

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
21 April 2005 (21.04.2005)

PCT

(10) International Publication Number
WO 2005/034997 A3

- (51) International Patent Classification⁷: **A61K 41/00**, 47/48
- (21) International Application Number: PCT/GB2004/004305
- (22) International Filing Date: 8 October 2004 (08.10.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 0323699.9 9 October 2003 (09.10.2003) GB
- (71) Applicant (for all designated States except US): **UNIVERSITY COLLEGE LONDON** [GB/GB]; Gower Street, London WC1E 9BT (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **WILSON, Michael** [GB/GB]; University College London, Gower Street, London WC1E 9BT (GB). **NAIR, Sean** [GB/GB]; University College London, Gower Street, London WC1E 9BT (GB).
- (74) Agents: **McCLUSKIE, Gail, Wilson et al.**; J.A. Kemp & Co., 14 South Square, Gray's Inn, London WC1R 5JJ (GB).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report
- (88) Date of publication of the international search report: 8 December 2005
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*



WO 2005/034997 A3

(54) Title: CONJUGATE OF A PHOTOSENSITISER AND A BACTERIOPHAGE

(57) Abstract: A composition comprising a conjugate of a photosensitiser and a bacteriophage is provided. The conjugate may be used to kill bacteria, particularly MRSA, EMRSA, VRSA, hetero-VRSA or CA-MRSA in a targeted method of photodynamic therapy.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2004/004305

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K41/00 A61K47/48

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 7 A61K

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, WPI Data, PAJ, BIOSIS, CHEM ABS Data, EMBASE, MEDLINE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/44395 A (THE NORWEGIAN RADIUM HOSPITAL RESEARCH FOUNDATION; JONES, ELIZABETH, L) 6 June 2002 (2002-06-06) page 21, line 1 page 11, line 35 - page 12, line 10 page 20, lines 20-25 page 24, lines 4-26 page 34, lines 16-25; claims 18,19 ----- -/--	1,3,4,8, 11,12,23

Further documents are listed in the continuation of box C.

Patent family members are listed in 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

- "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

14 June 2005

Date of mailing of the international search report

22 09 2005

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Gonzalez Ramon, N

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB2004/004305

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>CALDAS L-R ET AL: "ACTION ANTIVIRALE PAR EFFET PHOTODYNAMIQUE SUR DES SYSTEMES BACTERIENS: SENSIBILITE PARTICULIERE DES BACTERIES INFECTEES" COMPTES RENDUS HEBDOMADAIRES DES SEANCES DE L'ACADEMIE DES SCIENCES. SERIES D, SCIENCES NATURELLES, GAUTHIER-VILLARS, PARIS,, FR, no. 278, 29 April 1974 (1974-04-29), pages 2369-2372, XP001052858 ISSN: 0567-655X abstract; figures 1,2 -----</p>	1-25
Y	<p>MENEZES S. ET AL: "Photodynamic action of methylene blue: repair and mutation in Escherichia coli" JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY, B. BIOLOGY, vol. 5, 1990, pages 505-517, XP008048287 page 514, paragraph 2; figure 5 -----</p>	1-25
Y	<p>WO 99/26476 A (CERUS CORPORATION) 3 June 1999 (1999-06-03) page 20, lines 36-38; claim 14 page 23, line 21 - page 24, line 4 -----</p>	1-25
Y	<p>EMBLETON M. L. ET AL: "Selective lethal photosensitization of methicillin-resistant Staphylococcus aureus using an IgG-tin(IV) chlorin e6 conjugate" JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY, vol. 50, 2002, pages 857-864, XP008048237 cited in the application abstract; figures 2-6 see discussion -----</p>	1-25
A	<p>SZPAKOWSKA M. ET AL: "Photodynamic activity of the haematoporphyrin derivative with rutin and arginine substituents (HpD-Rut2-Arg2) against staphylococcus aureus and pseudomonas aeruginosa" PHARMACOLOGICAL RESEARCH, vol. 44, no. 3, 2001, pages 243-246, XP002331303 see discussion abstract page 244, column 2 -----</p>	1-25
Y	<p>WEBB R. B. ET AL: "Photodynamic effects of dyes on bacteria" MUTATION RESEARCH, vol. 59, 1979, pages 1-13, XP008048277 abstract; figure 3; table 1 -----</p>	13-25
	-/--	

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2004/004305

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>WO 03/063902 A (GAMBRO, INC) 7 August 2003 (2003-08-07) page 13, paragraph 4 - page 14, paragraph 1 page 30, paragraph 2; claim 1 page 12, paragraph 1</p> <p>-----</p>	1-25
A	<p>ROSENKRANZ A A ET AL: "TARGETED INTRACELLULAR DELIVERY OF PHOTSENSITIZERS TO ENHANCE PHOTODYNAMIC EFFICIENCY" IMMUNOLOGY AND CELL BIOLOGY, CARLTON, AU, vol. 78, no. 4, August 2000 (2000-08), pages 452-464, XP000982090 abstract; figure 2 page 460</p> <p>-----</p>	1-25
A	<p>US 6 500 800 B1 (SOBOLEV ALEXANDER SERGEEVICH ET AL) 31 December 2002 (2002-12-31) claims 1,2,8,16,17; example 5</p> <p>-----</p>	1-25
T	<p>EMBLETON M. L. ET AL: "Antibody-directed photodynamic therapy of methicillin-resistant Staphylococcus aureus" MICROBIAL DRUG RESISTANCE, vol. 10, no. 2, 2004, pages 92-97, XP008048242 abstract; figure 1 page 93, column 2 page 96, column 2</p> <p>-----</p>	1-25

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2004/004305

Box 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.: 28-30
because they relate to subject matter not required to be searched by this Authority, namely:
Although claims 13-23 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. Claims Nos.: 28-30
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 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 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.:
1-25

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Although claims 13-23 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

Continuation of Box II.1

Claims Nos.: 28-30

Claims 28-30 do not define subject matter in terms of technical features (Art 6 PCT)
A claim should be understandable without reference to the description: "substantially as described in the examples" cannot be accepted under Art. 6 PCT and Rule 6.2(a).

Continuation of Box II.2

Claims Nos.: 28-30

Claims 28-30 do not define subject matter in terms of technical features (Art 6 PCT)
A claim should be understandable without reference to the description: "substantially as described in the examples" cannot be accepted under Art. 6 PCT and Rule 6.2(a).

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, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-25

Composition comprising a conjugate of a photosensitiser and a bacteriophage. Use of the same for killing bacteria and the treatment of bacterial infections.

2. claims: 26,27

Use of a bacteriophage as a targeting agent in photodynamic therapy

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No PCT/GB2004/004305

Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
WO 0244395	A	06-06-2002	AU 2210402 A BR 0115794 A CA 2430334 A1 CN 1484706 A CZ 20031792 A3 EP 1339862 A1 HU 0402626 A2 JP 2004520020 T PL 362795 A1 US 2004096425 A1	11-06-2002 25-02-2004 06-06-2002 24-03-2004 15-10-2003 03-09-2003 29-03-2005 08-07-2004 02-11-2004 20-05-2004
WO 9926476	A	03-06-1999	AU 747842 B2 AU 1592999 A	23-05-2002 15-06-1999
WO 03063902	A	07-08-2003	CA 2474448 A1 EP 1471940 A2 JP 2005519920 T	07-08-2003 03-11-2004 07-07-2005
US 6500800	B1	31-12-2002	AU 1739697 A WO 9728822 A1 RU 2066552 C1	28-08-1997 14-08-1997 20-09-1996