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(71) Applicant (for all designated States except US): GOVERNMENT OF THE UNITED STATES OF AMERICA AS REPRESENTED BY THE SECRETARY OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES NATIONAL INSTITUTES OF HEALTH [US/US]; National Institute of Health, Office of Technology Transfer, 6011 Executive Blvd, Suite 325, Rockville, Maryland 20852 (US).

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(54) Title: DNA-PKCS MODULATES ENERGY REGULATION AND BRAIN FUNCTION

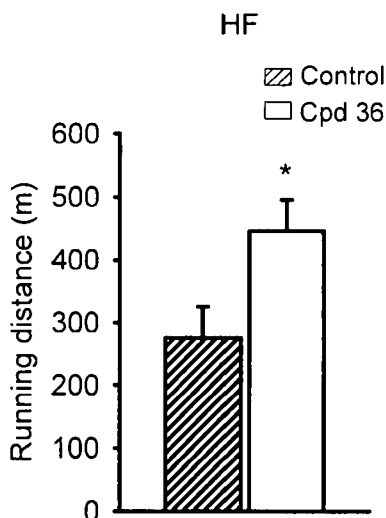


Fig. 45

(57) Abstract: The invention relates to new functions of the DNA-PKcs gene product in energy metabolism, brain function and physical fitness.

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# INTERNATIONAL SEARCH REPORT

International application No  
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**A. CLASSIFICATION OF SUBJECT MATTER**

INV. A61K31/5377 A61K31/555 A61K33/32 A61K48/00 A61P3/00  
A61P9/00 A61P25/00

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)  
A61K A61P

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, EMBASE, BIOSIS, BEILSTEIN Data, CHEM ABS 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 2005/089730 A (NOVARTIS FORSCHUNGSSTIFTUNG [CH]; FENG JIANHUA [CH]; HEMMINGS BRIAN AR) 29 September 2005 (2005-09-29) abstract page 3, lines 11-29 page 4, line 14 - line 27 claims 1-3	1-61
X	WO 01/42231 A (WELICHEM BIOTECH INC [CA]; CHEN GENHUI [CA]; WEBSTER JOHN M [CA]; LI J) 14 June 2001 (2001-06-14) abstract page 22; table 1 claims 10,15,20,26	1,25-28, 39-42
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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

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- \*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

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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2008/008234

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/054556 A (ZENTARIS GMBH [DE]) 18 May 2007 (2007-05-18)  abstract claims 1,46-48	1-10, 23-28, 39-48
X	WO 2006/122806 A (NOVARTIS AG [CH]; NOVARTIS PHARMA GMBH [AT]; GARCIA-ECHEVERRIA CARLOS) 23 November 2006 (2006-11-23) abstract page 16, line 1 - line 5 page 16, line 21 - line 29 claims 1,2,4	1,39-42
X	WO 00/55320 A (HUMAN GENOME SCIENCES INC [US]; ROSEN CRAIG A [US]; RUBEN STEVEN M [US]) 21 September 2000 (2000-09-21) abstract sequence 76 claim 1 page 251 - page 254 page 260 - page 263	1,39-48, 51-55
X	US 2002/165218 A1 (HALBROOK JAMES [US] ET AL) 7 November 2002 (2002-11-07) abstract paragraphs [0153] - [0159] claim 1	1,39-48, 51,52
X	WO 2007/008548 A (SIRTRIS PHARMACEUTICALS INC [US]; MILBURN MICHAEL [US]; MILNE JILL [US]) 18 January 2007 (2007-01-18)  abstract figures 1-22 claims 1-123	1-28, 39-48, 51,52, 56-60
X	US 2003/216389 A1 (ROBERTON ALAN D [AU] ET AL ROBERTSON ALAN D [AU] ET AL) 20 November 2003 (2003-11-20) abstract claims 1-12,18,19,40	1,39-48, 51,52, 56-60
X	WO 2005/056014 A (US GOVERNMENT [US]; MOSS JOEL [US]; KRISTOF ARNOLD [CA] HEALTH AND HUM) 23 June 2005 (2005-06-23) abstract page 41, line 25 - page 42 claims 1-6	1,39-42, 51,52, 56-60
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## INTERNATIONAL SEARCH REPORT

International application No

PCT/US2008/008234

(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/021933 A (GEN HOSPITAL CORP [US]; PETERSON RANDALL T [US]; HONG CHARLES C [US]) 22 February 2007 (2007-02-22)  abstract claims 1-5,12	1, 39, 43-48, 51, 52, 56-60
X	EP 1 733 733 A (KADOWAKI TAKASHI [JP]; YAMAUCHI TOSHIMASA [JP]) 20 December 2006 (2006-12-20)  abstract claims 9,11-13	1-9, 18, 25-28, 51, 52, 56-60
X	EP 1 762 234 A (KAO CORP [JP]) 14 March 2007 (2007-03-14)  abstract claims 1-24	1-10, 18, 21, 22, 25-28, 51, 52
X	US 2005/249827 A1 (GARDINER PAUL T [CA] ET AL) 10 November 2005 (2005-11-10)  abstract claims 1-3 paragraphs [0051] - [0053], [0073] - [0079]	1-7, 13-15, 21-28, 51, 52
X	WO 2007/042271 A (DSM IP ASSETS BV [NL]; RAEDERSTORFF DANIEL [FR]; WANG-SCHMIDT YING [CH]) 19 April 2007 (2007-04-19) abstract page 2, line 15 - line 28 claims 1,2	1-28, 51, 52
X	US 2004/204407 A1 (TANG PENG CHO [US] ET AL) 14 October 2004 (2004-10-14)  abstract claims 1,7,11	1, 23-28, 39-48, 51, 52
X	WO 2005/115379 A (UNIV NEW YORK [US]; ALBERT EINSTEIN SCHOOL OF MEDI [US] UNIV NEW YORK) 8 December 2005 (2005-12-08)  abstract claims 1,5,6,20,24	1-9, 25-28, 45-48, 51, 52

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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2008/008234

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>ESPEJEL SILVIA ET AL: "Shorter telomeres, accelerated ageing and increased lymphoma in DNA-PKcs-deficient mice." EMBO REPORTS MAY 2004, vol. 5, no. 5, May 2004 (2004-05), pages 503-509; XP002499520 ISSN: 1469-221X abstract page 506, left-hand column, line 18 - line 30 page 507, right-hand column, line 6 - line 19</p>	1-61
X	<p>----- WONG K-K ET AL: "Diminished lifespan and acute stress-induced death in DNA-PKcs-deficient mice with limiting telomeres" ONCOGENE, vol. 26, no. 20, May 2007 (2007-05), pages 2815-2821, XP002499521. ISSN: 0950-9232 the whole document</p>	1-61
P, X	<p>----- DEPARTMENT OF HEALTH AND HUMAN SERVICES: "National Institutes of Health, Government-Owned Inventions;" FEDERAL REGISTER, NOTICES, [Online] vol. 72, no. 200, 17 October 2007 (2007-10-17), pages 58857-58858, XP002499522 Retrieved-from the Internet: URL: <a href="http://www.smartpdf.com/register/2007/Oct/17/58857A.pdf">http://www.smartpdf.com/register/2007/Oct/17/58857A.pdf</a> [retrieved on 2008-10-14] the whole document</p>	1-48
A	<p>----- COLLIS S J ET AL: "THE LIFE AND DEATH OF DNA-PK" ONCOGENE, NATURE PUBLISHING GROUP, GB BASINGSTOKE, HANTS, vol. 24, no. 6, 3 February 2005 (2005-02-03), pages 949-961, XP008052096 ISSN: 0950-9232 the whole document</p>	1-61

# INTERNATIONAL SEARCH REPORT

International application No.  
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## 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.:
  
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.:

see annex

### 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, 51 - 61 (partially); 2 - 28, 39 - 48 (complete)

Use of DNA-PKcs inhibitors in the treatment of disorders related to energy regulation.

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2. claims: 1, 51 - 61 (partially); 30 - 38, 49 - 50 (complete)

Use of DNA-PKcs inhibitors in the treatment of neurological disorders.

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/008234

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2005089730	A	29-09-2005	EP 1746987 A2	31-01-2007
			US 2008038277 A1	14-02-2008
WO 0142231	A	14-06-2001	AU 780700 B2	14-04-2005
			AU 2133001 A	18-06-2001
			CA 2393297 A1	14-06-2001
			CN 1407978 A	02-04-2003
			EP 1248774 A2	16-10-2002
			HK 1051691 A1	18-10-2007
			JP 2003516400 T	13-05-2003
			US 2003171429 A1	11-09-2003
			WO 2007054556	A
AU 2006313701 A1	18-05-2007			
CA 2628039 A1	18-05-2007			
EP 1957487 A1	20-08-2008			
KR 20080068117 A	22-07-2008			
WO 2006122806	A	23-11-2006	AR 054127 A1	06-06-2007
			AU 2006249071 A1	23-11-2006
			CA 2608496 A1	23-11-2006
			EP 1888578 A2	20-02-2008
			JP 2008540599 T	20-11-2008
			KR 20080009724 A	29-01-2008
			NI 200700296 A	24-07-2008
			US 2008194579 A1	14-08-2008
WO 0055320	A	21-09-2000	AU 3395900 A	04-10-2000
			AU 3617600 A	04-10-2000
			AU 3617700 A	04-10-2000
			AU 3619400 A	04-10-2000
			AU 3619500 A	04-10-2000
			AU 3869400 A	04-10-2000
			CA 2364567 A1	21-09-2000
			CA 2364590 A1	21-09-2000
			CA 2364629 A1	21-09-2000
			CA 2366130 A1	21-09-2000
			CA 2366174 A1	21-09-2000
			CA 2366195 A1	21-09-2000
			EP 1168917 A2	09-01-2002
			EP 1165588 A1	02-01-2002
			EP 1169469 A1	09-01-2002
			EP 1165589 A1	02-01-2002
			EP 1159420 A1	05-12-2001
			EP 1163358 A1	19-12-2001
			JP 2003512815 T	08-04-2003
			JP 2003512816 T	08-04-2003
			JP 2003513610 T	15-04-2003
JP 2003514510 T	22-04-2003			
JP 2004508001 T	18-03-2004			
JP 2003514511 T	22-04-2003			
WO 0055173 A1	21-09-2000			
WO 0055350 A1	21-09-2000			
WO 0055351 A1	21-09-2000			
WO 0055180 A2	21-09-2000			
WO 0055174 A1	21-09-2000			
US 2002165218	A1	07-11-2002	US 2008090782 A1	17-04-2008

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/008234

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 2007008548	A	18-01-2007	AU 2006269459 A1 CA 2613141 A1 EP 1898897 A2 JP 2009500357 T	18-01-2007 18-01-2007 19-03-2008 08-01-2009
US 2003216389	A1	20-11-2003	NONE	
WO 2005056014	A	23-06-2005	AU 2004296868 A1 BR PI0417498 A CA 2546920 A1 CN 1889958 A EP 1694331 A1 JP 2007513962 T KR 20060123463 A MX PA06006651 A TR 200604485 T1	23-06-2005 29-05-2007 23-06-2005 03-01-2007 30-08-2006 31-05-2007 01-12-2006 11-08-2006 22-01-2007
WO 2007021933	A	22-02-2007	US 2008199449 A1	21-08-2008
EP 1733733	A	20-12-2006	WO 2005084697 A1	15-09-2005
EP 1762234	A	14-03-2007	WO 2006001278 A1 US 2007244202 A1	05-01-2006 18-10-2007
US 2005249827	A1	10-11-2005	US 2006280815 A1	14-12-2006
WO 2007042271	A	19-04-2007	JP 2009511522 T KR 20080105023 A	19-03-2009 03-12-2008
US 2004204407	A1	14-10-2004	NONE	
WO 2005115379	A	08-12-2005	CA 2568134 A1 EP 1755579 A2 JP 2008500347 T	08-12-2005 28-02-2007 10-01-2008