Nivid Serch

Sample Report - Invalidity

Table of Content

Objective and Scope

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Objective and Scope: Subject Matter

The objective of the search is to find and report prior art from Patents and Non Patent literature against the **independent claim 1 of the target patent US10434097 B1.**

1. What is claimed is: 1. A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

Objective and Scope: Prior Art Considerations

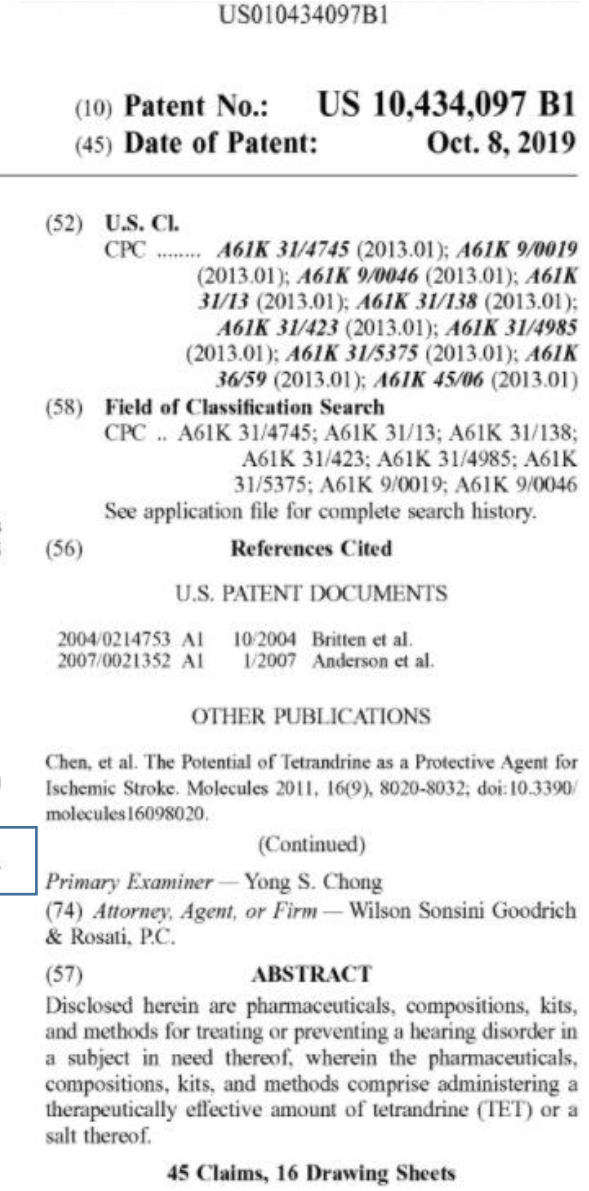
Jurisdiction: Global

Types of documents: Patents and Other literature

Date restriction: Documents published before 14th Sep, 2015 (claimed priority date);

OR

US patent documents filed before 2nd Feb, 2017



US010434097B1

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

(10) **Patent No.: US 10,434,097 B1**
(45) **Date of Patent: Oct. 8, 2019**

(54) **METHODS AND COMPOSITIONS FOR TREATING HEARING DISORDERS**

(71) Applicant: **GATEWAY BIOTECHNOLOGY, INC.**, Rootstown, OH (US)

(72) Inventors: **Jianxin Bao**, Kent, OH (US); **Xiaojie Chen**, San Francisco, CA (US)

(73) Assignee: **GATEWAY BIOTECHNOLOGY, INC.**, Rootstown, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 88 days.

(21) Appl. No.: **15/423,485**

(22) Filed: **Feb. 2, 2017**

Related U.S. Application Data

(63) Continuation of application No. 15/265,302, filed on Sep. 14, 2016, now abandoned.

(60) Provisional application No. 62/218,483, filed on Sep. 14, 2015.

(51) **Int. Cl.**

A61K 31/4745	(2006.01)
A61K 36/59	(2006.01)
A61K 45/06	(2006.01)
A61K 9/00	(2006.01)
A61K 31/13	(2006.01)
A61K 31/138	(2006.01)
A61K 31/4985	(2006.01)
A61K 31/5375	(2006.01)
A61K 31/423	(2006.01)

(52) **U.S. Cl.**
CPC ***A61K 31/4745*** (2013.01); ***A61K 9/0019*** (2013.01); ***A61K 9/0046*** (2013.01); ***A61K 31/13*** (2013.01); ***A61K 31/138*** (2013.01); ***A61K 31/423*** (2013.01); ***A61K 31/4985*** (2013.01); ***A61K 31/5375*** (2013.01); ***A61K 36/59*** (2013.01); ***A61K 45/06*** (2013.01)

(58) **Field of Classification Search**
CPC .. A61K 31/4745; A61K 31/13; A61K 31/138; A61K 31/423; A61K 31/4985; A61K 31/5375; A61K 9/0019; A61K 9/0046
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2004/0214753 A1 10/2004 Britten et al.
2007/0021352 A1 1/2007 Anderson et al.

OTHER PUBLICATIONS

Chen, et al. The Potential of Tetrandrine as a Protective Agent for Ischemic Stroke. Molecules 2011, 16(9), 8020-8032; doi:10.3390/molecules16098020.

(Continued)

Primary Examiner — Yong S. Chong
(74) *Attorney, Agent, or Firm* — Wilson Sonsini Goodrich & Rosati, P.C.

(57) **ABSTRACT**

Disclosed herein are pharmaceuticals, compositions, kits, and methods for treating or preventing a hearing disorder in a subject in need thereof, wherein the pharmaceuticals, compositions, kits, and methods comprise administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

45 Claims, 16 Drawing Sheets

Results

Results: Summary

US2004235803A1: This cited patent reference discloses methods for treating/preventing inflammatory condition in a fluid-containing organ. Said inflammatory condition is associated with an otic disorder selected from the group consisting of otitis externa, conductive and sensorineural hearing loss, trauma etc. Said method comprises administering pharmaceutical composition comprising an anti-inflammatory agent i.e. Tetrandrine to the organ via the exterior orifice. However said composition also comprises vehicle that comprises an amphipathic oil, microcrystalline wax and pharmaceutically acceptable non-aqueous carrier.

US20140357647A1:The patent reference discloses method of treating tumor i.e. ear tumor by administering A 7-substituted fangchinoline derivative; however said patent does not discloses explicitly discloses use of said drug for treating noise induced hearing disorder.

Non-Patent-1- The reference discloses Anti-inflammatory effects of fangchinoline and tetrandrine. Said reference discloses that both Fangchinoline and tetrandrine are the major alkaloids from Stephania tetrandrae S. Moore and has been used traditionally for the treatment of inflammatory diseases in oriental countries including Korea and have shown anti-inflammatory effects on mouse ear edema induced by croton oil. However said reference does not discloses explicitly discloses use of said drug for treating noise induced hearing disorder.

Results: Relevancy Table

Independent Claim 1 of US 10434097B1	US2004235803A1 (Cited result)	US2014357647A1	NPL-1
A method for treating noise induced hearing loss in a subject.	☑	☑	☑
Said method comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.	✓	✓	✓

Result Categorization	
Category X	Documents disclosing all the features of the subject matter and considered a prior art under section 102 of U.S.C 35

✓ : Mapped
✗ : No Excerpts found
☑ : Partial/inferential

Results: #1 US2004235803 A1 (Bibliographic)

Title	Publication Date	Filing Date	Priority Date	Assignee	Inventor(s)
Dispersible formulation of an anti-inflammatory agent	Nov 25, 2004	March 17, 2004	March 20, 2003	BRITTEN NANCY JEAN; BURNS JOHN W.; HALLBERG JOHN WALTER et al.	Britten, Nancy Jean ; et al.

Abstract

A method is provided for treatment of an inflammatory condition in a fluid-containing organ having a natural exterior orifice, such as the udder of a milk producing animal or an ear. The method comprises administering, to the organ via the exterior orifice, a pharmaceutical composition comprising an anti-inflammatory agent and a vehicle that comprises an amphipathic oil that is water dispersible and ethanol insoluble, microcrystalline wax and a pharmaceutically acceptable non-aqueous carrier. Also provided is such a composition comprising the anti-inflammatory agent. The composition is readily dispersible in the fluid of the fluid-containing organ.

Family members

AR043650A1; AT337793T; AU2004222523A1; BRPI0408556A; CA2519125A1; CL2004000573A1; CN1761487A; CO5611169A2; DE602004002201T2; DK1608407T3; EP1608407A2; EP1608407B1; ES2270361T3; JP2006520779A; KR100717433B1; KR20050114249A; MXPA05009978A; NO20054260L; PL1608407T3; PT1608407E; RU2005129266A; RU2325189C2; TW200503756A; TWI262084B; UY28235A1; WO2004082588A2; WO2004082588A3; ZA200506920B

Results: #1 US 2004235803 A1 (Mapping 1.1)

Independent Claim 1 of US 9623414 B2

A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

Excerpts from US 2004235803 A1

[Claims]

16. A method of treatment and/or prevention of an inflammatory condition in a fluid-containing organ having a natural exterior orifice, **the method comprising administering a pharmaceutical composition comprising an anti-inflammatory agent** to the organ via the exterior orifice, said composition farther comprising a vehicle that comprises (a) an Amphipathic oil that is water dispersible and ethanol insoluble, (b) microcrystalline wax and (c) a pharmaceutically acceptable non-aqueous carrier.

22. The method of claim **16 wherein the anti-inflammatory agent is selected from the group consisting o**f aceclofenac,……salacetamide, salicin, salicylamide, salicylamide [alpha]-acetic acid, salicylic acid, salicylsulfric acid, superoxide dismutase, suprofen, suxibuzone, talniflumate, tenidap, tenoxicam, terofenamate, **tetrandrine**, thiazolinobutazone, tiaprofenic acid, tiaramide, tilidine, tinoridine, tixocortol, tolfenamic acid, tolmetin, tramadol, triamcinolone, triamcinolone acetonide, tropesin, viminol, xenbucin, ximoprofen, zaltoprofen and zomepirac.

Results: #1 US 2004235803 A1 (Mapping 1.2)

Independent Claim 1 of US 9623414 B2

- **A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.**

Excerpts from US 2004235803 A1

[Claims]

16. A method of treatment and/or prevention of an inflammatory condition in a fluid-containing organ having a natural exterior orifice, the method comprising administering a pharmaceutical composition comprising an anti-inflammatory agent to the organ via the exterior orifice, said composition farther comprising a vehicle that comprises (a) an Amphipathic oil that is water dispersible and ethanol insoluble, (b) microcrystalline wax and (c) a pharmaceutically acceptable non-aqueous carrier.

20. The method of claim 19 wherein the inflammatory condition is associated with an otic disorder selected from the group consisting of otitis externa, otitis media, otorrhea, acute mastoiditis, infections related to otic surgical procedures….including purulent labyrinthitis and viral endolymphatic labyrinthitis, perilymph fistulas, presbycusis, drug-induced ototoxicity, acoustic neuromas, aerotitis media, infectious myringitis, bullous myringitis, otic neoplasm, squamous cell carcinoma, basal cell carcinoma, other otic cancers, pre-cancerous otic conditions, nonchromaffin paragangliomas, chemodectomas, glomus jugulare tumors, glomus tympanicum tumors, perichondritis, aural eczematoid dermatitis, malignant external otitis, subperichondrial hematoma, ceruminomas, impacted cerumen, sebaceous cysts, osteomas, keloids, tinnitus, vertigo, tympanic membrane infection, tympanitis, otic furuncles, petrositis, conductive and sensorineural hearing loss….

Results: #2 US2014357647 A1 (Bibliographic)

Title	Publication Date	Filing Date	Priority Date	Assignee	Inventor(s)
7-SUBSTITUTED HANFANGICHIN B DERIVATIVE, AND PREPARATION METHOD AND USE THEREOF	Dec 04, 2014	January 21, 2013	January 21, 2012	HANGZHOU BENSHENG PHARMACEUTICAL CO LTD [CN]	Rong; Frank ; et al.

Abstract

The present invention belongs to the field of natural medicine and pharmaceutical chemistry and specifically relates to novel 7-substituted fangchinoline derivatives of formula (I) and a pharmaceutically acceptable adduct, complex and salt thereof, to a process for the preparation of these compounds, pharmaceutical compositions containing such compounds and their use in preparing antineoplastic medicaments.

Family members

DK2805954T3; EP2805954A1; EP2805954A4; EP2805954B1; JP2015504075A; JP6298768B2; US9328122B2; WO2013107428A1

Results: #2 US 2014357647 A1(Mapping 1.1)

Independent Claim 1 of US 9623414 B2

A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

Excerpts from US 2014357647 A1

[Claims]

1. **A 7-substituted fangchinoline derivative of formula (I),** or a pharmaceutically acceptable salt thereof,

wherein

W is —OCHR 1—, —OSO 2—, or —OC(O)—…

[Description]

[0002] **Fangchinoline, or FAN (also known as Hanfangchin B), is a bisbenzylisoquinoline alkaloid extracted from the root of the Chinese herb fangji powder. Fangchinoline is naturally present in the root of fangji family plant Stephania tetrandra S.**

Results: #2 US 2014357647 A1(Mapping 1.2)

Independent Claim 1 of US 9623414 B2

A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

Excerpts from US 2014357647 A1

[Claims]

1. A 7-substituted fangchinoline derivative of formula (I), or a pharmaceutically acceptable salt thereof,

wherein

W is —OCHR 1—, —OSO 2—, or —OC(O)—…

23. **A method for treating a subject suffering from tumor**, comprising administrating to the subject in need thereof an effective amount of the 7-substituted fangchinoline derivative or a pharmaceutically acceptable salt thereof according to claim 1.

25. The method according to claim 23, wherein the tumor is selected from the group consisting of leukemia, multiple myeloma, lymphoma, liver cancer, gastric cancer, breast cancer, cholangiocellular carcinoma, pancreatic cancer, lung cancer, colorectal cancer, osteosarcoma, human cervical cancer, glioma, nasopharyngeal carcinoma, laryngeal carcinoma, esophageal cancer, **middle ear tumor,** melanoma and prostate cancer.

Comments: Said reference discloses method of treating tumor i.e. ear tumor by administering A 7-substituted fangchinoline derivative; however noise induced hearing disorder has not been explicitly disclosed.

Results: #3 Non- Patent-1(Bibliographic)

Title	Publication Date	Journal details	Affiliations	Inventor(s)
Anti-inflammatory effects of fangchinoline and tetrandrine	Feb 2000	Journal of Ethnopharmacology	College of Pharmacy, Chungbuk National University, Cheongju, Chungbuk	Hong-Serck Choi et al.

Abstract

Fangchinoline and tetrandrine are the major alkaloids from Stephania tetrandrae S. Moore which has been used traditionally for the treatment of inflammatory diseases in oriental countries including Korea. Both fangchinoline and tetrandrine showed anti-inflammatory effects on mouse ear edema induced by croton oil. In addition, the effects of fangchinoline and tetrandrine on cyclooxygenase, murine interleukin-5 (mIL-5) and human interleukin-6 (hIL-6) were examined in vitro to investigate the anti-inflammatory action mechanisms. One hundred micromolar of fangchinoline showed 35% of inhibition on cyclooxygenase, but the same concentration of tetrandrine did not show any inhibition. On the other hand, 12.5 μM of tetrandrine exhibited 95% of inhibition on mIL-5 activity, while fangchinoline did not show any effects. However, 4 μM of fangchinoline and 6 μM of tetrandrine showed 63 and 86% of inhibitions on hIL-6 activity, respectively. These results suggest that biochemical mechanisms of fangchinoline and tetrandrine on anti-inflammation are significantly different even though they are similar in chemical structure.

Results: #3 Non- Patent-1(Mapping)

Independent Claim 1 of US 9623414 B2

A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

A method for treating noise induced hearing loss in a subject in need thereof comprising administering a therapeutically effective amount of tetrandrine (TET) or a salt thereof.

Excerpts from Non-Patent-1

[Abstract]

Fangchinoline and tetrandrine are the major alkaloids from Stephania tetrandrae S. Moore which has been used traditionally for the treatment of inflammatory diseases in oriental countries including Korea.

[Abstract]

Fangchinoline and tetrandrine are the major alkaloids from *Stephania tetrandrae* S. Moore which has been used traditionally for the treatment of inflammatory diseases in oriental countries including Korea. **Both fangchinoline and tetrandrine showed anti-inflammatory effects on mouse ear edema induced by croton oil.**

Search Approach

Methodology

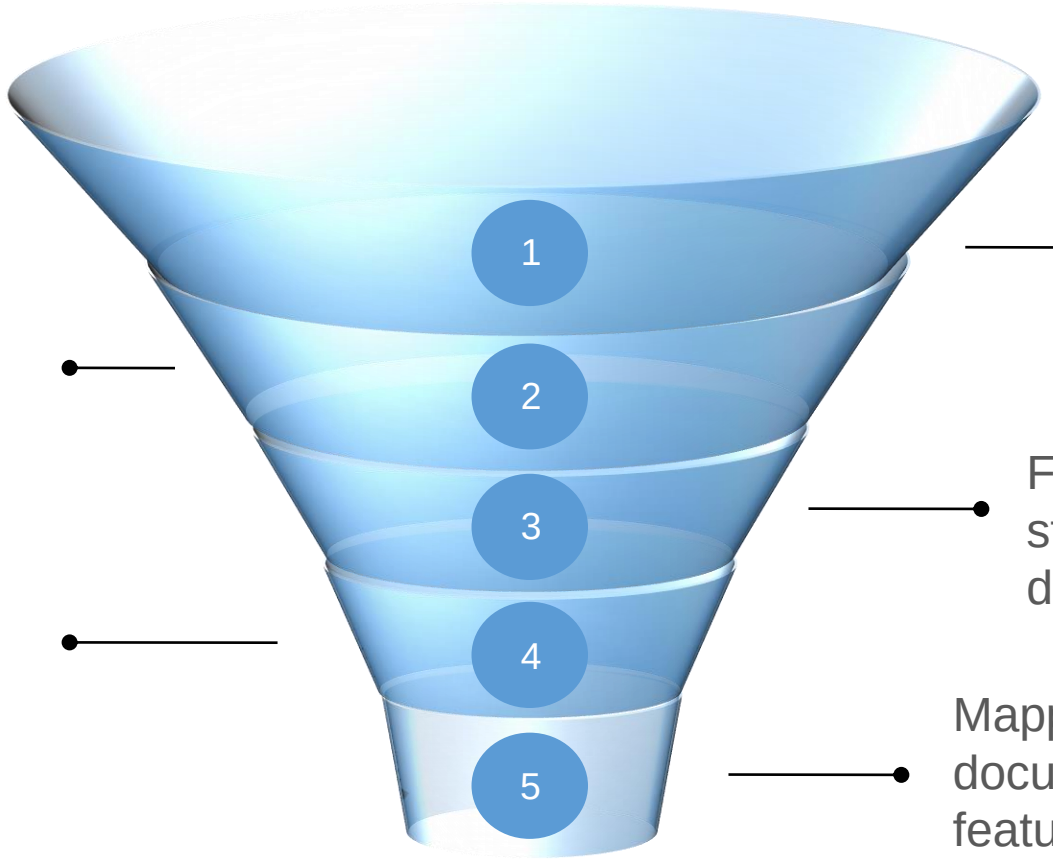
Keywords

Classifications

Strings

Search Approach: Methodology

Following search approach was implemented during the execution of the search:



1. Analyzing the subject matter of target patent.
2. Identifying relevant keywords and classifications pertaining to the subject matter.
3. Framing indicative search strategies for searching in the databases
4. Analysis of retrieved patent/non-patent documents
5. Mapping excerpts from relevant documents against the claim features of target patent.

Search Approach: Keywords

Terms	Keywords
Therapeutics Term Set	Therapy OR therapie? OR Therapeutic? OR Protect OR Treat+ OR Cure+ OR curing OR correct+ OR medicat+ OR medicament OR alleviate+ OR heal OR combat+ OR Drug+
Hearing Disorder Term Set	((Hear OR Hearing OR Otic? OR auditor+ OR (inner W ear?)) 5D (disorder+ OR defect+ OR impair+ OR loss OR deaf+) OR "NIHL" OR aminoglycoside? OR ((Noise 2D induced) OR (Acoustic? OR Voice?)) S (hear+ OR ear? OR Deaf+ OR trauma? OR defect?))
Tetrandrine Term Set	Tetrandrin? OR fanchinin? OR Sinomenin? OR hanjisong? OR Hanfangchin? OR (Tetramethoxy 6D dimethylberbaman) OR (Tetra 2D methoxy 6D dimethylberbaman) OR (bis 2D benzylisoquinoline 2D alkaloid?) OR (bis 2D benzyl 2D isoquinoline 2D alkaloid?) OR (tetramethoxy 6D dimethyl+) OR (tetra 2D methoxy 6D dimethyl+) OR (diazaheptacyclo S hexatriaconta) OR (di_azaheptacyclo S hexatriaconta) OR "C38H42N2O6" OR (Radix 2D stephania 2D tetrandrae?) OR (bis 2D benzyl 2D iso_quinoline 2D alkaloid?) OR (bisbenzyl 2D iso_quinoline 2D alkaloid?) OR (bisbenzylisoquinoline 2D alkaloid?) OR Berbaman OR Alkaloid?

Search Approach: Classifications (1.1)

IPC/CPC	Definitions
A61P-027/16	Otologicals
A61P-027/00	Drugs for disorders of the senses
Y10S-514/956	Aural or otic, i.e. ear

Search Approach: Strings

S.No	String
1	**Claims, Title, Abstract:** Hearing disorder Term Set P Tetrandrine Term Set
2	**Claims, Title, Abstract:** Hearing disorder Term Set AND Therapeutics Term Set **Full Text:** Tetrandrine Term Set
3	**Claims, Title, Abstract:** Hearing disorder Term Set AND **Full Text:** Tetrandrine Term Set
4	**Claims, Title, Abstract:** Tetrandrine Term Set AND **Full Text:** Hearing disorder Term Set
5	Full Text: Tetrandrine Term Set AND IPC/CPC: A61P-027/16+ OR Y10S-514/956+

Search Approach: Databases used

Patent databases

- Thomson innovation
- Questel orbit
- LexisNexis
- PatBase
- Free Patents Online
- USTO
- Espacenet
- InPass
- J-PlatPat
- KIPRIS
- CNIPA
- CIPO
- CAS REGISTRY/DGENE/PCTGEN/USGENE hosted by STN
- GENSEQ
- Patome
- Patentscope

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- Google Scholar
- Science Direct
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