 of document D1, wherein W is (b), and formula (I') of claim 1 of the present application, in which R³ is option v, overlap. In addition, document D1 discloses about twenty compounds that fall within the chemical area defined by the structural overlap (e.g. *N*-[(3*R*)-1-azabicyclo[2.2.2]oct-3-yl]-2-methyl-imidazo[1,2-*a*]pyridine-6-carboxamide in claim 8). In addition, document D1 discloses pharmaceutical compositions (claim 65) and methods of treatment of, *inter alia*, neurodegenerative diseases including Alzheimer's disease (claim 81).

The present application does not meet the requirements of Article 33(2) PCT.

For the sake of completeness, it should be noted that:

Formula 0 of claim 1 of document D2 and formula (I') of claim 1 of the present application also overlap. The position of the group -C(O)NHR³ represents a new technical teaching over the generic disclosure of D2. Example 65 on page 96 of D2 differs from the compounds of the present application through the position of the amide group -C(O)NHR³.

Document D3 discloses imidazo[1,2-*a*]pyridine derivatives of formula III that differ from the compounds of the present application through the position of the amide substituent.

Document D4 discloses several IRAK4 inhibitors. None of them corresponds to a compound according to formula (I') of claim 1 of the present application.

3. Inventive Step

Document D2, which can be regarded as the closest prior art to the present application, discloses amide derivatives as IRAK4 inhibitors useful for treating an inflammatory or autoimmune disease (see D1, claim 22).

At first, the problem to be solved by the present application could be seen in the provision of amide derivatives useful for treating an inflammatory or autoimmune disease that possess unexpected properties over the prior art.

There is, however, no experimental data or any other information supporting the presence of an unexpected effect associated with the technical element that is responsible for novelty of the present application over D2 (i.e. the specific position of the group $-C(O)NHR^3$).

The technical problem must therefore be reformulated into a less ambitious problem, namely the mere provision of alternative amide derivatives useful for the treatment of an inflammatory or autoimmune disease.

The data provided on pages 508-523 seem to indicate that at least the exemplified compounds according to formula (I') of current claim 1 actually solve the technical problem. However, in view of the structural overlap with D2, the person skilled in the art of medicinal chemistry would have considered obvious the compounds of formula (I') of current claim 1.

The present application does not meet the requirements of Article 33(3) PCT.

Item VIII.

Option vi of the current definition of R^3 is not necessarily limited to a carbon-only ring system and, as a result, option vi is partially redundant with option v. Claim 1 does not fulfil the requirements of conciseness set down in Article 6 PCT.

The claims must be self-contained and cannot refer, for example, to the description in order to define the subject-matter for which protection is sought. As a result, current claim 35 does not meet the requirements of Article 6 PCT. The actual examples must be explicitly recited in claim 35.