



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

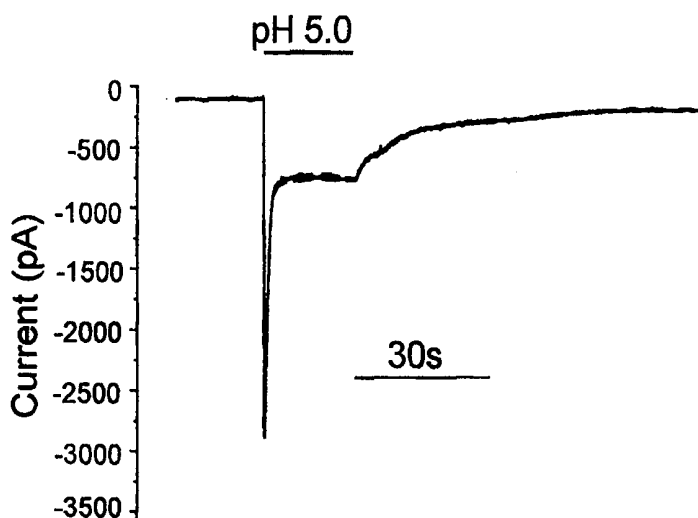
(51) International Patent Classification ⁶ : C12N 15/12, C07K 14/705, C12Q 1/68, C12N 15/85, 5/10, A61K 48/00, A01K 67/027		A3	(11) International Publication Number: WO 99/63081 (43) International Publication Date: 9 December 1999 (09.12.99)
(21) International Application Number: PCT/GB99/01743 (22) International Filing Date: 3 June 1999 (03.06.99) (30) Priority Data: 9811965.4 3 June 1998 (03.06.98) GB (71) Applicant (for all designated States except US): UNIVERSITY COLLEGE LONDON [GB/GB]; Gower Street, London WC1E 6HA (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): WOOD, John, Nicholas [GB/GB]; University College London, Dept. of Anatomy and Developmental Biology, Medawar Building, Gower Street, London WC1E 6BT (GB). ENGLAND, Steven [GB/GB]; Pfizer Limited, Ramsgate Road, Sandwich, Kent CT13 9NJ (GB). CHEN, Chih, Cheng [-/US]; National Institute of Health, Building 36, Bethesda, MD 20892 (US). AKOPIAN, Armen, Norakovich [AM/GB]; University College London, Dept. of Anatomy and Developmental Biology, Medawar Building, Gower Street, London WC1E 6BT (GB).			(74) Agents: KREMER, Simon, M. et al.; Mewburn Ellis, York House, 23 Kingsway, London WC2B 6HP (GB). (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 27 January 2000 (27.01.00)

(54) Title: ION CHANNELS

(57) Abstract

The invention provides acid sensitive cation channel proteins which are capable of reversibly mediating (i) a rapid, and (ii) a sustained cation current, particularly the SPASIC protein or variants (e.g. homologues or fragments) thereof. Also provided are nucleic acids encoding these, or which have utility in probing, amplifying or down-regulating these. Methods of providing the proteins and nucleic acids are disclosed, as are vectors, host cells, and organisms utilizing them, and antibodies. Also disclosed are methods of influencing the electrophysiological and/or pharmacological properties of a cell (e.g. by way of therapy) based on manipulation of the proteins or nucleic acids, and methods for screening for substances having ion-channel modulating activity (which may be potential analgesics; neuromodulatory agents; anti-inflammatory agents; agents that regulate neurotransmitter release or neuronal excitability).

SPASIC Expressed in COS-7 Cells



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 99/01743

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12N15/12 C07K14/705 C12Q1/68 C12N15/85 C12N5/10
A61K48/00 A01K67/027

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)

IPC 6 C12N C07K C12Q A61K A01K

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	RAINER WALDMANN ET AL.: "A proton-gated cation channel involved in acid-sensing" NATURE, vol. 386, no. 6621, 13 March 1997 (1997-03-13), pages 173-177, XP002068589 LONDON GB cited in the application the whole document --- -/--	1,4,5, 7-10, 21-39

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in 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

1 December 1999

Date of mailing of the international search report

07/12/1999

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/01743

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	WO 98 35034 A (CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS) 13 August 1998 (1998-08-13) page 1, line 5 -page 2, line 16 page 3, line 17 - line 26 page 6, line 4 - line 13 page 7, line 3 - line 11 page 7, line 20 -page 10, line 8 page 11, line 3 - line 11 sequence listing SEQ ID NO:4 -----	1,3-5, 7-10, 21-39
P, X	EP 0 875 570 A (SMITHKLINE-BEECHAM P.L.C.) 4 November 1998 (1998-11-04) page 2, line 33 -page 3, line 55 page 5, line 3 -page 6, line 31 page 7, line 40 - line 50 page 8, line 29 -page 9, line 44 sequence listing SEQ ID NOs. 7 and 8 -----	3-5, 7-14, 16-27

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 99/01743

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:
Remark: Although claims 28-31 and 36, as far as an in vivo methods, are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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 fee, this Authority did not invite payment of any additional fee.
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.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/01743

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9835034 A	13-08-1998	FR 2759372 A FR 2759373 A	14-08-1998 14-08-1998
EP 875570 A	04-11-1998	CA 2236128 A JP 11103866 A	01-11-1998 20-04-1999