



US009351956B1

(12) **United States Patent**
Carlson

(10) **Patent No.:** **US 9,351,956 B1**
(45) **Date of Patent:** **May 31, 2016**

(54) **PHARMACEUTICAL COMPOSITION COMPRISING AN ENANTIOMER OF LIPOAMIDE AND DERIVATIVES THEREOF AND METHOD OF USE**

(71) Applicant: **David Carlson**, Fairfax, CA (US)

(72) Inventor: **David Carlson**, Fairfax, CA (US)

(73) Assignee: **GeroNova Research Inc.**, Fairfax, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 358 days.

(21) Appl. No.: **13/922,064**

(22) Filed: **Jun. 19, 2013**

Related U.S. Application Data

(60) Provisional application No. 61/662,215, filed on Jun. 20, 2012.

(51) **Int. Cl.**
A61K 31/385 (2006.01)

(52) **U.S. Cl.**
CPC **A61K 31/385** (2013.01)

(58) **Field of Classification Search**
CPC **A61K 31/385**
See application file for complete search history.

(56) **References Cited**

PUBLICATIONS

Arivazhagan et al (Experimental Gerontology 37 (2001) 81-87).*

Guo et al., "Inhibitory effect of alpha-lipoic acid and its positively charged amide analogue on nitric oxide production in RAW 264.7 macrophages", *Biochem. Pharmacol.* 61(5) pp. 547-554 (2001).

Kim et al., "Polymeric worm micelles as nano-carriers for drug delivery", *Nanotechnology* 16, pp. S484-S491 (2005).

Lorenceau et al., "Generation of polymersomes from double-emulsions", *Langmuir* 21, pp. 9183-9186 (2005).

Pautot et al., "Production of Unilamellar vesicles using an inverted emulsion", *Langmuir* 19, pp. 2870-2879 (2003).

Persson et al., "Alpha-lipoic acid and alpha-lipoamide prevent oxidant-induced lysosomal rupture and apoptosis", *Redox Rep.* pp. 327-334 (2001).

Sen et al., "A positively charged alpha-lipoic acid analogue with increased cellular uptake and more potent immunomodulatory activity", *Biochem. Biophys. Res. Commun.* 247(2), pp. 223-228 (1998).

Shen et al., "Therapeutic potential of lipoamide and enhanced mitochondrial biogenesis for treatment of insulin resistance", Chapter 5 in *Mitochondrial Signaling in Health and Disease* pp. 93-111 (2012).

Tirosh et al., "Neuroprotective effects of alpha-lipoic acid and its positively charged amide analogue", *Free Radic. Biol. Med.* 26, pp. 1418-1426 (1999).

Tirosh et al., "Redox regulation of mitochondrial permeability transition: Effects of uncoupler, lipoic acid and its positively charged analog LA-plus and selenium", *BioFactors.* vol. 17, issue 1-4, pp. 297-306 (2003).

* cited by examiner

Primary Examiner — Benjamin Packard

(57) **ABSTRACT**

This invention is directed to pharmaceutical compositions comprising substantially enantiomerically pure lipoamide and derivatives thereof and methods of use of such compositions to modulate signaling pathways for the treatment of diseases and disorders.

4 Claims, 11 Drawing Sheets

