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

(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.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/29218

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/12 C12Q1/68 C07K14/47 C07K16/18 B01J19/00
A01K67/027 G01N33/50 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 C07K C12N

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)

BIOSIS, EPO-Internal, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-------------------------------------|
| X | <p>PALMITER RICHARD D ET AL: "ZnT-2, a mammalian protein that confers resistance to zinc by facilitating vesicular sequestration." EMBO (EUROPEAN MOLECULAR BIOLOGY ORGANIZATION) JOURNAL, vol. 15, no. 8, 1996, pages 1784-1791, XP001121096 ISSN: 0261-4189 page 1785 and Figure 1 and Material and methods. The sequence of this transporter (SWALL accession number Q62941) shows 80.2% identity with SEQ ID N°2 in 362 amino-acid overlap.</p> <p align="center">--- -/--</p> | <p>1,2,4,5, 8-11, 20-24</p> |

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

16 January 2003

Date of mailing of the international search report

04/02/2003

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|---|-----------------------|
| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | <p>ROLFS ANDREAS ET AL: "Metal ion transporters in mammals: Structure, function and pathological implications." JOURNAL OF PHYSIOLOGY (CAMBRIDGE), vol. 518, no. 1, 1 July 1999 (1999-07-01), pages 1-12, XP002227515 ISSN: 0022-3751 the whole document</p> <p style="text-align: center;">---</p> | 1-24 |
| A | <p>MCMAHON ROBERT J ET AL: "Mammalian zinc transporters." JOURNAL OF NUTRITION, vol. 128, no. 4, April 1998 (1998-04), pages 667-670, XP002227516 ISSN: 0022-3166 the whole document</p> <p style="text-align: center;">---</p> | 1-24 |
| A | <p>MURGIA CHIARA ET AL: "Cloning, expression, and vesicular localization of zinc transporter Dri 27/ZnT4 in intestinal tissue and cells." AMERICAN JOURNAL OF PHYSIOLOGY, vol. 277, no. 6 part 1, December 1999 (1999-12), pages G1231-G1239, XP002227517 ISSN: 0002-9513 the whole document</p> <p style="text-align: center;">---</p> | 1-24 |
| A | <p>COUSINS ROBERT J ET AL: "Integrative aspects of zinc transporters." JOURNAL OF NUTRITION, vol. 130, no. 5 Suppl, May 2000 (2000-05), pages 1384S-1387S, XP002227518 ISSN: 0022-3166 the whole document</p> <p style="text-align: center;">---</p> | 1-24 |
| P, X | <p>WO 01 12659 A (GERMAN HUMAN GENOME PROJECT ;WIEMANN STEFAN (DE)) 22 February 2001 (2001-02-22) shows 84% identity with SEQ ID N°2 the whole document</p> <p style="text-align: center;">---</p> | 1-11, 20-24 |
| P, X | <p>EP 1 074 617 A (HELIX RES INST) 7 February 2001 (2001-02-07) Seq of claim 8 (ID N°15542 and Geneseq entry AAH16506) shows 99.3% identity with SEQ ID N°3 in 2076 nucleotide overlap</p> <p style="text-align: center;">-----</p> | 1-11, 20-24 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/29218

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:

2. Claims Nos.: 17-18
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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 17-18

A meaningful search could not be carried out for the subject-matter of claims 17-18 because it is not possible to determine if any of the presently known substances is falling under the terms of these claims (i.e. a composition comprising an agent identified by method claim 16). Besides it is noted, that the compounds of claim 17 (and its use in claim 18) are not rendered novel just because of the fact that they have been identified by the method of claim 16, e.g. such compounds can already exist. (Apart from this, it is also not possible to establish the scope of these claims without testing all known substances, clearly an undue burden).

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

International Application No

PCT/US 01/29218

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