



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>5</sup> :</b> <b>C12N 15/16, A61K 37/24</b> <b>C12P 21/02, C07K 13/00</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 94/02611</b> <b>(43) International Publication Date:</b> 3 February 1994 (03.02.94)
<b>(21) International Application Number:</b> PCT/US93/07116 <b>(22) International Filing Date:</b> 28 July 1993 (28.07.93) <b>(30) Priority data:</b> 07/920,810                      28 July 1992 (28.07.92)                      US <b>(71) Applicant:</b> NEW ENGLAND DEACONESS HOSPITAL [US/US]; 185 Pilgrim Road, Boston, MA 02215 (US). <b>(72) Inventors:</b> SYTKOWSKI, Arthur, J. ; 203 Park Avenue, Ar- lington, MA 02174 (US). GRODBERG, Jennifer ; 400 Brookline Avenue, N° 9E, Boston, MA 02215 (US). <b>(74) Agents:</b> GRANAHAN, Patricia et al.; Hamilton, Brook, Smith & Reynolds, Two Militia Drive, Lexington, MA 02173 (US).	<b>(81) Designated States:</b> JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the</i> <i>claims and to be republished in the event of the receipt of</i> <i>amendments.</i>  <b>(88) Date of publication of the international search report:</b> 31 March 1994 (31.03.94)	
<b>(54) Title:</b> RECOMBINANT HUMAN ERYTHROPOIETIN WITH ALTERED BIOLOGICAL ACTIVITY		
<b>(57) Abstract</b>  DNA encoding modified, secretable erythropoietin proteins whose ability to regulate the growth and differentiation of red blood cell progenitors are different from the wildtype recombinant erythropoietin and to methods of modifying or altering the regulating activity of a secretable erythropoietin and using modified secretable erythropoietin proteins.		

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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 93/07116

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 5 C12N15/16 A61K37/24 C12P21/02 C07K13/00

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 5 C07K C12N A61K C12P

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)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 409 113 (BEHRINGWERKE A.G.) 23 January 1991 see claims ---	23
A	EUROPEAN JOURNAL OF BIOCHEMISTRY vol. 202, no. 2, December 1991, BERLIN, DE pages 225 - 229 CHERN, Y. ET AL. 'Structural role of amino acids 99-110 in recombinant human erythropoietin' cited in the application see the whole document --- -/--	1-23

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
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- \*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

4 January 1994

Date of mailing of the international search report

04 -02- 1994

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

Andres, S

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 93/07116

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

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA vol. 83, no. 17 , September 1986 , WASHINGTON US pages 6465 - 6469 POWELL, J. ET AL. 'Human erythropoietin gene: high level expression in stably transfected mammalian cells and chromosome localization' cited in the application see the whole document ---	1
A	JOURNAL OF BIOLOGICAL CHEMISTRY vol. 263, no. 33 , 25 November 1988 , BALTIMORE, MD US pages 17516 - 17521 DUBÉ, S. ET AL. 'Glycosylation at specific sites of erythropoietin is essential for biosynthesis, secretion, and biological function' cited in the application see the whole document ---	1
P,X	WO,A,92 21029 (GENENTECH, INC.) 26 November 1992  see page 14 - page 15; table 1b see claims 13,25 -----	1-5, 8-10,17, 22,23

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 93/07116

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 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:  
**Remark : Although claims 17-21 are directed to a method of treatment of (diagnostic method practised on) the human/animal body the search has been carried out and based on the alleged effects of the compound/ 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 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:

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/US 93/07116

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0409113	23-01-91	DE-A- 3923963	31-01-91
		AU-B- 638470	01-07-93
		AU-A- 5914590	24-01-91
		CA-A- 2021528	21-01-91
		JP-A- 3072885	28-03-91
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WO-A-9221029	26-11-92	NONE	
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