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- 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))

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23 December 2010

(54) Title: REGULATION OF AGING BY MODULATION OF MITOCHONDRIAL FUNCTION

(57) Abstract: The invention relates to the field of longevity enhancement. More particularly, the invention provides compositions and methods relating to modulation of mitochondrial function. In certain embodiments, the invention provides methods and related compositions for the enhancement of longevity in an animal, comprising inhibition of one or more electron transport chain components, such as cco-1 and homologs thereof, in a tissue-specific manner in the animal.



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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/031641

A. CLASSIFICATION OF SUBJECT MATTER

INV. C12N15/113 A61K31/713 C07K14/435

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)

C12N A61K C07K

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, BIOSIS, EMBASE, Sequence Search, 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	ZORDAN MAURO A ET AL: "Post-transcriptional silencing and functional characterization of the Drosophila melanogaster homolog of human Surf1" GENETICS, vol. 172, no. 1, January 2006 (2006-01), pages 229-241, XP002591529 ISSN: 0016-6731 the whole document	1,3,7-9
Y A	----- WO 03/000861 A2 (UNIV CALIFORNIA [US]; KENYON CYNTHIA [US]; APFELD JAVIER [US]; DILLIN) 3 January 2003 (2003-01-03) page 1 - page 3 claims 37-39; example 2; table 1 ----- -/--	4,10 2
Y A	WO 03/000861 A2 (UNIV CALIFORNIA [US]; KENYON CYNTHIA [US]; APFELD JAVIER [US]; DILLIN) 3 January 2003 (2003-01-03) page 1 - page 3 claims 37-39; example 2; table 1	4,10 1-3,7-9

 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

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05/11/2010

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/031641

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>DILLIN ANDREW ET AL: "Rates of behavior and aging specified by mitochondrial function during development" SCIENCE, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, vol. 298, no. 5602, 20 December 2002 (2002-12-20), pages 2398-2401, XP002320683 WASHINGTON, DC, US ISSN: 0036-8075 DOI: 10.1126/SCIENCE.1077780 cited in the application</p>	4,10
A	the whole document	1-3,7-9
Y	<p>REA SHANE L ET AL: "Relationship between mitochondrial electron transport chain dysfunction, development, and life extension in Caenorhabditis elegans" PLOS BIOLOGY, vol. 5, no. 10, October 2007 (2007-10), pages 2312-2329, XP002591530 cited in the application</p>	4,10
A	the whole document	1-3,7-9
A	<p>LEE SIU SYLVIA ET AL: "A systematic RNAi screen identifies a critical role for mitochondria in C. elegans longevity" NATURE GENETICS, NATURE PUBLISHING GROUP, vol. 33, no. 1, 1 January 2003 (2003-01-01), pages 40-48, XP002320682 NEW YORK, US ISSN: 1061-4036 DOI: 10.1038/NG1056 cited in the application</p>	1-4,7-10
A	<p>FENG J ET AL: "Mitochondrial electron transport is a key determinant of life span in Caenorhabditis elegans." DEVELOPMENTAL CELL, vol. 1, no. 5, November 2001 (2001-11), pages 633-644, XP002591531 ISSN: 1534-5807 cited in the application</p>	1-4,7-10
A	<p>DELL'AGNELLO CARLOTTA ET AL: "Increased longevity and refractoriness to Ca²⁺-dependent neurodegeneration in Surf1 knockout mice" HUMAN MOLECULAR GENETICS, vol. 16, no. 4, February 2007 (2007-02), pages 431-444, XP002591532 cited in the application</p>	1-4,7-10
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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2010/031641

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>ASENCIO CLAUDIO ET AL: "Silencing of ubiquinone biosynthesis genes extends life span in Caenorhabditis elegans. (Express article also available)" THE FASEB JOURNAL : OFFICIAL PUBLICATION OF THE FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY, vol. 17, no. 9, June 2003 (2003-06), XP002591533 ISSN: 1530-6860 the whole document 20 pages</p>	1-4,7-10
A	<p>LARSEN PAMELA L ET AL: "Extension of life-span in Caenorhabditis elegans by a diet lacking coenzyme Q" SCIENCE, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, vol. 295, no. 5552, 4 January 2002 (2002-01-04), pages 120-123, XP002291129 WASHINGTON, DC; US ISSN: 0036-8075 DOI: 10.1126/SCIENCE.1064653 the whole document</p>	1-4,7-10
A	<p>LIBINA NATALIYA ET AL: "Tissue-specific activities of C. elegans DAF-16 in the regulation of lifespan." CELL, vol. 115, no. 4, 14 November 2003 (2003-11-14), pages 489-502, XP002591534 ISSN: 0092-8674 the whole document</p>	1-4,7-10
X,P	<p>COPELAND J M ET AL: "Extension of Drosophila Life Span by RNAi of the Mitochondrial Respiratory Chain" CURRENT BIOLOGY, CURRENT SCIENCE, vol. 19, no. 19, 13 October 2009 (2009-10-13), pages 1591-1598, XP026794809 GB ISSN: 0960-9822 [retrieved on 2009-09-10] cited in the application</p>	1,3,7-9
Y	<p>page 1595 - page 1596; figures 6, 7</p>	4,10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/031641**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 all searchable 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.:

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.:

1-4, 8-10(completely); 7(partially)

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: 1-4, 8-10(completely); 7(partially)

method of increasing longevity comprising modulating electron transport chain (ETC) function in a tissue specific manner

2. claims: 5, 6, 11, 12, 22-24(completely); 7(partially)

method of increasing longevity comprising modulating the mitochondrial unfolded protein response system;
pharmaceutical composition comprising a compound capable of stimulating the mitochondrial unfolded protein response;
method of enhancing longevity using said composition

3. claims: 13-21

method of identifying a compound that modulates longevity comprising i.a. measuring the activity of an ETC component

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/031641

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03000861	A2	CA	03-01-2003
		EP	14-04-2004
