

United States Patent [19]

Lormeau et al.

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[54] **MUCOPOLYSACCHARIDES HAVING BIOLOGICAL PROPERTIES, PREPARATION AND APPLICATION THEREOF AS DRUGS**

[75] Inventors: **Jean-Claude Lormeau, Maromme; Maurice Petitou; Jean Choay**, both of Paris, all of France

[73] Assignee: **Choay S.A.**, Paris, France

[*] Notice: The portion of the term of this patent subsequent to Feb. 19, 2002 has been disclaimed.

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Related U.S. Application Data

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[30] Foreign Application Priority Data

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[52] U.S. Cl. **514/56; 536/21; 514/822**

[58] Field of Search **514/56, 822; 536/21**

[56] References Cited

U.S. PATENT DOCUMENTS

3,862,003 1/1975 Okuyana et al. 536/21
4,122,250 10/1978 Schner 536/21
4,168,377 9/1979 Choay et al. 536/21

4,175,182 11/1979 Schner 536/21
4,281,108 7/1981 Fussi 536/21
4,303,651 12/1981 Lindahl et al. 536/21
4,351,938 9/1982 Barrett 536/21
4,550,519 2/1985 Lormeau et al. 514/56

OTHER PUBLICATIONS

E. A. Johnson et al, *Thrombos. Haemostas.* (Stuttg.), vol. 37, pp. 586-591, Jan. '76.

L. O. Anderson et al, *Thrombosis Research*, vol. 9, pp. 575-583, Sep. '76.

Trevor W. Barrowcliffe et al, *Thrombosis Research*, vol. 2, pp. 27-36, Oct., '77.

T. W. Barrowcliffe et al, *British Medical Bulletin*, vol. 34, pp. 143-150 (1978).

Primary Examiner—John W. Rollins

Attorney, Agent, or Firm—Weiser & Stapler

[57] ABSTRACT

Mucopolysaccharides biologically active and more specific than heparin, particularly with respect to the blood factor Xa. These mucopolysaccharides may be obtained by partial depolymerization, under controlled conditions, of heparin, by the action of a chemical agent such as nitrous acid. The conditions implemented allow the preparation of mucopolysaccharides having a USP titer lower than that of the starting heparin and a Yin-Wessler titer at least equal to that of said heparin. These products may be used particularly as antithrombotic drugs.

31 Claims, No Drawings