

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 May 2004 (21.05.2004)

PCT

(10) International Publication Number
WO 2004/041172 A3

(51) International Patent Classification:

C07K 1/00 (2006.01) *A01N 37/18* (2006.01)
C07K 14/00 (2006.01) *A61K 38/00* (2006.01)
C07K 17/00 (2006.01)

(21) International Application Number:

PCT/US2003/034328

(22) International Filing Date: 29 October 2003 (29.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

10/284,740 31 October 2002 (31.10.2002) US

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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, 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, 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 (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (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:
21 December 2006

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.

(54) Title: INTERFERON ANTAGONISTS USEFUL FOR THE TREATMENT OF INTERFERON RELATED DISEASES

(57) Abstract: The present invention relates to a process for ameliorating or preventing diseases that are caused, in part, by an increased level of, and/or an abnormal responsivity to, interferon. Alzheimer's disease, HIV infection, Down syndrome, transplant rejection, autoimmune disease, and infant encephalitis are examples of such diseases. Specifically, the invention provides a method for treating subjects suffering from, or at risk for, such diseases by the administration of a pharmacological preparation of interferon binding proteins of mammalian and/or viral origin that antagonized interferon's action. This invention comprises compositions of interferon binding proteins that can be inhibit the activity of interferon gamma plus interferon alpha such compositions along with their method of production and modification being described herein.

WO 2004/041172 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/34328

A. CLASSIFICATION OF SUBJECT MATTER
 IPC: C07K 1/00(2006.01),14/00(2006.01),17/00(2006.01);A01N 37/18(2006.01);A61K 38/00(2006.01)
 USPC: 530/350;514/2
 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)
 U.S. : 530/350; 514/2

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|--------------------------|
| X | Maroun LE, Anti-interferon immunoglobulins can improve the trisomy 16 mouse phenotype. Teratology, 1995, Vol 51, pages 329-335. | 1-5, 18-19, 21, 25, 27 |
| A | HALLAM, DM et al. Evidence for an interferon-related inflammatory reaction in the trisomy 16 mouse brain leading to caspase-1-mediated neuronal apoptosis. J. of Neuroimmunol. 2000, Vol 110, pages 66-75. | 1-5, 16-21, 25-27, 32-33 |
| X | US 5,888,511 A (Skurkovich et al) 30 March 1999 (30.03.1999), Abstract, Summary of Invention columns 4-7, in particular column 4, lines 38-64. | 1-5, 18-19, 25 |
| X | US 5,780,027 A (MAROUN) 14 July 1998 (14.07.1998), entire document, especially model and example columns 7-8. | 1-5, 18-21, 25-27 |
| Y | US 4,766,106 (KATRE et al) 23 August 1988 (23.08.1988), see abstract, columns 2-4, claims 1-15. | 16, 32 |
| Y | SHIN et al. Transferrin-antibody fusion proteins are effective in brain targeting. PNAS. Vol. 92, pages 2820-2824. | 17, 33 |

Further documents are listed in the continuation of Box C. See patent family annex.

| * Special categories of cited documents: | "T" |
|---|--|
| "A" document defining the general state of the art which is not considered to be of particular relevance | 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 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 | |

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| Date of the actual completion of the international search 31 July 2006 (31.07.2006) | Date of mailing of the international search report 25 SEP 2006 |
| Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner of Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201 | Authorized officer Janet Andres <i>Janet Ford</i> Telephone No. 571-272-1600 |

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/34328

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim 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. Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation 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.: 1-5, 16-21, 25, 27, 32-33 in part

Remark on Protest

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

No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-5, 16-21, 25-27, 32-33 drawn to composition to the extent of IFN-alpha binding protein and/or IFN-gamma binding protein and method of treating Alzheimer's disease and/or Down's syndrome.

Group II, claim(s) 1-3, 6, 16-21, 25-27, 32-33 drawn to composition to the extent of IFN-gamma receptor and method of treating Alzheimer's disease and/or Down's syndrome.

Group III, claim(s) 1-3, 7-8, 16-21, 25-27, 32-33, 42-44, 48-51 drawn to composition to the extent of B18R and method of treating Alzheimer's disease and/or Down's syndrome.

Group IV, claim(s) 1-3, 9, 16-21, 25-27, 32-33, 45-50, 52 drawn to composition to the extent of B8R and method of treating Alzheimer's disease and/or Down's syndrome.

Group V, claim(s) 1-3, 10-21, 25-27 and 32-33 drawn to composition to the extent of interferon-specific antibody and method of treating Alzheimer's disease and/or Down's syndrome.

Group VI, claim(s) 34-36, drawn to method of treating or preventing transplant rejection.

Group VII, claim(s) 1-3, 6, 16-19, 24, 25, 30-33, 37-41 drawn to composition to the extent of IFN-gamma receptor and method of treating HIV/AIDS.

Group VIII, claim(s) 1, 19, 22, 25, 28 drawn to method of treating or preventing infant encephalitis.

Group IX, claim(s) 1, 19, 23, 25, 29 drawn to method of treating or preventing autoimmune disease.

The inventions listed as Groups I-IX do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The inventions lack unity as they are directed to different special technical features, namely, IFN-gamma binding protein anticipated by prior art reference US 5,763,210, 9 June 1998, and IFN-alpha/beta binding protein anticipated by prior art reference EP 0588177, 23 March 1994. Further, US 5,780,027 anticipates to methods of treatment of Down's syndrome and/or Alzheimer's disease via inhibition of interferons alpha, beta and/or gamma. The methods differ in administration of different technical features and provide for different functions, effects, and outcomes. Accordingly, the inventions lack unity.