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[Continued on next page]

(54) **Title:** ULK1 COMPOSITIONS, INHIBITORS, SCREENING AND METHODS OF USE

**a**

<u>Optimal AMPK Motif</u>	<sup>5 4 3 2 1 0 1 2 3 4</sup> L R R V x S x x N L
Secondary selections	M K K S x S x P D V
Additional selections	I x H R x S x x E I

Candidate AMPK sites in ULK1 and ULK2

Human ULK1	Ser467	I R R S G S T T P L
Mouse ULK1	Ser467	I R R S G S T S P L
Xenopus trop ULK1	Ser465	V R K S S S T S P V
Apis mellifera	Ser394	I R S G S S V V P R

Human ULK1	Ser555	G C R L H S A P N L
Human ULK2	Ser528	G A R L Q S A P T L
Mouse ULK1	Ser555	G C R L H S A P N L
Xenopus trop ULK1	Ser551	G S R L H S A P N L
Danio renio ULK1	Ser542	G T R L N S A P C L
Apis mellifera	Ser472	G N N S A S S P L L
C.elegans UNC-51	Ser484	V C G S S T K P S P

Human ULK1	Thr574	L P K P P T D P L G
Human ULK2	Ser547	L R K Q H S D P V C
Mouse ULK1	Ser574	L P K P P S D P L G
Xenopus trop ULK1	Ser574	I K K Q Y S D P V M
C.elegans UNC-51	Thr532	I P K S A T T A N I

Human ULK1	Ser637	F P K T P S S Q N L
Mouse ULK1	Ser637	F P K T P S S Q N L
Xenopus trop ULK1	Ser637	F P R G P S S Q N L
Danio renio ULK1	Ser626	F P K P P S S P N M

FIGURE 1

(57) **Abstract:** This disclosure relates to methods and compositions useful for the treatment of cancer and diseases and disorders associated with autophagy.



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**(81) Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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**Published:**

- with international search report (Art. 21(3))
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- with sequence listing part of description (Rule 5.2(a))

**(88) Date of publication of the international search report:**  
20 October 2011

**A. CLASSIFICATION OF SUBJECT MATTER**

*C12N 9/12(2006.01)i, C07K 19/00(2006.01)i, C12N 15/54(2006.01)i, C12N 15/62(2006.01)i, G01N 33/574(2006.01)i, A61P 35/00(2006.01)i*

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 9/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models  
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal), Pubmed

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DORSEY, F. C. et al. 'Mapping the phosphorylation sites of Ulk1' Journal of Proteome Research. Vol. 8(11), pp. 5253-5263 (6 October 2009) See the abstract, Figure 2.	1-16,16(1)
A	HOSOKAWA, N. et al. 'Nutrient-dependent mTORC1 association with ULK-Atg13-FI P200 complex required for autophagy' Molecular Biology of the Cell. Vol. 20(7), pp. 1981-1991 (11 February 2009) See the abstract.	1-16,16(1)
A	CHAN, E. Y. 'mTORC1 phosphorylates the ULK1-mAtg13-FIP200 autophagy regu- latory complex' Science Signaling. Vol. 2(84), pe51 (18 August 2009) See the abstract.	1-16,16(1)
PA	LEE, J. W. et al. 'The association of AMPK with ULK1 regulates autophagy' PLoS One. Vol. 5(11), pp. e15394 (3 November 2010) See the abstract.	1-16,16(1)

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 application or patent 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 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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**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.: 17-25  
because they relate to subject matter not required to be searched by this Authority, namely:  
Said claims pertain to methods for treatment of the human body, thus relate to a subject-matter which International Searching Authority is not required to search under PCT Art. 17(2)(a)(i) and Rule 39.1(iv).
2.  Claims Nos.: 18, 23-26  
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 Extra sheet.
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:

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 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.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2010/060578**Patent document  
cited in search reportPublication  
datePatent family  
member(s)Publication  
date

None

The subject-matter of claims 18, 23–26 is not considered to comply with the requirements of PCT Article 6, as said claims only describe a method or a composition comprising an agent that inhibits, promotes, or modulates phosphorylation or activity of ULK1 without mentioning any structural features thereof. The mere activity indication without reference to the structural features renders the scope of the claims unclear.