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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: ISOLATED HUMAN ION CHANNEL PROTEINS, NUCLEIC ACID MOLECULES ENCODING HUMAN ION CHANNEL PROTEINS, AND USES THEREOF

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1 GAGCGCGCTG CCTGAGCTGA GCCGCCGTAG GTGAGGGGCC CGCGTCCCCG
   51 CCCGCCCTGG GCGCCGCGCC TGGCACTGAT CCTGCCGGTC GCCCACTGTC
  101 GCCGCCCGCC CCGCCCCGCGG GCACCATGAC AGCTCTGAGC GCTGGGGTTA
  151 CAGACTGTGG TTTTGTGCTT GCTCACCAAA GCTAACCTCA GCATGCTCAA
  201 AAGGAAGCAG AGTTCCAGGG TGGAAGCCCA GCCAGTCACT GACTTTGGTC
  251 CTGATGAGTC TCTGTCGGAT AATGCTGACA TCCTCTGGAT TAACAAACCA
  301 TGGGTTCACT CTTTGCTGCG CATCTGTGCC ATCATCAGCG TCATTTCTGT
  351 TTGTATGAAT ACGCCAATGA CCTTCGAGCA CTATCCTCCA CTTCAGTATG
  401 TGACCTTCAC TTTGGATACA TTATTGATGT TTCTCTACAC GGCAGAGATG
  451 ATAGCAAAAA TGCACATCCG GGGCATTGTC AAGGGGGATA GTTCCTATGT
  501 GAAAGATCGC TGGTGTGTTT TTGATGGATT TATGGTCTTT TGCCTTTGGG
  551 TTTCTTTGGT GCTACAGGTG TTTGAAATTG CTGATATAGT TGATCAGATG
  601 TCACCTTGGG GCATGTTGCG GATTCCACGG CCACTGATTA TGATCCGAGC
  651 ATTCCGGATT TATTTCCGAT TTGAACTGCC AAGGACCAGA ATTACAAATA
  701 TTTTAAAGCG ATCGGGAGAA CAAATATGGA GTGTTTCCAT TTTTCTACTT
  751 TTCTTTCTAC TTCTTTATGG AATTTTAGGA GTTCAGATGT TTGGAACATT
  801 TACTTATCAC TGTGTTGTAA ATGACACAAA GCCAGGGAAT GTAACCTGGA
  851 ATAGTTTAGC TATTCCAGAC ACACACTGCT CACCAGAGCT AGAAGAAGGC
  901 TACCAGTGCC CACCTGGATT TAAATGCATG GACCTTGAAG ATCTGGGACT
  951 TAGCAGGCAA GAGCTGGGCT ACAGTGGCTT TAATGAGATA GGAACTAGTA
 1001 TATTCACCGT CTATGAGGCC GCCTCACAGG AAGGCTGGGT GTTCCTCATG
 1051 TACAGAGCAA TTGACAGCTT TCCCCGTTGG CGTTCCTACT TCTATTTCAT
 1101 CACTCTCATT TTCTTCCTCG CCTGGCTTGT GAAGAACGTG TTTATTGCTG
 1151 TTATCATTGA AACATTTGCA GAAATCAGAG TACAGTTTCA ACAAATGTGG
 1201 GGATCGAGAA GCAGCACTAC CTCAACAGCC ACCACCCAGA TGTTTCATGA
 1251 AGATGCTGCT GGAGGTTGGC AGCTGGTAGC TGTGGATGTC AACAAGCCCC
 1301 AGGGACGCGC CCCAGCCTGC CTCCAGAAAA TGATGCGGTC ATCCGTTTTC
 1351 CACATGTTCA TCCTGAGCAT GGTGACCGTG GACGTGATCG TGGCGGCTAG
 1401 CAACTACTAC AAAGGAGAAA ACTTCAGGAG GCAGTACGAC GAGTTCTACC
 1451 TGGCGGAGGT GGCTTTTACA GTACTTTTTG ATTTGGAAGC ACTTCTGAAG
 1501 ATATGGTGTT TGGGATTTAC TGGATATATT AGCTCATCTC TCCACAAATT
 1551 CGAACTACTA CTCGTAATTG GAACTACTCT TCATGTATAC CCAGATCTTT
 1601 ATCATTCACA ATTCACGTAC TTTCAGGTTC TCCGAGTAGT TCGGCTGATT
 1651 AAGATTTCAC CTGCATTAGA AGACTTTGTG TACAAGATAT TTGGTCCTGG
 1701 AAAAAAGCTT GGGAGTTTGG TTGTATTTAC TGCCAGCCTC TTGATTGTTA
 1751 TGTCAGCAAT TAGTTTGCAG ATGTTCTGCT TTGTCGAAGA ACTGGACAGA
 1801 TTTACTACGT TTCCGAGGGT AAGAGTTTTA AAAATGCAGT AAGTTAAATT
 1851 CATTGTTCTT ATTTTAGTAA TAATGATTAA CATCAAAGTA ATTTCACTTT
 1901 AGTCATTCAG AAGTATTATC CTATTTTTGA TAACTTGGGA TAATTAGATT
 1951 TTAATATTTA AAATTGTCTC TTCTGCAGGG TGCAGGTGTT TCAGACCATT
 2001 TTCAGCATTG TCAGATTATA TATCAATTCT AAAATTCTGG AAATAATCTA
 2051 ATAGAGTTAG ATGCTGAAAC CTGAATGCTA GGGTTCTTAG CACCTATAAA
 2101 TTAAAATACA GCAGAATTTT AAAATAAAGC TTGCATTTTT GTGTTCAAGA
 2151 GAGTTAACAT ATTTTTAATG TTTTATAATT TATATATTGT TATGTTAGTC
 2201 AGAATCTAGA AGGAAGCTTT TGATTTTCAA TAAAATAAAA TTCATAGGCT
 2251 CTTCAGCATT TTAAATGTCT CTCAGCTTTC TCAGTAGAAT TCACTTAAGC
 2301 TAAAAAGGAA GTTAGAAATC AATGGATCCA TAAACAAAAG TCATGTAAGA
 2351 GGTACAGCTC TTAACCAGAA GGACCTTGAA ATTTAACTCT ATGTGGACTT
 2401 AGAAACATAA AAAAATACAA TGACCAGACA AATAATGTAT ATATTTTTAC
 2451 TCAAAAAAAA AAAAAAAAAA AAAAAAAAAA AA
 (SEQ ID NO:1)

FEATURES:
5'UTR:       1 - 192
Start Codon: 193
Stop Codon:  1840
3'UTR:       1843
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(57) Abstract: The present invention provides amino acid sequences of peptides that are encoded by genes within the human genome, the transporter peptides of the present invention. The present invention specifically provides isolated peptide and nucleic acid molecules, methods of identifying orthologs and paralogs of the transporter peptides, and methods of identifying modulators of the transporter peptides.

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(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, 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, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
21 August 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Intern: Application No
PCT/US 02/00100

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N15/12 C07K14/705 C12Q1/68 C07K16/28 C12N5/10
G01N33/53

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 7 C12N C07K C12Q G01N

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, MEDLINE, EMBL, WPI Data, PAJ, BIOSIS, EMBASE, SEQUENCE SEARCH

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LEE J-H ET AL: "Cloning of a novel four repeat protein related to voltage-gated sodium and calcium channels" FEBS LETTERS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 445, no. 2-3, 26 February 1999 (1999-02-26), pages 231-236, XP004259263 ISSN: 0014-5793 the whole document ---	1-23
X	DATABASE EMBL 'Online! SWALL, retrieved from EBI Database accession no. Q9Z165 XP002232396 abstract --- -/--	1-23

[X] Further documents are listed in the continuation of box C.

[X] 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	Date of mailing of the international search report
6 March 2003	17/03/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Madruga, J

INTERNATIONAL SEARCH REPORT

Interr al Application No
PCT/US 02/00100

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL 'Online! EM_HUM, retrieved from EBI Database accession no. AL354891.11 XP002232397	4-9,13
Y	Nucleotides 1-914 abstract	1-3, 10-12, 14-23
Y	PONGS O: "Voltage-gated potassium channels: from hyperexcitability to excitement" FEBS LETTERS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 452, no. 1-2, 4 June 1999 (1999-06-04), pages 31-35, XP004259719 ISSN: 0014-5793 the whole document	1-3, 10-12, 14-23
P,X	WO 01 83752 A (CURTIS RORY A J ;GLUCKSMANN MARIA A (US); MILLENNIUM PHARM INC (US) 8 November 2001 (2001-11-08) Protein 23949, SEQ ID NO:1, SEQ ID NO: 2, SEQ ID NO: 3 claims; figure 1	1-23
E	WO 02 46404 A (CHUMAKOV ILYA ;GENSET SA (FR); ABDERRAHIM HADI (FR); COHEN DANIEL) 13 June 2002 (2002-06-13) SEQ ID NO: 4, SEQ ID NO: 2 page 262 -page 271; claims	1-23
E	US 2002/042100 A1 (MERKULOV GENNAY V ET AL) 11 April 2002 (2002-04-11) claims; figures 1-3	1-23
E	WO 02 04520 A (INCYTE GENOMICS INC) 17 January 2002 (2002-01-17) SEQ ID NO: 28, SEQ ID NO:60, TRICH-28 page 108; claims; figures; table 3	1-23
A	GREGER R: "Chloride transport in thick ascending limb, distal convolution, and collecting duct." ANNUAL REVIEW OF PHYSIOLOGY. UNITED STATES 1988, vol. 50, 1988, pages 111-122, XP008014241 ISSN: 0066-4278 cited in the application the whole document	1-23

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INTERNATIONAL SEARCH REPORT

Inter Application No
PCT/US 02/00100

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	HOPKINS W F ET AL: "VOLTAGE-GATED POTASSIUM CHANNEL INHIBITORS" CURRENT PHARMACEUTICAL DESIGN, BENTHAM SCIENCE PUBLISHERS, SCHIPHOL, NL, vol. 2, no. 4, 1996, pages 389-396, XP002070146 ISSN: 1381-6128 the whole document	16-19

INTERNATIONAL SEARCH REPORT

In tional application No.
PCT/US 02/00100

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. [X] Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

Although claim 18 is 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. [X] 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:

see FURTHER INFORMATION sheet PCT/ISA/210

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.

Continuation of Box I.2

Present claims 17 and 18 relate to a productdefined by reference to a desirable characteristic or property, namely its ability to bind a peptide. The claims cover all products having this characteristic or property, whereas the application provides support within the meaning of Article 6 PCT and/or disclosure within the meaning of Article 5 PCT for only a very limited number of such products. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the product by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search over the whole of the claimed scope impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear, supported and disclosed, namely those parts relating to an antibody.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter Application No
PCT/US 02/00100

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0183752 A	08-11-2001	AU 5737801 A	12-11-2001
		EP 1280902 A2	05-02-2003
		WO 0183752 A2	08-11-2001
WO 0246404 A	13-06-2002	AU 3357302 A	18-06-2002
		WO 0246404 A2	13-06-2002
US 2002042100 A1	11-04-2002	WO 02074810 A2	26-09-2002
WO 0204520 A	17-01-2002	AU 7323901 A	21-01-2002
		WO 0204520 A2	17-01-2002