

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
8 February 2007 (08.02.2007)

PCT

(10) International Publication Number  
**WO 2007/016501 A3**

(51) International Patent Classification:

A61K 9/00 (2006.01) A61P 25/00 (2006.01)  
A61K 48/00 (2006.01)

60615 (US). **KAMINSKI, Michael** [US/US]; 16350 Deer Run Drive, Lockport, IL 60441 (US).

(21) International Application Number:

PCT/US2006/029774

(74) Agents: **FAHRLANDER, Jill, A.** et al.; Michael Best & Friedrich LLP, One South Pinceney Street, P.O. Box 1806, Madison, WI 53701-1806 (US).

(22) International Filing Date: 1 August 2006 (01.08.2006)

(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, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/704,639 1 August 2005 (01.08.2005) US  
60/723,189 3 October 2005 (03.10.2005) US

(71) Applicant (for all designated States except US): **THE UNIVERSITY OF CHICAGO** [US/US]; 5801 South Ellis Avenue, Chicago, IL 60637 (US).

(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, IS, IT, LT, LU, LV, MC, NL, PL, PT,

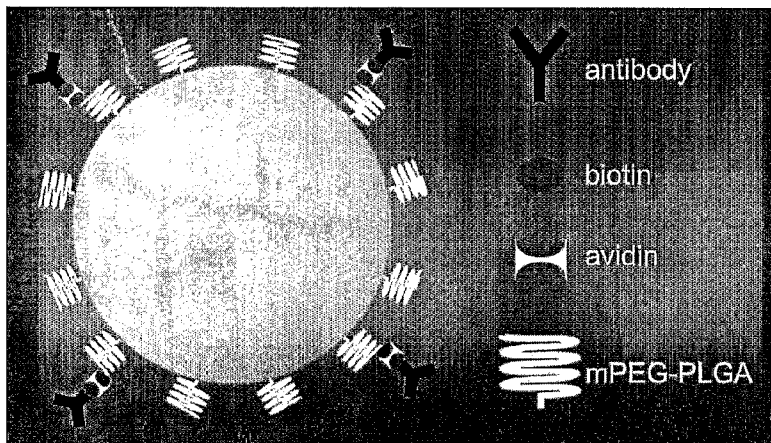
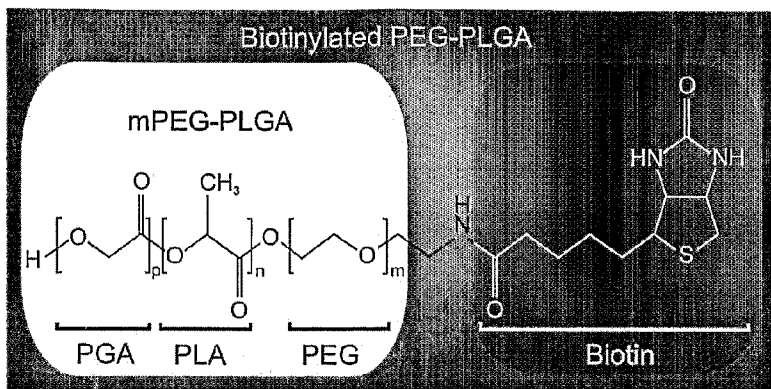
(72) Inventors; and

(75) Inventors/Applicants (for US only): **KRAIG, Richard, P.** [US/US]; 4734 South Kenwood Avenue, Chicago, IL

[Continued on next page]

(54) Title: COMPOSITIONS AND METHOD FOR BRAIN SPECIFIC TARGETED DELIVERY OF THERAPEUTIC AGENTS

(57) Abstract: Disclosed are methods and compositions for delivering a therapeutic agent to target organs or tissues, such as brain. The methods and compositions use bone marrow stem cells, monocytes, macrophages or microglial cells to deliver the therapeutic agent associated with nanoparticles to the target organ or tissue.



WO 2007/016501 A3



RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**(88) Date of publication of the international search report:**  
12 July 2007

**Published:**

— with international search report

*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.*

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2006/029774

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
INV. A61K9/00 A61K48/00 A61P25/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) A61K A61P		
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		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JENDELOVA PAVIA ET AL: "Magnetic resonance tracking of transplanted bone marrow and embryonic stem cells labeled by iron oxide nanoparticles in rat brain and spinal cord" JOURNAL OF NEUROSCIENCE RESEARCH, vol. 76, no. 2, 15 April 2004 (2004-04-15), pages 232-243, XP002428312 ISSN: 0360-4012 abstract page 233, right-hand column  ----- -/--	1-4, 10-13, 19,20, 23-26, 28,29
<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 *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		Date of mailing of the international search report
5 April 2007		18/04/2007
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  ESCOLAR BLASCO, P

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2006/029774

## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2004/112747 A (BAXTER INT [US]; RABINOW BARRETT E [US]; GENDELMAN HOWARD E [US]; KIPP) 29 December 2004 (2004-12-29)  page 3, paragraph 3 - page 4, paragraph 2 page 6, paragraphs 2,3 page 30, paragraph 2 page 32, paragraph 3	1-5, 10, 11, 13, 19, 20, 23-31
P, X	WO 2005/072706 A (BAXTER INT [US]; BAXTER HEALTHCARE SA [CH]; WERLING JANE [US]; CHAUBAL) 11 August 2005 (2005-08-11)  page 2, paragraph 4 - page 3, paragraph 1	1-4, 10-13, 19, 20, 22, 28
Y	BHARALI DHRUBA J ET AL: "Organically modified silica nanoparticles: A nonviral vector for in vivo gene delivery and expression in the brain" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, vol. 102, no. 32, 28 July 2005 (2005-07-28), pages 11539-11544, XP002428313 ISSN: 0027-8424 page 11539, right-hand column, paragraph 2 abstract	1-30
Y	MAKAR T K ET AL: "BRAIN-DERIVED NEUROTROPHIC FACTOR (BDNF) GENE DELIVERY INTO THE CNS USING BONE MARROW CELLS AS VEHICLES" NEUROSCIENCE LETTERS, LIMERICK, IE, vol. 356, 19 February 2004 (2004-02-19), pages 215-219, XP009081855 ISSN: 0304-3940 page 216, right-hand column, paragraph 1	1-30
Y	SAWADA M ET AL: "Brain-specific gene expression by immortalized microglial cell-mediated gene transfer in the mammalian brain" FEBS LETTERS, ELSEVIER, AMSTERDAM, NL, vol. 433, no. 1-2, 14 August 1998 (1998-08-14), pages 37-40, XP004258219 ISSN: 0014-5793 page 38, right-hand column, paragraph 1	1-30
	-/--	

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2006/029774

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>MENEI PHILIPPE ET AL: "Drug delivery into the brain using poly(lactide-co-glycolide) microspheres."                      EXPERT OPINION ON DRUG DELIVERY MAR 2005, vol. 2, no. 2, March 2005 (2005-03), pages 363-376, XP009081833                      ISSN: 1742-5247                      page 372, right-hand column</p>	1-31

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2006/029774

## 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.: —  
because they relate to subject matter not required to be searched by this Authority, namely:  

Although claims 1-27 are directed to a method of treatment of the human body, the search has been carried out and based on the alleged effects of the composition.
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 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:

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.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2006/029774
---

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004112747 A	29-12-2004	AU 2004249172 A1	29-12-2004
		CA 2540695 A1	29-12-2004
		EP 1663158 A2	07-06-2006
		US 2006280430 A1	14-12-2006
WO 2005072706 A	11-08-2005	AU 2005209243 A1	11-08-2005
		CA 2554246 A1	11-08-2005
		CN 1913871 A	14-02-2007
		EP 1713443 A2	25-10-2006
		KR 20060135729 A	29-12-2006