

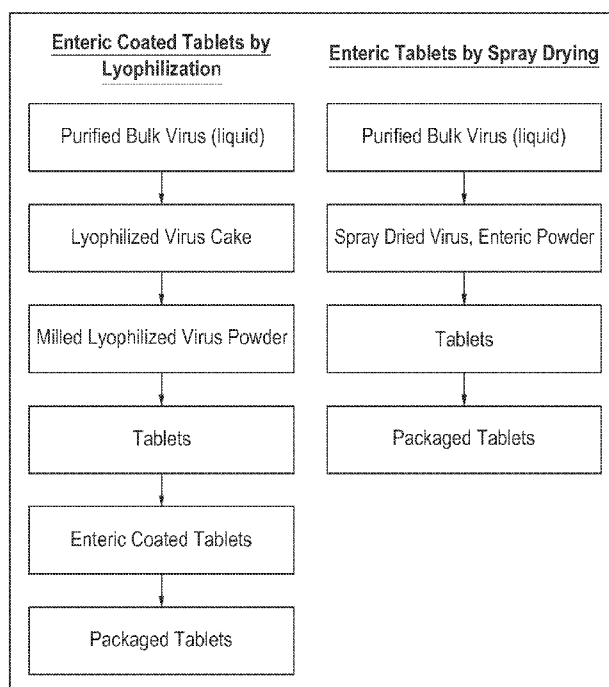


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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

[Continued on next page]

(54) **Title:** FORMULATIONS USEFUL FOR SPRAY DRYING VACCINES

FIG. 1



(57) **Abstract:** The present invention is directed to formulations for spray-drying viral particles, methods for spray drying such compositions, and pharmaceutical compositions and vaccines comprising the present spray-dried powders. The present formulations advantageously provide for spray-drying viral particles at low temperatures, thereby producing spray-dried viral powders having viral infectivities comparable to those of powders prepared by lyophilization of comparable formulations. The methods and compositions described herein advantageously provide substantially higher throughput and production rates for the production of viral powders. Further, spray-dried viral powders incorporating enteric polymers can be produced at low temperatures.



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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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INTERNATIONAL SEARCH REPORT

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PCT/US 12/26518

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61K 31/545 (2012.01)

USPC - 424/204.1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC-424/204.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC-424/184.1, 470 (see search terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PUBWESY, Google Scholar, Formulation, compositions, virus, viral, antigen, immuogenic, adenoviruses, spray dry, spray dried, spray drying, sucrose, cyclodextrin, raffinose, mannitol, lactose, starch, powders

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 7,229,645 B2 (Maa et al.) 12 June 2007 (12.06.2007) entire document especially col 3, ln 1-2, ln 24-40; col 8, ln 66; col 9, ln 26; col 13, ln 20-35; col 15, ln 1-10; col 16, ln 35-58; col 17, ln 10-30, ln 64-67; col 55, ln 15-18	1-2, 5-20, 25/(1,18), 26-31, 33-35/(1,18) ----- 3, 21-24, 32, 36
Y	US 2009/0148477 A1 (Bruder et al.) 11 June 2009 (11.06.2009) entire document especially para [0022]	3, 32, 36
Y	US 2005/0266011 A1 (Maa et al.) 01 December 2005 (01.12.2005) entire document especially para [0026]-[0027], [0043], [0093]	4
Y	US 6,667,323 B1 Whittle et al. 23 December 2003 (23.12.2003) entire document especially col 64, ln 25-60	21-24, 25/(21), 26-31/(31), 32/(27/(25)/(21)), 36/(28/(21), 33-35/(21))
X,P	US 2011/0123564 A1 (Mayall et al.) 26 May 2011 (26.05.2011) entire document	1-36

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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