US009173859B2

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

(10) **Patent No.: US 9,173,859 B2**
(45) **Date of Patent: *Nov. 3, 2015**

(54) **USES OF DPP IV INHIBITORS**

(71) Applicants: **Klaus Dugi**, Dresden (DE); **Frank Himmelsbach**, Mittelbiberach (DE); **Michael Mark**, Biberach an der Riss (DE)

(72) Inventors: **Klaus Dugi**, Dresden (DE); **Frank Himmelsbach**, Mittelbiberach (DE); **Michael Mark**, Biberach an der Riss (DE)

(73) Assignee: **Boehringer Ingelheim International GmbH**, Ingelheim am Rhein (DE)

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

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/161,007**

(22) Filed: **Jan. 22, 2014**

(65) **Prior Publication Data**

US 2014/0135348 A1 May 15, 2014

Related U.S. Application Data

(63) Continuation of application No. 12/946,193, filed on Nov. 15, 2010, now Pat. No. 8,673,927, which is a continuation of application No. 11/744,703, filed on May 4, 2007, now Pat. No. 8,232,281.

(30) **Foreign Application Priority Data**

May 4, 2006 (EP) 06009203

(51) **Int. Cl.**

A61K 31/52	(2006.01)
A61K 31/155	(2006.01)
A61K 31/197	(2006.01)
A61K 31/4985	(2006.01)
A61K 31/522	(2006.01)

(52) **U.S. Cl.**

CPC ***A61K 31/155*** (2013.01); ***A61K 31/197*** (2013.01); ***A61K 31/4985*** (2013.01); ***A61K 31/522*** (2013.01); *Y10S 514/866* (2013.01)

(58) **Field of Classification Search**

CPC A61K 31/52; A61K 31/155; A61K 31/197
USPC 514/263.21, 635, 868
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,056,046	A	9/1936	Fourneau
2,375,138	A	5/1945	Salvin
2,629,736	A	2/1953	Krimmel
2,730,544	A	1/1956	Sahyun
2,750,387	A	6/1956	Krimmel
2,928,833	A	3/1960	Leake et al.
3,174,901	A	3/1965	Sterne
3,236,891	A	2/1966	Seemuller
3,454,635	A	7/1969	Muth
3,673,241	A	6/1972	Marxer
3,925,357	A	12/1975	Okada et al.
4,005,208	A	1/1977	Bender et al.
4,061,753	A	12/1977	Bodor et al.
4,382,091	A	5/1983	Benjamin et al.
4,599,338	A	7/1986	Regnier et al.
4,639,436	A	1/1987	Junge et al.
4,687,777	A	8/1987	Meguro et al.
4,743,450	A	5/1988	Harris et al.
4,816,455	A	3/1989	Schickaneder et al.
4,873,330	A	10/1989	Lindholm
4,968,672	A	11/1990	Jacobson et al.
5,041,448	A	8/1991	Janssens et al.
5,051,517	A	9/1991	Findeisen et al.
5,084,460	A	1/1992	Munson, Jr. et al.
5,130,244	A	7/1992	Nishimaki et al.
5,164,526	A	11/1992	Macher
5,219,870	A	6/1993	Kim
5,223,499	A	6/1993	Greenlee et al.
5,234,897	A	8/1993	Findeisen et al.
5,258,380	A	11/1993	Janssens et al.
5,266,555	A	11/1993	Findeisen et al.
5,273,995	A	12/1993	Roth
5,284,967	A	2/1994	Macher
5,300,298	A	4/1994	LaNoue
5,329,025	A	7/1994	Wong et al.
5,332,744	A	7/1994	Chakravarty et al.

(Continued)

FOREIGN PATENT DOCUMENTS

AU	2003280680	A1	6/2004
AU	2009224546	A1	9/2009

(Continued)

OTHER PUBLICATIONS

Kroller-Schön, S. et al., "Glucose-independent Improvement of Vascular Dysfunction in Experimental Sepsis by Dipeptidyl Peptidase-4 Inhibition." Cardiovascular Research, 2012, vol. 96, No. 1, pp. 140-149.

Lakatos, P. L. et al., "Elevated Serum Dipeptidyl IV (CD26, EC 3.4.14.5) Activity in Experimental Liver Cirrhosis." European Journal of Clinical Investigation, 2000, vol. 30, No. 9, pp. 793-797.

Lambier, A.M. et al., Dipeptidyl-Peptidase IV from Bench to Bedside: An Update on Structural Properties, Functions, and Clinical Aspects of the Enzyme DPP IV. Critical Reviews in Clinical Laboratory Sciences, 2003, 40(3), p. 209-294.

Lee Jones, K. et al., "Effect of Metformin in Pediatric Patients With Type 2 Diabetes." Diabetes Care, 2002, vol. 25, No. 1, pp. 89-94.

(Continued)

Primary Examiner — Kevin E Weddington

(74) *Attorney, Agent, or Firm* — Michael P. Morris; David L. Kershner

(57) **ABSTRACT**

The specification describes the use of selected DPP IV inhibitors for the treatment of physiological functional disorders and for reducing the risk of the occurrence of such functional disorders in at-risk patient groups. In addition, the use of the above-mentioned DPP IV inhibitors in conjunction with other active substances is described, by means of which improved treatment outcomes can be achieved. These applications may be used to prepare corresponding medicaments.

22 Claims, No Drawings