United States Patent [19]

Garman

[11] **Patent Number: 4,935,465**

[45] **Date of Patent: Jun. 19, 1990**

[54] **CONJUGATES OF PHARMACEUTICALLY USEFUL PROTEINS**

[75] Inventor: **Andrew J. Garman**, Betchworth, United Kingdom

[73] Assignee: **Beecham Group p.l.c.**, England

[21] Appl. No.: **802,663**

[22] Filed: **Nov. 27, 1985**

[30] **Foreign Application Priority Data**

Nov. 30, 1984 [GB] United Kingdom 8430252

[51] **Int. Cl.**[5] **C07K 17/06;** C07K 17/08; A61K 37/54; A61K 37/465

[52] **U.S. Cl.** **525/54.1;** 530/334; 530/402; 530/403; 530/404; 435/177; 435/180; 435/181

[58] **Field of Search** 525/54.1; 530/334, 335, 530/336, 337, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411; 435/174, 177, 180, 181

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,055,635	10/1977	Green et al.	435/180
4,179,337	12/1979	Davis et al.	530/409
4,496,689	1/1985	Mitra	525/54.1
4,542,225	9/1985	Blattler et al.	548/473
4,569,789	2/1986	Blattler et al.	530/387
4,618,492	10/1986	Blattler et al.	424/85
4,640,835	3/1987	Shimizu et al.	424/94
4,764,368	8/1988	Blattler et al.	424/85
4,859,736	8/1989	Rink	525/54.1
4,863,735	9/1989	Kohn et al.	525/54.1

FOREIGN PATENT DOCUMENTS

0038154	10/1981	European Pat. Off. .
98110	1/1984	European Pat. Off. .
2515684	5/1983	France .
1059670	2/1967	United Kingdom .
1390716	4/1975	United Kingdom .

OTHER PUBLICATIONS

Means et al., Chemical Modification of Proteins, Holden-Day, San Francisco, 1971 pp. 76-77.

Patent Abstracts of Japan, vol. 8, No. 156 (C-234) [1593], 19th Jul. 1984.

G. Durand et al.: "Les Enzymes-Production et utilisations industrielles", part 1, 1982, pp. 81-118, Gauthier-Villars, Paris.

Chemical Abstracts, vol. 88, No. 22, 29th May 1978, p. 41, Abstract No. 153575h.

Shimizu et al., IXth International Congress On Thrombosis And Haemostasis, Stockholm, Jul. 3-8, 1983.

Primary Examiner—Nathan M. Nutter

Attorney, Agent, or Firm—Jacobs & Jacobs

[57] **ABSTRACT**

A conjugate comprising a pharmaceutically useful protein linked to at least one water-soluble polymer by means of a reversible linking group.

8 Claims, 5 Drawing Sheets