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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, BN, 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, IR, IS, JP, KE, KG, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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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Declarations under Rule 4.17:

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

— *with sequence listing part of description (Rule 5.2(a))*

(88) Date of publication of the international search report:
18 December 2014

(54) Title: METHODS OF TREATING AUTOIMMUNE DISEASES USING IL-17 ANTAGONISTS

(57) Abstract: The disclosure is directed to novel predictive methods and personalized therapies for treating an autoimmune disease (AI) selected from psoriasis, uveitis, rheumatoid arthritis (RA), psoriatic arthritis (PsA), ankylosing spondylitis (AS), and multiple sclerosis (MS). Specifically, this disclosure relates to methods of treating a patient having an AI disease by selectively administering an IL-17 antagonist, e.g., an IL-17 antibody, such as secukinumab, to the patient on the basis of that patient being genetically predisposed to have a favorable response to treatment with the IL-17 antagonist. Also disclosed herein are transmittable forms of information, diagnostic methods, and kits useful in predicting the likelihood that a patient having uveitis, RA, PsA, AS, psoriasis or MS will respond to treatment with an IL-17 antagonist, e.g., an IL-17 antibody, such as secukinumab.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
INV. G01N33/50
ADD.

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)
G01N

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 practicable, search terms used)
EPO-Internal, BIOSIS, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005/051422 A1 (CELLTECH R&D LTD [GB]; CHRISTIE MARK IAN [GB]; MEAD RICHARD JAMES [GB]) 9 June 2005 (2005-06-09) claims 1, 4-9	1-18,20, 21,23-28
A	US 7 807 155 B2 (DI PADOVA FRANCO E [CH] ET AL) 5 October 2010 (2010-10-05) claims 18-21	1-18,20, 21,23-28
A	LEONARDI CRAIG ET AL: "Anti-Interleukin-17 Monoclonal Antibody Ixekizumab in Chronic Plaque Psoriasis", March 2012 (2012-03), NEW ENGLAND JOURNAL OF MEDICINE, VOL. 366, NR. 13, PAGE(S) 1190-1199, XP002726553, ISSN: 0028-4793(print) the whole document	1-18,20, 21,23-28

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[X] Further documents are listed in the continuation of Box C.

[X] 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 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	Date of mailing of the international search report
2 July 2014	01/10/2014

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PAPP KIM A ET AL: "Brodalumab, an Anti-Interleukin-17-Receptor Antibody for Psoriasis", March 2012 (2012-03), NEW ENGLAND JOURNAL OF MEDICINE, VOL. 366, NR. 13, PAGE(S) 1181-1189, XP002726554, ISSN: 0028-4793(print) the whole document	1-18,20, 21,23-28
X,P	BAETEN DOMINIQUE ET AL: "Anti-interleukin-17A monoclonal antibody secukinumab in treatment of ankylosing spondylitis: a randomised, double-blind, placebo-controlled trial", November 2013 (2013-11), LANCET (NORTH AMERICAN EDITION), VOL. 382, NR. 9906, PAGE(S) 1705-1713, XP002726555, ISSN: 0140-6736(print) page 1710, right-hand column, paragraph 2 - left-hand column, paragraph 1	1-18,20, 21,23-28
A,P	WO 2013/158821 A2 (NOVARTIS AG [CH]; BEK STEPHAN [CH]; BRACHAT ARNDT [CH]; HUEBER WOLFGAN) 24 October 2013 (2013-10-24) page 2, paragraphs 3, 4 claims 1-18	1-18,20, 21,23-28

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2014/060110

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		SI 2364729 T1	29-08-2014
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		WO 2013158821 A2	24-10-2013

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2014/060110

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, 16(completely); 5-15, 17, 18, 20, 21, 23-28(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, 16(completely); 5-15, 17, 18, 20, 21, 23-28(partially)

   The methods of independent claims 1, 2, 5-9, 15 and 16 as far as referring to ERAP1 or to the indicated single nucleotide polymorphisms thereof.

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2. claims: 5-15, 17, 18, 22-28(all partially)

   The methods of independent claims 5-9, 15 as far as referring to the indicated single nucleotide polymorphisms of IL17A.

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3. claims: 19(completely); 5-15, 17, 23-28(partially)

   The methods of independent claims 5-9, 15 as far as referring to the indicated single nucleotide polymorphisms of IL17RA.

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4. claims: 5-15, 17, 20, 22-28(all partially)

   The methods of independent claims 5-9, 15 as far as referring to the indicated single nucleotide polymorphisms of IL23R.

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5. claims: 5-15, 20, 23-28(all partially)

   The methods of independent claims 5-9, 15 as far as referring to the indicated single nucleotide polymorphisms of IL12B.

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6. claims: 5-15, 20, 23-28(all partially)

   The methods of independent claims 5-9, 15 as far as referring to the indicated single nucleotide polymorphisms of TNFRSF1A.

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7. claims: 5-15, 21, 23-28(all partially)

   The methods of independent claims 5-9, 15 as far as referring to the indicated single nucleotide polymorphisms of CFH.

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8. claims: 5-15, 20, 23-28(all partially)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

The methods of independent claims 5-9, 15 as far as referring the indicated single nucleotide polymorphism rs17066096 located intergenic between the human IL20RAand IL22RA2genes.
