United States Patent [19]

Kramer et al.

[11] **Patent Number: 4,927,806**

[45] **Date of Patent: * May 22, 1990**

[54] **SATURATED SALT/CONCENTRATED DEXTRAN FORMULATION TO TREAT HEMORRHAGE**

[75] Inventors: **George C. Kramer**, Davis; **Paul R. Perron**, Citrus Heights, both of Calif.

[73] Assignee: **The Regents of the University of California**, Berkeley, Calif.

[*] Notice: The portion of the term of this patent subsequent to Mar. 13, 2007 has been disclaimed.

[21] Appl. No.: **41,605**

[22] Filed: **Apr. 23, 1987**

[51] **Int. Cl.**[5] **A61K 37/02**; A61K 31/715

[52] **U.S. Cl.** **514/2**; 514/54; 514/59; 514/60; 514/832; 514/833; 514/921

[58] **Field of Search** 514/59, 60, 2, 832, 514/833, 921, 54

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,864,478	2/1975	Bonhard	424/101
3,993,750	11/1976	Fox, Jr.	514/921
4,049,795	9/1977	Laborit	514/921
4,271,144	6/1981	Holly	514/59
4,308,255	12/1981	Raj et al.	424/153

OTHER PUBLICATIONS

Modig, cited in Biol. Abstracts 78(3) 2473 No. 21745, 1983.

Pristoupil, cited in Chem. Abstracts, vol. 82, 1975, No. 4772b.

Shimazaki, Shuji, et al. Body Fluid Changes During Hypertonic Lactated Saline Solution Therepay for Burn Shock, the Journal of Trauma, 17:38–43, 1977.

Lopes, O. U., Pontieri, V., Rocha, M., Silva, Jr., E., and Velasco, I. T., Hyperosmotic NaCl and Severe Hemorrhagic Shock: Role of the Innervated Lung, Am. J. Physiol 241 (Heart Cir. Physio 20: H883–H890) 1981.

Rush, Jr., B. F., M.D.–Treatment of Experimental Shock: Comparison of the Effects of Norepinephrine, Dibenzyline, Dextran, Whole Blood, and Balanced Saline Solutions, Surgery, vol. 61, No. 6, pp. 938–944 (1967).

Velasco, I. T., Pontieri, V., Rocha E. Silva, Jr., M., and Lopes, O. U., Hyperosmotic NaCl and Severe Hemorrhagic Shock, Am. J. Physiol. 239(5) H664–H673, 1980.

Brooks, D. K.; Williams, W. G.; Morley, R. W.; Whiteman, R., Osmolar and Electrolyte Changes in Haemorrhagic Shock, The Lancet. pp. 521–527, Mar. 9, 1963.

Silbert, Samuel, The Treatment of Thromboangiitis Obliterans, Journal A.M.A. 1759–1761 (Jun. 5, 1926).

Baue, M. D., Arthur E., et al.—A Comparison of Isotonic and Hypertonic Solutions Blood on Blood Flow and Oxygen Consumption in the Initial Treatment of Hemorrhagic Shock, J. of Trauma, vol. 7, No. 5, pp. 743–756 (1967).

Fraser, John; Cowell, E. M., Clinical Study of Blood Pressure in Wound Conditions, Journal A.M.A. Feb. 23, 1918, pp. 520-535, vol. 70, No. 8.

Danowski, T. S.; Winkler, A. W.; Elkinton, J. R.–The Treatment of Shock Due to Salt Depletion; Comparison of the Hemodynamic Effects of Isotonic Saline, of Hypertonic Saline, and of Isotonic Glucose Solutions, J.C.I. 25:130–138 (1946).

Lopes et al.; Chemical Abstracts vol. 96:617p (1982).

Velasco et al.; Chemical Abstracts vol. 93:215562r (1980).

Primary Examiner—Ronald W. Griffin
Assistant Examiner—Nancy S. Carson
Attorney, Agent, or Firm—Pretty, Schroeder Brueggemann & Clark

[57] **ABSTRACT**

A highly concentrated solution is provided which is both hyperosmotic and hyperoncotic with respect to blood plasma and has utility in treating patients experiencing or threatening to experience hypodynamic shock. The physiologically acceptable solution comprises a crystalloid to provide a osmolarity in excess of 5000 mOsms and a colloid to provide an oncocity in excess of 200 mm Hg. The solution is easily transported and administered by a single, rapid infusion of about less than about 1 ml/kg of body weight and results in a rapid and sustained normalization of circulatory function.

15 Claims, 1 Drawing Sheet