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Novas et al.

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(54) METHODS OF TREATING MULTIPLE SCLEROSIS

(71) Applicant: Biogen MA Inc., Cambridge, MA (US)

(72) Inventors: Mark Novas, Lexington, MA (US); Rui (Ray) Zhang, Sharon, MA (US)

(73) Assignee: Biogen MA Inc., Cambridge, MA (US)

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This patent is subject to a terminal dis-

claimer.

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(56) References Cited

U.S. PATENT DOCUMENTS

4,959,389 A 9/1990 Speiser et al. 6,436,992 B1 8/2002 Joshi et al. (Continued)

FOREIGN PATENT DOCUMENTS

CN 103732062 A 4/2014 JP 2009-528359 A 8/2009 (Continued)

OTHER PUBLICATIONS

Assessment Report TECIFDERA®, published by the European Medicines Agency, Nov. 26, 2013.

(Continued)

Primary Examiner — Shengjun Wang (74) Attorney, Agent, or Firm — Choate, Hall & Stewart LLP; Brenda Herschbach Jarrell; Tracy L. Vrablik

(57) ABSTRACT

Provided herein are methods of treating multiple sclerosis with a fumarate, wherein the fumarate is a dialkyl fumarate, a monoalkyl fumarate, a combination of a dialkyl fumarate and a monoalkyl fumarate, a prodrug of monoalkyl fumarate, a deuterated form of any of the foregoing, or a pharmaceutically acceptable salt, clathrate, solvate, tautomer, or stereoisomer of any of the foregoing, or a combination of any of the foregoing. The methods provided herein improve the safety of treatment by informing and monitoring patients undergoing treatment regarding progressive multifocal leukoencephalopathy, and/or by monitoring lymphocyte count.

27 Claims, 4 Drawing Sheets

