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# SUPPLEMENTARY EUROPEAN SEARCH REPORT

Application Number
EP 15 74 6105

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | WO 2009/030500 A1 (ABBOTT GMBH & CO KG [DE]; MUELLER BERNHARD [DE]; SCHAFFAR GREGOR [DE];) 12 March 2009 (2009-03-12) * abstract, p. 4 lines 5-10, p. 11 line 26 - p. p. 16 line 10, p. 20 line 26 - p. 23 line 23, p. 60 lines 29-35, claims 1-40 * | 1-3 | INV. G01N33/53 C07K16/22 A61K39/395 A61K45/06 A61K31/7105 C07K16/28 |
| X,P | Y. XIAO ET AL: "RGMb is a novel binding partner for PD-L2 and its engagement with PD-L2 promotes respiratory tolerance", MOLECULAR IMMUNOLOGY., vol. 48, no. 11, 21 April 2014 (2014-04-21), pages 1292-959, XP055234934, GB ISSN: 0161-5890, DOI: 10.1084/jem.20130790 * abstract, p. 945 left-hand column second full paragraph - p. 946 right-hand column line 14, p. 948 paragraph bridging the left- to the right-hand column - p. p. 953 left-hand column line 8, p. 955 right-hand column 1st full paragraph, Fig. 1-9 * | 1-3 | C12N15/113 C12N15/115 G01N33/566 A61K39/00 |
| X,P | WO 2014/022759 A1 (DANA FARBER CANCER INST INC [US]; BOSTON CHILDREN S HOSPITAL [US]) 6 February 2014 (2014-02-06) * abstract, p. 3 line 28 - p. 10 line 9, p. 108 line 21 - p. 110 line 44, examples 3-13 and claims * | 1-3 | |

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TECHNICAL FIELDS SEARCHED (IPC)

C07K
A61K

The supplementary search report has been based on the last set of claims valid and available at the start of the search.

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 10 October 2017 | Hermann, Patrice |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
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& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04N04)

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| A | CORRADINI E ET AL: "The RGM/DRAGON family of BMP co-receptors", CYTOKINE AND GROWTH FACTOR REVIEWS, ELSEVIER LTD, GB, vol. 20, no. 5-6, 1 October 2009 (2009-10-01), pages 389-398, XP026790608, ISSN: 1359-6101 [retrieved on 2009-11-07] * the whole document * | 1-3 | |
| A | CONRAD S ET AL: "RGMb controls aggregation and migration of Neogenin-positive cells in vitro and in vivo", MOLECULAR AND CELLULAR NEUROSCIENCES, SAN DIEGO, US, vol. 43, no. 2, 1 February 2010 (2010-02-01), pages 222-231, XP026824981, ISSN: 1044-7431 [retrieved on 2009-11-26] * the whole document * | 1-3 | TECHNICAL FIELDS SEARCHED (IPC) |
| A | MEIKO HAGIHARA ET AL: "Neogenin, a Receptor for Bone Morphogenetic Proteins", JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 286, no. 7, 13 December 2010 (2010-12-13), pages 5157-5165, XP055188569, ISSN: 0021-9258, DOI: 10.1074/jbc.M110.180919 * the whole document * | 1-3 | |

The supplementary search report has been based on the last set of claims valid and available at the start of the search.

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 10 October 2017 | Hermann, Patrice |

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EPO FORM 1503 03.82 (P04N04)

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Application Number

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## CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

## LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present (supplementary) European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present (supplementary) European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present (supplementary) European search report has been drawn up for those parts of the European patent application which relate to the first mentioned in the claims, namely claims:

1-3(partially)

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# LACK OF UNITY OF INVENTION
# SHEET B

Application Number
EP 15 74 6105

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3(partially)

Invention 1 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a blocking antibody that binds RGMb.

---

2. claims: 1-3(partially)

Invention 2 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a blocking antibody that binds NEO1.

---

3. claims: 1-3(partially)

Invention 3 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a blocking antibody that binds BMP2.

---

4. claims: 1-3(partially)

Invention 4 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a blocking antibody that binds BMP4.

---

5. claims: 1-3(partially)

Invention 5 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a non activating form of RGMb.

---

6. claims: 1-3(partially)

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

Invention 6 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a non activating form of NEO1.

---

7. claims: 1-3(partially)

Invention 7 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a non activating form of BMP2.

---

8. claims: 1-3(partially)

Invention 8 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a non activating form of BMP4.

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9. claims: 1-3(partially)

Invention 9 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a soluble form of RGMb.

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10. claims: 1-3(partially)

Invention 10 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a soluble form of NEO1.

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11. claims: 1-3(partially)

Invention 11 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a soluble form of BMP2.

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12. claims: 1-3(partially)

Invention 12 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a soluble form of BMP4.

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13. claims: 1-3(partially)

Invention 13 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is an RGMb fusion protein.

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14. claims: 1-3(partially)

Invention 14 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a NEO1 fusion protein.

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15. claims: 1-3(partially)

Invention 15 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a BMP2 fusion protein.

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16. claims: 1-3(partially)

Invention 16 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a BMP4 fusion protein.

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17. claims: 1-3(partially)

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

Invention 17 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a nucleic acid molecule that blocks transcription or translation of RGMb, NEO1, BMP2 and/or BMP4.

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18. claims: 1-3(partially)

Invention 18 relates to an agent that inhibits the repulsive guidance molecule b (RGMb)-neogenin (NEO1)-bone morphogenic protein (BMP) signaling pathway for use in treating a subject having a respiratory inflammatory disorder, more specifically wherein the agent is a small molecule antagonist of RGMb, NEO1, BMP2 and/or BMP4.

---

19. claim: 4

Invention 19 relates to a cell-based method for screening for compounds which treat a respiratory inflammatory disorder by modulating RGMb-NEO1-BMP signaling comprising contacting (a) a cell expressing RGMb protein with a NEO1, BMP2 and/or BMP4 protein or (b) a cell expressing NEO1 protein with a RGMb, BMP2 and/or BMP4 protein; and a test compound, and determining the ability of the test compound to 1) (a) modulate the binding between RGMb protein and the NEO1, BMP2 and/or BMP4 protein or (b) modulate the binding between NEO1 protein and the RGMb, BMP2 and/or BMP4 protein and 2) modulate one or more respiratory inflammatory disorder symptoms selected from the group listed in claim 4.

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20. claim: 5

Invention 20 relates to a cell-free method for screening for compounds which treat a respiratory inflammatory disorder by modulating RGMb-NEO1-BMP signaling comprising contacting (a) a RGMb, NEO1, BMP2 and/or BMP4 protein with at least one of the protein's natural binding partners selected from the group cnsisting of RGMb, NEO1, BMP2 and/or BMP4, and a test compound, and determining the ability of the test compound to 1) modulate the binding between the protein(s) and 2) modulate one or more respiratory inflammatory disorder symptoms selected from the group listed in claim 5.

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21. claim: 6

# LACK OF UNITY OF INVENTION
## SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

Invention 21 relates to a method for assessing the efficacy of an agent for treating a respiratory inflammatory disorder comprising the steps and alternatives of claim 6.

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 74 6105

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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10-10-2017

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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| | | EP 2033971 A1 | 11-03-2009 |
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| | | WO 2009030500 A1 | 12-03-2009 |
| WO 2014022759 A1 | 06-02-2014 | EP 2879710 A1 | 10-06-2015 |
| | | HK 1210430 A1 | 22-04-2016 |
| | | US 2015299322 A1 | 22-10-2015 |
| | | WO 2014022759 A1 | 06-02-2014 |



For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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|---|---|---|---|
| 专利名称(译) | 调节RGMb-新生儿BMP信号的药剂及其使用方法 | | |
| 公开(公告)号 | EP3102939A4 | 公开(公告)日 | 2018-02-28 |
| 申请号 | EP2015746105 | 申请日 | 2015-02-05 |
| [标]申请(专利权)人(译) | 达那-法伯癌症研究所<br>波士顿儿童医院 | | |
| 申请(专利权)人(译) | Dana-Farber癌症研究所INC.<br>波士顿儿童医院 | | |
| 当前申请(专利权)人(译) | Dana-Farber癌症研究所INC.<br>波士顿儿童医院 | | |
| [标]发明人 | DEKRUYFF ROSEMARIE<br>FREEMAN GORDON J<br>UMETSU DALE T<br>YU SANHONG<br>XIAO YANPING | | |
| 发明人 | DEKRUYFF, ROSEMARIE<br>FREEMAN, GORDON J.<br>UMETSU, DALE T.<br>YU, SANHONG<br>XIAO, YANPING | | |
| IPC分类号 | G01N33/53 | | |
| CPC分类号 | A61K2039/505 C07K16/22 C07K16/2803 A61K31/7105 A61K39/3955 A61K45/06 C07K16/2863 C07K2317/565 C07K2317/76 C12N15/1138 C12N15/115 C12N2310/11 C12N2310/14 C12N2310/16 C12N2320/31 G01N33/566 G01N2333/715 G01N2500/04 | | |
| 代理机构(译) | 赫尔比希，CHRISTIAN | | |
| 优先权 | 61/936150 2014-02-05 US | | |
| 其他公开文献 | EP3102939A2 | | |
| 外部链接 | Espacenet | | |


摘要(译)

本发明涉及调节RGMb- Neogenin-BMP信号传导的组合物和方法。


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| X | WO 2009/030500 A1 (ABBOTT GMBH & CO KG [DE]; MUELLER BERNHARD [DE]; SCHAFFAR GREGOR [DE]) 12 March 2009 (2009-03-12) * abstract, p. 4 lines 5-10, p. 11 line 26 - p. 15 line 10, p. 20 line 26 - p. 23 line 23, p. 60 lines 29-35, claims 1-40 * | 1-3 | INV. G01N33/53 C07K16/22 A61K39/395 A61K45/06 A61K31/7105 C07K16/28 C12N15/113 C12N15/115 G01N33/566 A61K39/00 |
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