US008859741B2

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

(10) **Patent No.: US 8,859,741 B2**
(45) **Date of Patent: Oct. 14, 2014**

(54) **ANTIGEN BINDING PROTEINS TO PROPROTEIN CONVERTASE SUBTILISIN KEXIN TYPE 9 (PCSK9)**

(71) Applicant: **Amgen Inc.**, Thousand Oaks, CA (US)

(72) Inventors: **Simon Mark Jackson**, San Carlos, CA (US); **Nigel Pelham Clinton Walker**, Burlingame, CA (US); **Derek Evan Piper**, Santa Clara, CA (US); **Wenyan Shen**, Palo Alto, CA (US); **Chadwick Terence King**, North Vancouver (CA); **Randal Robert Ketchem**, Snohomish, WA (US); **Christopher Mehlin**, Seattle, WA (US); **Teresa Arazas Carabeo**, New York, NY (US)

(73) Assignee: **Amgen Inc.**, Thousand Oaks, CA (US)

( * ) Notice: 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.: **14/261,087**

(22) Filed: **Apr. 24, 2014**

(65) **Prior Publication Data**

US 2014/0228545 A1 Aug. 14, 2014

**Related U.S. Application Data**

(60) Continuation of application No. 13/251,909, filed on Oct. 3, 2011, which is a division of application No. 12/197,093, filed on Aug. 22, 2008, now Pat. No. 8,030,457.

(60) Provisional application No. 61/086,133, filed on Aug. 4, 2008, provisional application No. 60/957,668, filed on Aug. 23, 2007, provisional application No. 61/008,965, filed on Dec. 21, 2007, provisional application No. 61/010,630, filed on Jan. 9, 2008.

(51) **Int. Cl.**
***C07K 16/40*** (2006.01)
***C07K 16/00*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***C07K 16/40*** (2013.01)
USPC ..... **530/388.26**; 530/388.1; 530/388.15

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 5,545,807 | A | 8/1996 | Surani et al. |
| 5,766,886 | A | 6/1998 | Studnicka et al. |
| 5,869,619 | A | 2/1999 | Studnicka |
| 6,875,432 | B2 | 4/2005 | Liu et al. |
| 7,029,895 | B2 | 4/2006 | Glucksmann et al. |
| 7,261,893 | B2 | 8/2007 | Veldman et al. |
| 7,300,754 | B2 | 11/2007 | Abi Fadel et al. |
| 7,368,531 | B2 | 5/2008 | Rosen et al. |
| 7,411,051 | B2 | 8/2008 | Rosen et al. |
| 7,456,264 | B2 | 11/2008 | Keler et al. |
| 7,482,147 | B2 | 1/2009 | Glucksmann et al. |
| 7,572,618 | B2 | 8/2009 | Mintier et al. |
| 7,776,577 | B2 | 8/2010 | Kapeller-Libermann et al. |
| 7,968,689 | B2 | 6/2011 | Rosen et al. |
| 8,030,457 | B2 | 10/2011 | Jackson et al. |
| 8,062,640 | B2 | 11/2011 | Sleeman et al. |
| 8,080,243 | B2 | 12/2011 | Liang et al. |
| 8,168,762 | B2 | 5/2012 | Jackson et al. |
| 8,188,233 | B2 | 5/2012 | Condra et al. |
| 8,188,234 | B2 | 5/2012 | Condra et al. |
| 8,344,114 | B2 | 1/2013 | Sparrow et al. |
| 8,357,371 | B2 | 1/2013 | Sleeman et al. |
| 8,399,646 | B2 | 3/2013 | Liang et al. |
| 8,420,098 | B2 | 4/2013 | Camphausen et al. |
| 8,426,363 | B2 | 4/2013 | Liang et al. |
| 8,501,184 | B2 | 8/2013 | Sleeman et al. |
| 8,530,414 | B2 | 9/2013 | Davies et al. |
| 8,563,698 | B2 | 10/2013 | Jackson et al. |
| 8,598,320 | B2 | 12/2013 | Hedrick et al. |
| 8,697,070 | B2 | 4/2014 | Condra et al. |
| 8,748,583 | | 6/2014 | Jackson et al. |
| 2002/0045571 | A1 | 4/2002 | Liu et al. |
| 2002/0081679 | A1 | 6/2002 | Chiang et al. |
| 2003/0119038 | A1 | 6/2003 | Bingham et al. |
| 2004/0009553 | A1 | 1/2004 | Glucksmann et al. |
| 2004/0023243 | A1 | 2/2004 | Henry et al. |
| 2004/0038242 | A1 | 2/2004 | Edmonds et al. |
| 2004/0248177 | A1 | 12/2004 | Abi Fadel et al. |
| 2005/0101529 | A1 | 5/2005 | Yue et al. |
| 2005/0118625 | A1 | 6/2005 | Mounts |
| 2005/0147612 | A1 | 7/2005 | Yayon et al. |
| 2005/0197285 | A1 | 9/2005 | Rosen et al. |
| 2006/0116508 | A1 | 6/2006 | Glucksmann et al. |
| 2006/0147945 | A1 | 7/2006 | Edmonds et al. |
| 2006/0223088 | A1 | 10/2006 | Rosen et al. |

(Continued)

FOREIGN PATENT DOCUMENTS

| | | |
|---|---|---|
| EP | 2481758 | 8/2012 |
| EP | 2650016 | 10/2013 |

(Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 13/918,755, filed Dec. 26, 2013, Wu et al.
U.S. Appl. No. 09/499,235, filed Feb. 7, 2000, Chiang et al.
U.S. Appl. No. 09/517,906, filed Mar. 3, 2000, Chiang et al.
U.S. Appl. No. 09/692,785, filed Oct. 20, 2000, Chiang et al.
U.S. Appl. No. 09/775,009, filed Feb. 1, 2001, Chiang et al.
U.S. Appl. No. 10/287,290, filed Nov. 1, 2002, Bingham et al.
U.S. Appl. No. 10/426,776, filed Apr. 30, 2003, Glucksmann et al.
U.S. Appl. No. 11/313,836, filed Dec. 21, 2005, Glucksmann et al.

(Continued)

*Primary Examiner* — Sharon Wen
(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **ABSTRACT**

Antigen binding proteins that interact with Proprotein Convertase Subtilisin Kexin Type 9 (PCSK9) are described. Methods of treating hypercholesterolemia and other disorders by administering a pharmaceutically effective amount of an antigen binding protein to PCSK9 are described. Methods of detecting the amount of PCSK9 in a sample using an antigen binding protein to PCSK9 are described.

**24 Claims, 152 Drawing Sheets**