

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 November 2007 (08.11.2007)

PCT

(10) International Publication Number
WO 2007/124849 A3

(51) International Patent Classification:

<i>A61K 31/00</i> (2006.01)	<i>A61K 31/381</i> (2006.01)
<i>A61P 11/00</i> (2006.01)	<i>A61K 31/44</i> (2006.01)
<i>A61P 35/00</i> (2006.01)	<i>A61K 31/4402</i> (2006.01)
<i>A61P 25/28</i> (2006.01)	<i>A61K 31/4406</i> (2006.01)
<i>A61P 25/16</i> (2006.01)	<i>A61K 31/4418</i> (2006.01)
<i>A61K 31/166</i> (2006.01)	<i>A61K 31/444</i> (2006.01)
<i>A61K 31/18</i> (2006.01)	<i>A61K 31/47</i> (2006.01)
<i>A61K 31/341</i> (2006.01)	

(21) International Application Number:

PCT/EP2007/003293

(22) International Filing Date:

13 April 2007 (13.04.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10 2006 019 589.2 27 April 2006 (27.04.2006)	DE
10 2006 049 527.6	
20 October 2006 (20.10.2006)	DE

(71) Applicant (for all designated States except US):
SANOFI-AVENTIS DEUTSCHLAND GMBH
[DE/DE]; Brüningstrasse 50, 65929 Frankfurt am Main (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BRENDEL, Joachim** [DE/DE]; c/o Sanofi-Aventis Deutschland GmbH, 65926 Frankfurt am Main (DE). **GOEGELEIN, Heinz** [DE/DE]; c/o Sanofi-Aventis Deutschland GmbH, 65926 Frankfurt am Main (DE). **WIRTH, Klaus** [DE/DE]; c/o Sanofi-Aventis Deutschland GmbH, 65926

Frankfurt am Main (DE). **KAMM, Walter** [DE/DE]; c/o Sanofi-Aventis Deutschland GmbH, 65926 Frankfurt am Main (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:

8 October 2009

(54) Title: INHIBITORS OF THE TASK-1 AND TASK-3 ION CHANNEL

(57) Abstract: The invention relates to the use of Kv1.5 inhibitors for producing a medicament for the therapy or prophylaxis of respiratory disorders, sleep-related respiratory disorders, central and obstructive sleep apneas, upper airway resistance syndrome, Cheyne-Stokes respiration, snoring, disrupted central respiratory drive, sudden child death, postoperative hypoxia and apnea, muscle-related respiratory disorders, respiratory disorders after long-term ventilation, respiratory disorders during adaptation in high mountains, acute and chronic lung disorders with hypoxia and hypercapnia, neurodegenerative disorders, dementia, Alzheimer's disease, Parkinson's disease, Huntington's disease, cancer disorders, breast cancer, lung cancer, colon cancer and prostate cancer.



WO 2007/124849 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/003293

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K31/00 A61P11/00 A61P35/00 A61P25/28 A61P25/16
A61K31/166 A61K31/18 A61K31/341 A61K31/381 A61K31/44
A61K31/4402 A61K31/4406 A61K31/4418 A61K31/444 A61K31/47

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)

A61P A61K

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 practical, search terms used)

EPO-Internal, WPI Data, BIOSIS, EMBASE, CHEM ABS Data, BEILSTEIN 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 2005/085188 A (COMPASS PHARMACEUTICALS LLC [US]; FISHER KARL J [US]; ABELMAN MATT [US]) 15 September 2005 (2005-09-15) page 1, line 16 - line 21 figures 2A-G, 2I-J, 2P	1-3, 8-13
A	WO 2005/030727 A (MERCK & CO INC [US]; ISAACS RICHARD [US]; DINSMORE CHRISTOPHER J [US];) 7 April 2005 (2005-04-07) page 12, lines 15-19 page 4, line 5	1-13
A	WO 03/063797 A (SQUIBB BRISTOL MYERS CO [US]; ICAGEN INC [US]; LLOYD JOHN [US]; JEON Y) 7 August 2003 (2003-08-07) page 40, line 29 - line 31 page 7, line 26 - line 32	1-13

☒ 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 document but published on or after the international filing date
- *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)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *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

10 August 2009

Date of mailing of the international search report

14/08/2009

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

Nyek i, Agnes

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2007/003293

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	HONG ZHIGANG ET AL: "Pergolide is an inhibitor of voltage-gated potassium channels, including Kv1.5, and causes pulmonary vasoconstriction." CIRCULATION 6 SEP 2005, vol. 112, no. 10, 6 September 2005 (2005-09-06), pages 1494-1499, XP002498082 ISSN: 1524-4539 abstract -----	1-13
A	COTTEN JOSEPH F ET AL: "The ventilatory stimulant doxapram inhibits TASK tandem pore (K2P) potassium channel function but does not affect minimum alveolar anesthetic concentration." ANESTHESIA AND ANALGESIA MAR 2006, vol. 102, no. 3, March 2006 (2006-03), pages 779-785, XP009103929 ISSN: 1526-7598 abstract -----	1-13
A	WO 01/00573 A (AVENTIS PHARMA GMBH [DE]) 4 January 2001 (2001-01-04) cited in the application page 4, lines 10,11; claim 1 -----	1-13
A	WO 2005/084675 A (AVENTIS PHARMA GMBH [DE]; WIRTH KLAUS [DE]) 15 September 2005 (2005-09-15) the whole document -----	1-13
P,X	WO 2006/136305 A (SANOFI AVENTIS DEUTSCHLAND [DE]; BRENDDEL JOACHIM [DE]; ENGLERT HEINRIC) 28 December 2006 (2006-12-28) page 4, lines 1-5 page 5, lines 21-23 claims 12,13 -----	1-13
P,X	WO 2006/058905 A (DEVGEN NV [BE]; BLOM PETRA [BE]; DE KERPEL JAN OCTAAF [BE]; FOURMAINTR) 8 June 2006 (2006-06-08) claims 33,37 -----	1-13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2007/003293

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 allsearchable 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.:
1-13 (partially)
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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-13 (in part)

Claim 1-13 (in part) directed to the use of Kv1.5 inhibitors of the formula Ia for producing a medicament for the therapy or prophylaxis of the diseases listed in claim 1

2. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of Kv1.5 inhibitors of the formula Ib for producing a medicament for the therapy or prophylaxis of the diseases listed in claim 1.

3. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of Kv1.5 inhibitors of the formula Ic for producing a medicament for the therapy or prophylaxis of the diseases listed in claim 1

4. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of Kv1.5 inhibitors of of the formula Id for producing a medicament for the therapy or prophylaxis of the diseases listed in claim 1

5. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of Kv1.5 inhibitors of the formula Ie for producing a medicament for the therapy or prophylaxis of the diseases listed in claim 1

6. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of Kv1.5 inhibitors of the formula If for producing a medicament for the therapy or prophylaxis of the diseases listed in claim 1

7. claims: 1-13 (in part)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Claims 1-13 (in part) directed to directed to the use of
Kv1.5 inhibitors of the formula Ig for producing a
medicament for the therapy or prophylaxis of the diseases
listed in claim 1

8. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of
Kv1.5 inhibitors of the formula Ih for producing a
medicament for the therapy or prophylaxis of the diseases
listed in claim 1

9. claims: 1-13 (in part)

Claims 1-13 (in part) directed to directed to the use of
Kv1.5 inhibitors of the formula Ij for producing a
medicament for the therapy or prophylaxis of the diseases
listed in claim 1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/003293

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2005085188	A	15-09-2005	NONE	
WO 2005030727	A	07-04-2005	AU 2004276267 A1 CA 2539541 A1 CN 1856473 A EP 1667977 A1 JP 2007506748 T	07-04-2005 07-04-2005 01-11-2006 14-06-2006 22-03-2007
WO 03063797	A	07-08-2003	AU 2003210817 B2 BR 0307329 A CA 2474451 A1 CN 1732146 A EP 1507504 A1 HR 20040667 A2 IS 7370 A JP 2006508016 T MX PA04007365 A NZ 534098 A RU 2343143 C2 US 2007142333 A1 YU 66204 A ZA 200405905 A	16-07-2009 11-04-2006 07-08-2003 08-02-2006 23-02-2005 31-08-2005 23-07-2004 09-03-2006 31-03-2005 27-04-2007 10-01-2009 21-06-2007 17-08-2006 31-05-2006
WO 0100573	A	04-01-2001	AT 248811 T AU 771601 B2 AU 5531800 A BR 0011938 A CA 2377087 A1 CN 1358172 A CZ 20014523 A3 DE 19929076 A1 DK 1194403 T3 EE 200100684 A EP 1194403 A1 ES 2200886 T3 HK 1047575 A1 HU 0201711 A2 JP 2003503385 T MX PA01012281 A NO 20015816 A NZ 516347 A PL 352985 A1 PT 1194403 E RU 2238934 C2 SK 19092001 A3 TR 200103701 T2 TW 256950 B US 6221866 B1 ZA 200109732 A	15-09-2003 25-03-2004 31-01-2001 19-03-2002 04-01-2001 10-07-2002 17-04-2002 28-12-2000 08-12-2003 15-04-2003 10-04-2002 16-03-2004 31-12-2004 28-09-2002 28-01-2003 30-07-2002 29-11-2001 30-01-2004 22-09-2003 30-01-2004 27-10-2004 04-06-2002 21-05-2002 21-06-2006 24-04-2001 30-08-2002
WO 2005084675	A	15-09-2005	AR 047975 A1 AU 2005218731 A1 BR PI0508054 A CA 2557263 A1 CN 1921855 A DE 102004009931 A1 EP 1720549 A1 JP 2007523926 T	15-03-2006 15-09-2005 17-07-2007 15-09-2005 28-02-2007 15-09-2005 15-11-2006 23-08-2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/003293

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005084675 A		KR 20060125862 A US 2007043091 A1 UY 28777 A1	06-12-2006 22-02-2007 30-09-2005
WO 2006136305 A	28-12-2006	AU 2006261317 A1 CA 2610326 A1 CN 101203508 A DE 102005028845 A1 EP 1899320 A1 JP 2008543897 T KR 20080021047 A US 2008188520 A1	28-12-2006 28-12-2006 18-06-2008 28-12-2006 19-03-2008 04-12-2008 06-03-2008 07-08-2008
WO 2006058905 A	08-06-2006	AU 2005311251 A1 BR PI0516915 A CA 2588517 A1 CN 101098698 A EP 1819330 A1 JP 2008521862 T KR 20070094754 A US 2008125432 A1	08-06-2006 11-03-2008 08-06-2006 02-01-2008 22-08-2007 26-06-2008 21-09-2007 29-05-2008