Abstract

An effective Staphylococcus aureus vaccine may require several antigenic components, and so various combinations of S. aureus antigens are identified for use in immunisation. These polypeptides may optionally be used in combination with S. aureus saccharides.
A. CLASSIFICATION OF SUBJECT MATTER

INV. A61K39/085 C07K14/31
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)
A61K C07K

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, BIOSIS, EMBASE, WPI Data, Sequence Search

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>WO 02/094868 A2 (CHIRON SPA [IT]; MASIGNANI VEGA [IT]; MORA MARIROSA [IT]; SCARSELLI MA) 28 November 2002 (2002-11-28) e.g. claim 1,11,12,22; the whole document ----</td>
<td>1,4,6-8, 19</td>
</tr>
<tr>
<td>A</td>
<td>SCHAFER ADAM C ET AL: &quot;Vaccination and passive immunisation against Staphylococcus aureus.&quot; INTERNATIONAL JOURNAL OF ANTIMICROBIAL AGENTS NOV 2008 LNKD- PUBMED:18757184, vol. 32 Suppl 1, November 2008 (2008-11), pages S71-S78, XP002601981, ISSN: 0924-8579 e.g. section 6.2 on page S75; page S77, right-hand column, paragraph 2; the whole document ----</td>
<td>1,4,6-8, 19</td>
</tr>
</tbody>
</table>

* 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 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

"*" 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.
"S" document member of the same patent family

Date of the actual completion of the international search | 3 January 2011 |
Date of mailing of the international search report | 14/01/2011 |

Name and mailing address of the ISA/ Authorized officer
European Patent Office, P.B. 5016 Patentlaan 2
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Tel. (+31-70) 340-2040, Fac (+31-70) 340-3016
Gruber, Andreas
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>
| A        | DATABASE Geneseq [Online]  
20 November 2003 (2003-11-20), XP002601982, retrieved from EBI accession no. GSP:ABM72354  
Database accession no. ABM72354 the whole document | 1,4,6-8, 19 |
| A        | DATABASE Geneseq [Online]  
20 November 2003 (2003-11-20), XP002601983, retrieved from EBI accession no. GSP:ABM73069  
Database accession no. ABM73069 the whole document | 1,4,6-8, 19 |
| A        | WO 03/020875 A2 (SQUARED BIOTECHNOLOGIES INC D [US]; SCOTT DAVID L JR [US])  
13 March 2003 (2003-03-13) page 54; claim 3; sequence 5 | 1,4,6-8, 19 |
| X        | WO 2008/019162 A2 (UNIV CHICAGO [US]; MISSIAKAS DOMINIQUE; STRANGER-JONES YUKIKO; BURTS M)  
14 February 2008 (2008-02-14) e.g. claims 1,2,7; page 4, last paragraph ; examples 2,3,5,7; table 8; the whole document | 1-20 |
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
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<tbody>
<tr>
<td>WO 02094868 A2</td>
<td>28-11-2002</td>
<td>CA 2440368 A1</td>
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<td>EP 1373310 A2</td>
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<td>JP 2005502326 T</td>
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<td>JP 2009165468 A</td>
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<td>US 2010047267 A1</td>
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<td>US 2010055130 A1</td>
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<td>WO 03020875 A2</td>
<td>13-03-2003</td>
<td>AU 2002353764 A1</td>
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<tr>
<td>WO 2008019162 A2</td>
<td>14-02-2008</td>
<td>AU 2007281934 A1</td>
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<td>EP 1998800 A2</td>
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<td>US 2009317421 A1</td>
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</table>
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 4, 6-8, 19(all partially)

   [Note: The claims comprise an extremely large number of possible combinations while only a few of these have been specifically disclosed in the application, the following inventions are limited to these specific combinations given in the application, in parenthesis the passage of the present application is cited which discloses the specific combination.]

   An immunogenic composition comprising a combination of antigens, wherein the combination consists of sta006 and sta011 and optionally also contains hla and isdA, hla, hla and spa, spa, sta019, or sta019 and hla (page 5, line 9 – page 10, line 13) ---

2. claims: 1-4, 6-8, 19(all partially)

   An immunogenic composition comprising a combination of antigens, wherein the combination consists of sdrD and sdrE2 and isdC and optionally also contains sta011, hla, esxA or esxB (page 5, line 9 – page 10, line 13) ---

3. claims: 1-4, 6-8, 11, 19(all partially)

   An immunogenic composition comprising a combination of antigens, wherein the combination consists of sasD and clfB and sdrC and optionally also contains clfA, sta006, esxA, spa, or hla (page 5, line 9 – page 10, line 13) ---

4. claims: 5(completely); 1-4, 6-8, 19(partially)

   An immunogenic composition comprising a combination of antigens, wherein the combination consists of a) esxA and esxB and optionally also contains sta011, sasD and clfB and sdrC, hla, or isdA; or b) esxA and esxB and sta006 and optionally also contains hla, sta011, isdA and sta011 and spa, hla and sta011, isdA, sta011 and spa, isdA and sta011, isdA and clfB, hla and clfB, or sta011 and clfB (page 5, line 9 – page 10, line 13) ---

5. claims: 1, 6-8, 19(all partially)

   An immunogenic composition comprising a combination of antigens, wherein the combination consists of sta002 and sta003 and sta0021 and NW_10 (page 127, line 13) ---

6. claims: 9, 10, 12-18, 20(completely); 11, 19(partially)
polypeptide of formula NH2-A- \(-X-L\)-n-B-COOH, wherein X is an amino acid sequence of a staphylococcal antigen, selected from the group consisting of S. aureus antigens given in claim 9, composition according to claims 10, 13, 18, polypeptide according to claims 12, 15, 16, 17, nucleic acid according to claim 20
INTERNATIONAL SEARCH REPORT

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.:
   1-5 (partially)
   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 FURTHER INFORMATION sheet PCT/ISA/210

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 fee, 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.:
   5, 9, 10, 12-18, 20 (completely); 1-4, 6-8, 11, 19 (partially)

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.

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)
Continuation of Box II.2

Claims Nos.: 1-5(partially)

Present claim 1-5 relates to an extremely large number of possible combination of antigens. Support and disclosure in the sense of Article 6 and 5 PCT is to be found however for only a very small proportion of these combinations, see page 5, line 9 – page 10, line 13, and page 127, line 13. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search of claim 1-5 (PCT Guidelines 9.19 and 9.23). The search of claim 1-5 was restricted to those claimed combinations which appear to be supported and a generalisation of their structural formulae, as given on page 5, line 9 – page 10, line 13, and page 127, line 13.

The applicant’s attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.