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United States Patent [19]

Balschmidt et al.

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[45] **Date of Patent:** **Nov. 17, 1992**

[54] **HUMAN INSULIN ANALOGUES**

[75] **Inventors:** **Per Balschmidt, Espergaerde; Jens J.V. Brange, Klampenborg, both of Denmark**

[73] **Assignee:** **Novo Nordisk A/S, Bagsvaerd, Denmark**

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[22] **Filed:** **Dec. 20, 1989**

Related U.S. Application Data

[63] Continuation of Ser. No. 416,218, Oct. 2, 1989, abandoned, which is a continuation of Ser. No. 332,697, Apr. 3, 1989, abandoned.

[30] **Foreign Application Priority Data**

Dec. 23, 1988 [DK] Denmark 7215/88
Sep. 28, 1989 [DK] Denmark 4777/89

[51] **Int. Cl.⁵** **C07K 7/40; A61K 37/26**

[52] **U.S. Cl.** **514/3; 530/303; 435/69.4**

[58] **Field of Search** **530/303; 514/3; 435/69.4, 68.1**

[56] **References Cited**

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[57] **ABSTRACT**

The present invention relates to novel human insulin analogues exhibiting a low ability to associate in solution, a method for the preparation of such insulin analogues, insulin preparations containing the human insulin analogues of the invention and a method of treating Diabetes Mellitus using these human insulin analogues.

35 Claims, 5 Drawing Sheets

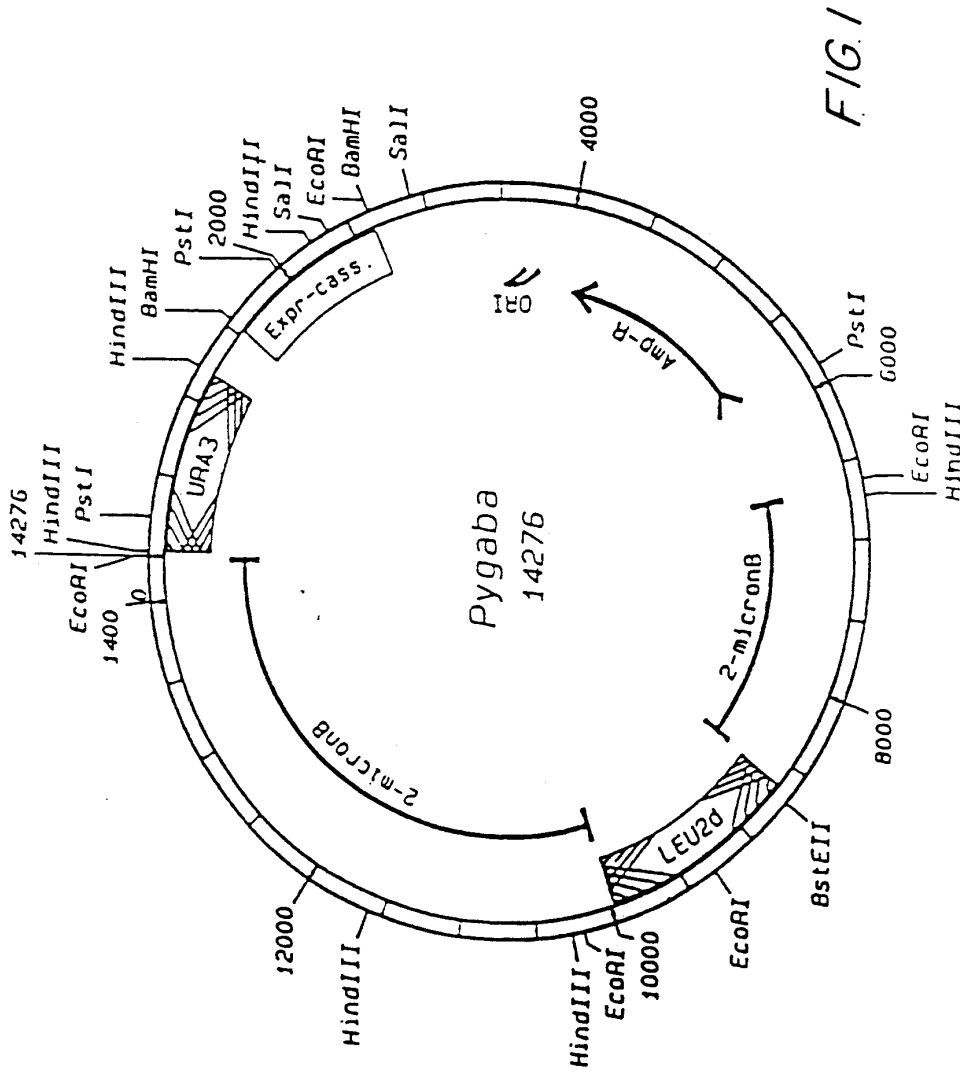


FIG. 1

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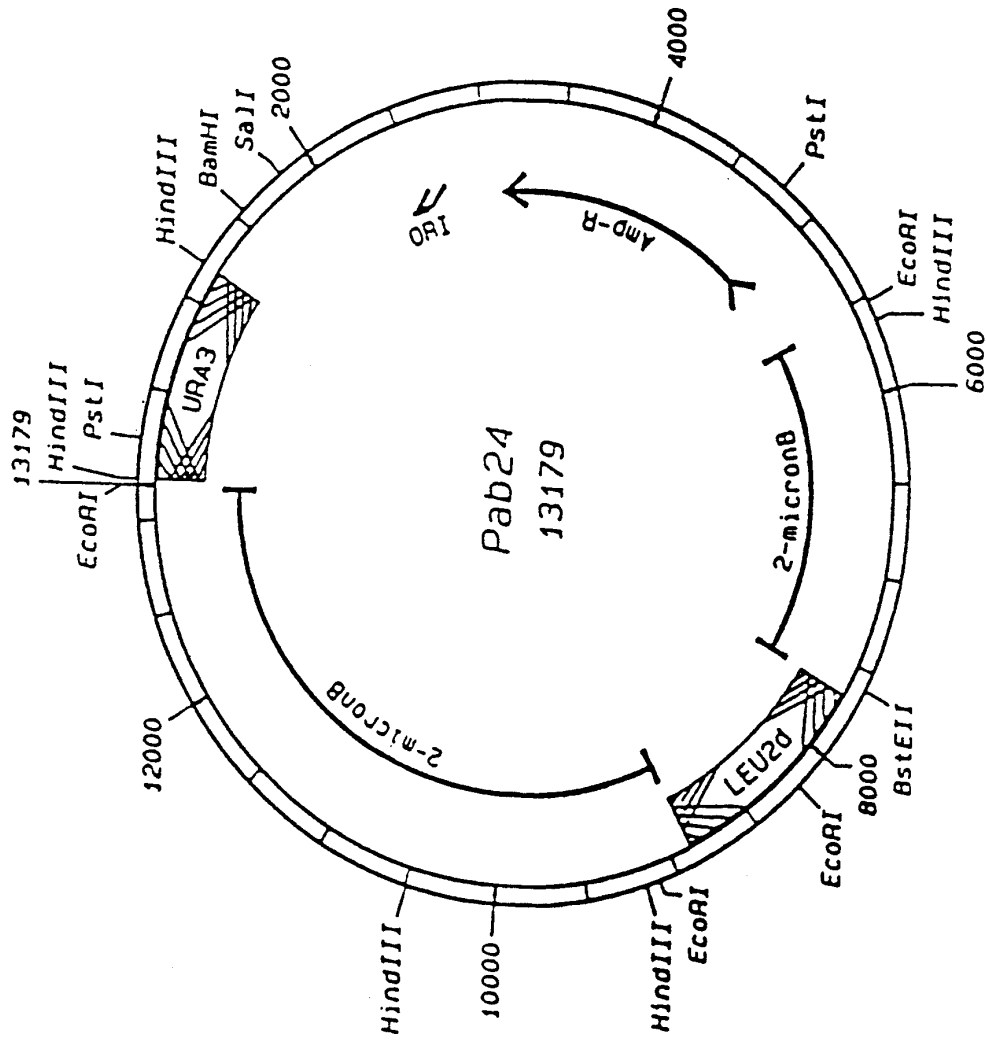


FIG. 2

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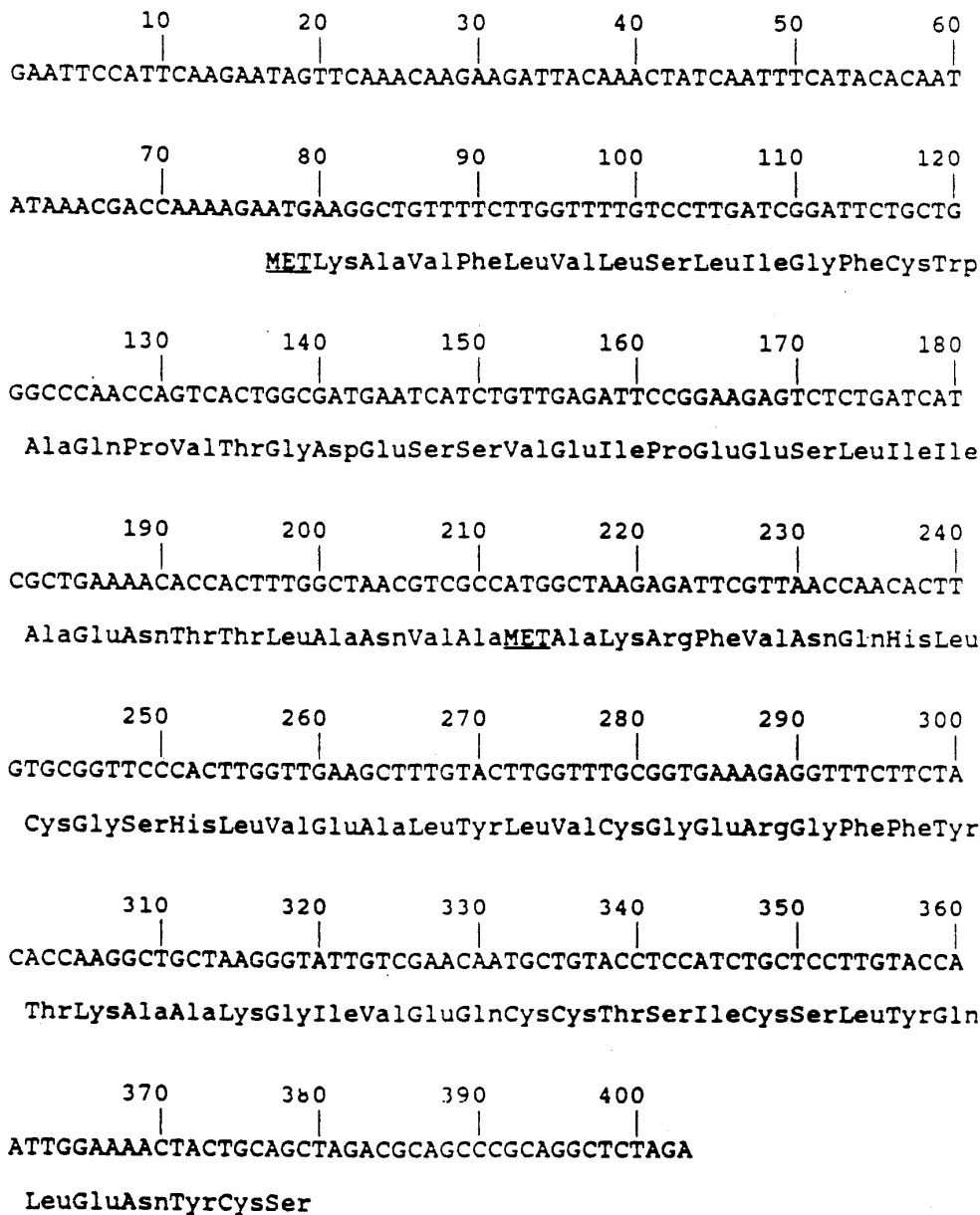


FIG. 3

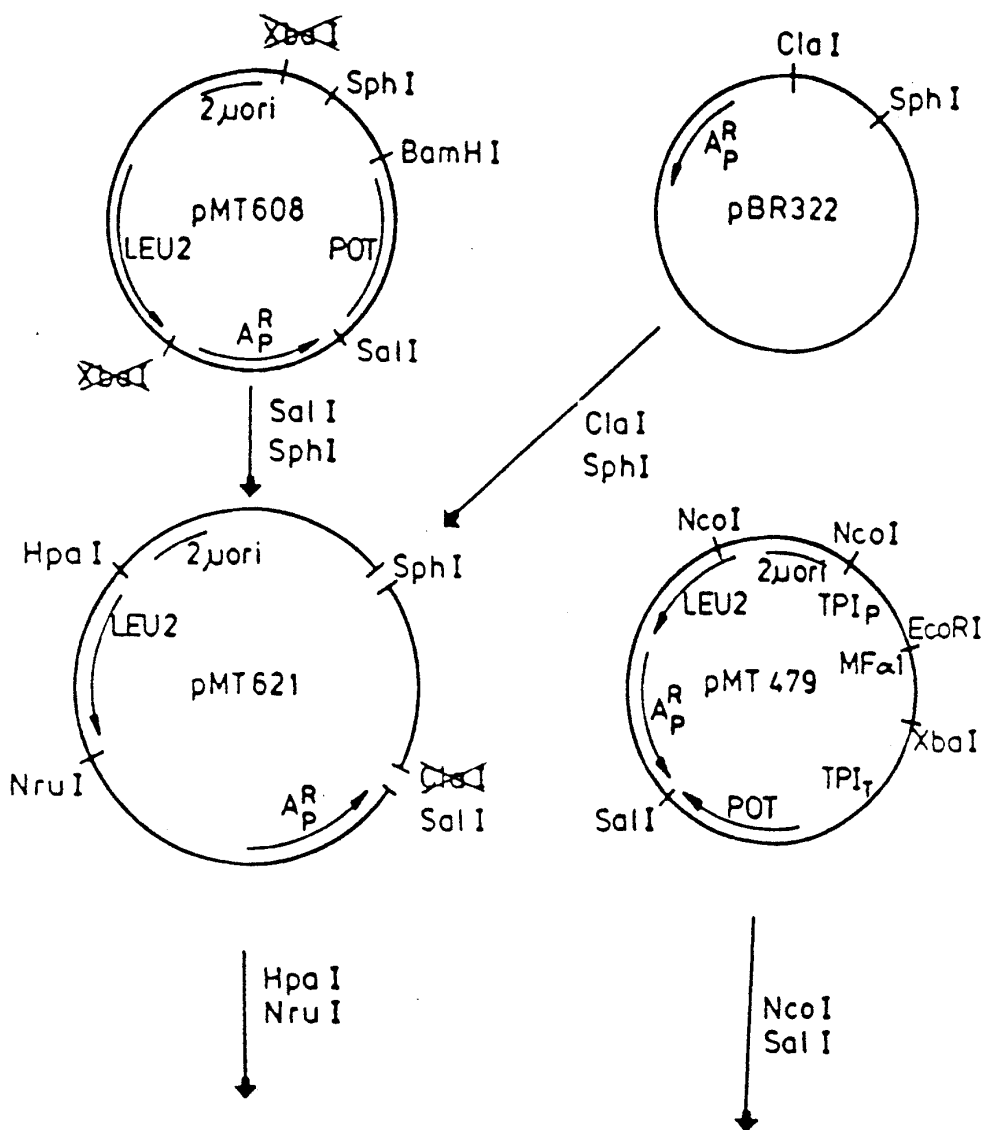


FIG. 4

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