



US006528063B2

(12) **United States Patent**
Stram et al.

(10) **Patent No.: US 6,528,063 B2**
(45) **Date of Patent: *Mar. 4, 2003**

(54) **RECOMBINANT VACCINES AGAINST IBDV**
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(*) 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).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/477,574**

(22) Filed: **Jan. 4, 2000**

(65) **Prior Publication Data**

US 2002/0015708 A1 Feb. 7, 2002

Related U.S. Application Data

(60) Provisional application No. 60/114,634, filed on Jan. 4, 1999.

(51) **Int. Cl.**⁷ **A61K 39/12**; A61K 48/00; C12N 15/33; C12N 5/14; A01H 5/00

(52) **U.S. Cl.** **424/204.1**; 424/93.21; 435/69.3; 435/419; 800/298; 800/317.2; 800/317.3

(58) **Field of Search** 424/204.1, 93.21; 435/69.3, 419; 800/298, 317.2, 317.3

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO 96/40229 * 12/1996 A61K/39/00

OTHER PUBLICATIONS

van Bokhoven et al. Journal of general virology, Nov. 1990, 71: 2509-17 (abstract only).*

Modelska et al. PNAS 95:2481-2485, Mar. 1998.*

Carillo et al. Journal of Virology 72(2):1668-1690, Feb. 1998.*

Dalsgaard et al. Nature Biotechnology 15(3):248-52, abstract only cited, 1997.*

Vakharia et al. Journal of General Virology 74:1201-1206, 1994.*

Hoshi et al. Vaccine 13(3):245-252, 1995.*

* cited by examiner

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(57) **ABSTRACT**

There is provided a stable vaccine for providing protection against disease having viral proteins transgenically expressed in plant cells. Also provided is a stable vaccine which provides protection against disease containing viral protein and coding sequences cloned into an *E. coli* expression system. A method of vaccination by transgenically expressing viral proteins capable of providing protection against disease into plant cells and administering the plant cells to an animal in need of vaccination is also provided. Also provided is a method of vaccination by cloning viral protein and coding sequences capable of providing protection against disease into an *E. coli* expression system and administering the *E. coli* into the animal in need of vaccination.

11 Claims, 11 Drawing Sheets