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(54) **Title:** ANTI-C10ORF54 ANTIBODIES AND USES THEREOF

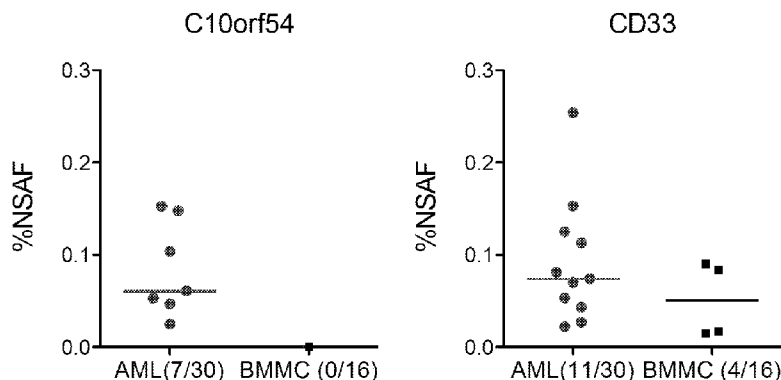


FIG. 1A

(57) **Abstract:** The present disclosure relates generally to anti-C10orf54 antibodies, including antibody-drug conjugates comprising the antibodies, and methods of their use.

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INTERNATIONAL SEARCH REPORT

International application no.

PCT/US 14/41388

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61K 39/395, C07K 16/18 (2014.01)
 CPC - A61K 39/395, A61K 39/39533, C07K 16/18

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(8) - A61K 39/395, C07K 16/18 (2014.01)
 CPC - A61K 39/395, A61K 39/39533, C07K 16/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 CPC - C07K 16/00
 (keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 PatBase, PubWEST (USPT, PGPB, EPAB, JPAB), Google Scholar
 Search terms: C10orf54 or chromosome 10 open-reading frame 54 or GI24 or SISP1 or B7-H5, antibodies, antibody, immunoglobulin, mAb, VH, VL, variable, heavy, light, CDR, FR

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/0175858 A1 (RUBEN et al.) 18 September 2003 (18.09.2003) para [1008], [1012]-[1015], [1292], [1310] [1408]	1-2, 30
A	WO 2013/026004 A2 (NISHIMURA et al.) 21 February 2013 (21.02.2013) para [0110], SEQ ID NO: 38	1-2, 30
A	US 2006/0269550 A1 (HEIMAN) 30 November 2006 (30.11.2006) para [0057], SEQ ID NO: 21	1-2, 30
A	US 2012/0328624 A1 (YOSHIDA et al.) 27 December 2012 (27.12.2012) para [0017], SEQ ID NO: 37	1-2, 30
A	US 2013/0045210 A1 (KOBAYASHI et al.) 21 February 2013 (21.02.2013) para [0077], SEQ ID NO: 41	1-2, 30
A	WO 2012/047427 A2 (FAN et al.) 12 April 2012 (12.04.2012) SEQ ID NOs: 378 and 38	1-2, 30
A	US 2003/0099655 A1 (WATKINS et al.) 29 May 2003 (29.05.2003) para [0043], SEQ ID NO: 32	1-2, 30
A	US 2003/0138428 A1 (DO COUTO et al.) 24 July 2003 (24.07.2003) SEQ ID NO:30	1-2, 30
A	US 2004/0053865 A1 (HART et al.) 18 March 2004 (18.03.2004) claim 33, SEQ ID NO: 28	1-2, 30
A	US 2012/0276009 A1 (PFEIFER et al.) 01 November 2012 (01.11.2012) para [0300], SEQ ID NO: 74	1-2, 30
A	WO 2012/045882 A2 (PFEIFER et al.) 12 April 2012 (12.04.2012) SEQ ID NO: 74	1-2, 30

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 14/41388

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.: 6-29, 46-73, 76-83
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:

-----Please see continuation in extra 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 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.: 1-2 and 30, limited to SEQ ID NOs: 36-38 and 45-47

- 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

International application No.

PCT/US 14/41388

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007/0014720 A1 (GAZIT-BORNSTEIN et al.) 18 January 2007 (18.01.2007) SEQ ID NO: 76	1-2, 30
A	US 2012/0276123 A1 (VAN RYN et al.) 01 November 2012 (01.11.2012) para [0077], SEQ ID NO: 60	1-2, 30
A	US 2011/0312505 A1 (REDDY et al.) 22 December 2011 (22.12.2011) SEQ ID NO: 50	1-2, 30
A	WO 2012/130834 A1 (VAN RYN et al.) 04 October 2012 (04.10.2012) SQ ID NO:60	1-2, 30

INTERNATIONAL SEARCH REPORT

International application no.
PCT/US 14/41388

Continuation of:
Box No III Observations where unity of invention is lacking

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I+: Claims 1-5 and 30-45, drawn to an isolated antibody that binds to C10orf54. Group I+ will be searched without fee to the extent that it reads on an isolated antibody comprising:

- (a) a heavy chain variable (VH) region comprising:
VH CDR1 having amino acid sequence SEQ ID NO:36,
VH CDR2 having amino acid sequence SEQ ID NO:37,
VH CDR3 having amino acid sequence SEQ ID NO:38, and
(b) a light chain variable (VL) region comprising:
VL CDR 1 having amino acid sequence SEQ ID NO:45,
VL CDR 2 having amino acid sequence SEQ ID NO:46,
VL CDR 3 having amino acid sequence SEQ ID NO:47,

It is believed that claims 1-2 and 30, limited to the above sequences read on this first named invention. [Note that claims 3-5 are drawn to VH and VL framework regions VH FR1, VH FR2, VH FR3, VH FR4, VL FR1, VL FR2, VL FR3, VL FR4, not encompassed by the first named invention, and will only be searched with election and payment of additional fees. Note that claims 31-45 require VH CDR1, VH CDR2, VH CDR3, VL CDR1, VL CDR2, VL CDR3, sequences not encompassed by the first named invention, and will be searched only if all of the sequences recited in each of the claims is elected for search and with payment of additional fee]. Applicants must indicate, if applicable, the claims which read on the first named invention if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched/examined. An exemplary election would be: an isolated antibody comprising: (a) a VH region comprising: VH CDR1 having amino acid sequence SEQ ID NO:30, VH CDR2 having amino acid sequence SEQ ID NO:37, VH CDR3 having amino acid sequence SEQ ID NO:38, and (b) a VL region comprising: VL CDR 1 having amino acid sequence SEQ ID NO:45, VL CDR 2 having amino acid sequence SEQ ID NO:46, VL CDR 3 having amino acid sequence SEQ ID NO:47.

Group II: Claims 74-75, drawn to a method of treating cancer or killing a tumor cell

The inventions listed as Groups I+ and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical feature of the inventions of Group I+ is the specific isolated antibody comprising specific heavy chain variable (VH) region sequences (VH CDR1, VH CDR2, VH CDR3, VH FR1, VH FR2, VH FR3, VH FR4) and light chain variable (VL) region sequences (VL CDR1, VL CDR2, VL CDR3, VL FR1, VL FR2, VL FR3, VL FR4). Each invention of Group I+ requires a unique isolated antibody, not required by the other inventions, and not required by Group II.

Group II requires treating a cancer or cancer cell with an antibody, not required by Group I+.

The feature shared by Groups I+ and II is an antibody that binds to C10orf54, and more specifically (for Group I+), is an isolated antibody that binds to C10orf54, wherein the antibody comprises: (a) a heavy chain variable (VH) region comprising: (1) a VH CDR1; (2) a VH CDR2; and (3) a VH CDR3; and/or (b) a light chain variable (VL) region comprising: (1) a VL CDR1; (2) a VL CDR2; and (3) a VL CDR3.

However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is obvious in light of US 2003/0175858 A1 to Ruben et al. (hereinafter "Ruben"). Ruben discloses an isolated antibody (para [01408] - "kit includes a substantially isolated antibody"), that binds to C10orf54 (para [1008] - "antibodies or small molecules directed against the B7-H5 gene"; para [1012]-[1014] teaching B7-H5 polypeptides; para [1015] - "antibodies that bind one or more of these polypeptides"; Note that C10orf54 is also known as B7-H5, see Applicant's specifications, p 15, ln 17-21). Ruben further teaches that the antibody can comprise a heavy chain variable (VH) region or light chain variable (VL) region (para [1292] - "Most preferably the antibodies are human antigen-binding antibody fragments of the present invention and include ... fragments comprising either a VL or VH domain") comprising one or more complementarity determining regions (CDRs) (para [1310]). Although Ruben does not specifically recite VH CDR1, VH CDR2, VH CDR3, VL CDR1, VL CDR2, and VL CDR3, one of ordinary skill in the art would have readily appreciated that antibody variable domains (i.e. VL and VH) each comprise three CDRs (i.e. CDR1, CDR2, CDR3). Thus, the isolated antibody that binds to C10orf54 comprising VH region comprising VH CDR1, VH CDR2, VH CDR3, and VL region comprising VL CDR1, VL CDR2, and VL CDR3 would have been obvious in view of Ruben. As the technical feature was known in the art at the time of the invention, it cannot be considered a special technical feature that would otherwise unify the groups.

Groups I+ and II therefore lack unity of invention under PCT Rule 13 because they do not share a same or corresponding special technical feature.