US006120751A

United States Patent [19]

Unger

[11] **Patent Number: 6,120,751**

[45] **Date of Patent: *Sep. 19, 2000**

[54] **CHARGED LIPIDS AND USES FOR THE SAME**

[75] Inventor: **Evan C. Unger**, Tucson, Ariz.

[73] Assignee: **ImaRx Pharmaceutical Corp.**, Tucson, Ariz.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/925,353**

[22] Filed: **Sep. 8, 1997**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/823,791, Mar. 21, 1997, and a continuation-in-part of application No. 08/851,780, May 6, 1997, and a continuation-in-part of application No. 08/877,826, Jun. 18, 1997, and a continuation-in-part of application No. 08/887,215, Jul. 2, 1997.

[51] **Int. Cl.**[7] **A61K 49/04**; A61K 9/50; A61K 9/127; B01J 13/02

[52] **U.S. Cl.** **424/9.51**; 424/9.52; 424/450; 424/502; 264/4.1; 264/4; 428/402.2

[58] **Field of Search** 424/450, 9.52, 424/9.51, 489, 498, 502, 1.21, 9.321, 812; 514/937; 264/4, 4.1, 4.32, 4.33; 427/2.14, 213.3, 213.31; 428/402, 402.24, 402.2; 436/829

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,015,128	1/1962	Sommerville et al.	18/2.6
3,293,114	12/1966	Kenaga et al.	162/168
3,401,475	9/1968	Morehouse et al.	40/306
3,479,811	11/1969	Walters	57/153
3,488,714	1/1970	Walters et al.	161/161
3,532,500	10/1970	Priest et al.	96/91
3,594,326	7/1971	Himmel et al.	252/316
3,615,972	10/1971	Morehouse et al.	156/79
3,647,784	3/1972	Stein et al.	260/239.55 R
3,649,620	3/1972	Ercoli et al.	260/239.55
3,650,831	3/1972	Jungermann et al.	134/27
3,732,172	5/1973	Herbig et al.	252/316
3,873,564	3/1975	Schneider et al.	260/309.6
3,945,956	3/1976	Garner	260/2.5 B
3,960,583	6/1976	Netting et al.	106/122
3,968,203	7/1976	Spitzer et al.	424/47
4,027,007	5/1977	Messina	424/46
4,078,052	3/1978	Papahadjopoulos	424/36
4,089,801	5/1978	Schneider	252/316
4,108,806	8/1978	Cohrs et al.	521/54
4,138,383	2/1979	Rembaum et al.	260/29.7 H
4,162,282	7/1979	Fulwyler et al.	264/9
4,179,546	12/1979	Garner et al.	521/56
4,192,859	3/1980	Mackaness et al.	424/5
4,224,179	9/1980	Schneider	252/316
4,229,360	10/1980	Schneider et al.	260/403
4,265,251	5/1981	Tickner	128/660
4,276,885	7/1981	Tickner et al.	128/660
4,310,505	1/1982	Baldeschwieler et al.	424/1
4,310,506	1/1982	Baldeschwieler et al.	424/1
4,315,514	2/1982	Drewes et al.	128/653
4,331,654	5/1982	Morris	424/38
4,342,826	8/1982	Cole	435/7

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

641363	3/1990	Australia .
B-30351/89	3/1993	Australia .
0 107 559	5/1984	European Pat. Off. .
0 077 752 B1	3/1986	European Pat. Off. .
0 243 947	4/1987	European Pat. Off. .
0 231 091	8/1987	European Pat. Off. .
0 272 091	6/1988	European Pat. Off. .
0 320 433 A2	12/1988	European Pat. Off. .
0 324 938	7/1989	European Pat. Off. .
0 338 971	10/1989	European Pat. Off. .
357163 A1.	3/1990	European Pat. Off. .
0 361 894	4/1990	European Pat. Off. .
0 368 486 A2	5/1990	European Pat. Off. .
0 382 451 A2	8/1990	European Pat. Off. .
0 216 730	1/1991	European Pat. Off. .
0 422 938 B1	4/1991	European Pat. Off. .
0 467 031 A2	5/1991	European Pat. Off. .
441468 A2	8/1991	European Pat. Off. .
0 357 164 B1	10/1991	European Pat. Off. .
0 458 745 A1	11/1991	European Pat. Off. .
0 314 764 B1	9/1992	European Pat. Off. .
0 554 213 A1	8/1993	European Pat. Off. .
0 579 703 B1	1/1994	European Pat. Off. .
0 727 225 A2	8/1996	European Pat. Off. .

(List continued on next page.)

OTHER PUBLICATIONS

Fitzpatrick, et al., "Metal Ion Catalyzed Decarboxylation: Kinetics and Mechanism of the Oxidative Decarboxylation of Copper (II) Complexes of Aminomalonic Acid in Aqueous Solution", *Inorganic Chemistry,* vol. 13, No. 3, pp. 568–574 (1974).

Thanassi, "Aminomalonic Acid: Spontaneous Decarboxylation and Reaction with 5–Deoxypyridoxal", *Bio–Chemistry,* vol. 9, No. 3, pp. 525–532 (1970).

Stelmashok et al., *Koordinatsionnaya Khimiya,* vol. 3, No. 4, pp. 524–527 (1977) (Russian and English language versions).

Mayhew et al., "High–Pressure Continuous–Flow System for Drug Entrapment in Liposomes", *Methods in Enzymology,* vol. 149, pp. 64–77 (1987).

(List continued on next page.)

Primary Examiner—Jose' G. Dees
Assistant Examiner—Michael G. Hartley
Attorney, Agent, or Firm—Woodcock Washburn Kurtz Mackiewicz & Norris LLP

[57] **ABSTRACT**

The present invention is directed to charged lipids, compositions comprising charged lipids, and the use of these compositions in drug delivery, targeted drug delivery, therapeutic imaging and diagnostic imaging, as well as their use as contrast agents.

20 Claims, 4 Drawing Sheets