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Published:

- 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))
- with sequence listing part of description (Rule 5.2(a))

(88) Date of publication of the international search report:

17 February 2022 (17.02.2022)

(54) Title: SKIN-BASED TESTING FOR DETECTION OF CELL-MEDIATED IMMUNE RESPONSES TO SARS-COV-2

(57) Abstract: The present disclosure provides methods for detecting cell-mediated immunity to SARS-CoV-2 in a subject, methods for detecting a cell-mediated immune response against SARS-CoV-2 in a subject and methods for determining if a vaccine against SARS-CoV-2 elicits a cell-mediated immune response in a subject, comprising administering to the skin of the subject one or more peptides.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER		
INV. G01N33/569 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		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>Dagur Hanuman Singh ET AL: "Epitope-Based Vaccine Design against Novel Coronavirus SARS-CoV-2 Envelope Protein", Eurasian Journal of Medicine and Oncology vol.4 (3), 15 May 2020 (2020-05-15), pages 201-208, XP055852976, DOI: 10.14744/ejmo.2020.01978 Retrieved from the Internet: URL:https://ejmo.org/pdf/EpitopeBased%20Vaccine%20Design%20against%20Novel%20Coronavirus%20SARSCoV2%20Envelope%20Protein-01978.pdf [retrieved on 2021-10-20] relevant for non unity; abstract</p> <p style="text-align: center;">----- -/--</p>	1-162
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.		<input checked="" type="checkbox"/> 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		"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
"E" earlier application or patent but published on or after the international filing date		"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
"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)		"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
"O" document referring to an oral disclosure, use, exhibition or other means		"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
10 November 2021	13/01/2022	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040. Fax: (+31-70) 340-3016	Authorized officer van der Kooij, M	

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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 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.:

1-162 (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.

INTERNATIONAL SEARCH REPORT

International application No PCT/US2021/042102
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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>Le Bert Nina ET AL: "SARS-CoV-2-specific T cell immunity in cases of COVID-19 and SARS, and uninfected controls", Nature, 15 July 2020 (2020-07-15), pages 457-462, XP055852985, DOI: 10.1038/s41586-020-2550-z Retrieved from the Internet: URL:https://www.nature.com/articles/s41586-020-2550-z.pdf [retrieved on 2021-10-20] relevant for non unity; figures 1,2; table 1 -----</p>	1-162
Y	<p>Rammensee Hans-Georg ET AL: "Designing a therapeutic SARS-CoV-2 T-cell-inducing vaccine for high-risk patient groups Corresponding author", / 11 May 2020 (2020-05-11), pages 1-21, XP055852798, DOI: 10.21203/rs.3.rs-27316/v1 Retrieved from the Internet: URL:https://www.researchsquare.com/article/rs-27316/v1 [retrieved on 2021-10-19] Relevant for non unity; page 4, paragraph 3; table 1 page 6, paragraph 1 -----</p>	1-162
Y	<p>GRIFONI ALBA ET AL: "A Sequence Homology and Bioinformatic Approach Can Predict Candidate Targets for Immune Responses to SARS-CoV-2", CELL HOST & MICROBE, ELSEVIER, NL, vol. 27, no. 4, 16 March 2020 (2020-03-16) , page 671, XP086125935, ISSN: 1931-3128, DOI: 10.1016/J.CHOM.2020.03.002 [retrieved on 2020-03-16] table 5 ----- -/--</p>	1-162

INTERNATIONAL SEARCH REPORT

International application No
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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>NOORIMOTLAGH ZAHRA ET AL: "Immune and bioinformatics identification of T cell and B cell epitopes in the protein structure of SARS-CoV-2: A systematic review", INTERNATIONAL IMMUNOPHARMACOLOGY, ELSEVIER, AMSTERDAM, NL, vol. 86, 28 June 2020 (2020-06-28), XP086247462, ISSN: 1567-5769, DOI: 10.1016/J.INTIMP.2020.106738 [retrieved on 2020-06-28] first item in table 3; page 7</p> <p align="center">-----</p>	1-162
A	<p>Novak Natalijia ET AL: "SARS-CoV-2, COVID-19, skin and immunology - What do we know so far?", Allergy, vol. 76, 13 July 2020 (2020-07-13), pages 698-713, XP055852691, DOI: 10.1111/all.14498 Retrieved from the Internet: URL:https://onlinelibrary.wiley.com/doi/full/10.1111/all.14498 [retrieved on 2021-10-19] the whole document</p> <p align="center">-----</p>	1-162
Y,P	<p>PAVIA CHARLES S ET AL: "COVID-19: Is there a role for Western blots and skin testing for determining immunity and development of a vaccine?", DIAGNOSTIC MICROBIOLOGY AND INFECTIOUS DISEASE, ELSEVIER, AMSTERDAM, NL, vol. 98, no. 4, 13 August 2020 (2020-08-13), XP086341288, ISSN: 0732-8893, DOI: 10.1016/J.DIAGMICROBIO.2020.115148 [retrieved on 2020-08-13] abstract section 2 on pages 2-3 conclusions</p> <p align="center">-----</p>	1-162
A,P	<p>GARDUÑO-SOTO MYRIAM ET AL: "Dermatological aspects of SARS-CoV-2 infection: mechanisms and manifestations", ARCHIVES OF DERMATOLOGICAL RESEARCH, SPRINGER, INTERNATIONAL, BERLIN, DE, vol. 313, no. 8, 6 November 2020 (2020-11-06), pages 611-622, XP037537310, ISSN: 0340-3696, DOI: 10.1007/S00403-020-02156-0 [retrieved on 2020-11-06] the whole document</p> <p align="center">-----</p>	1-162

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 2021/163438 A1 (UNIV WASHINGTON [US]) 19 August 2021 (2021-08-19) claim 1; sequence 31 -----	1-162
E	WO 2021/156267 A1 (CUREVAC AG [DE]) 12 August 2021 (2021-08-12) claim 6; sequence 4964 -----	1-162

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2021163438 A1	19-08-2021	NONE	

WO 2021156267 A1	12-08-2021	DE 112021000012 T5	18-11-2021
		EP 3886897 A1	06-10-2021
		US 2021379181 A1	09-12-2021
		WO 2021156267 A1	12-08-2021

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-162 (partially)

Methods as specified by the claims involving to the use of at least the peptide defined by SEQ.ID.No:1; kits comprising said peptide; a combination or pool of peptides comprising said peptide.

2-358. claims: 1-162 (partially)

Methods as specified by the claims involving to the use of at least the peptide defined by SEQ.ID.No:2-358, respectively; kits comprising said respective peptides; a combination or pool of peptides comprising said respective peptides.
