

How to search for biotechnological inventions ?

Prior art searches in patent and non-patent literature

1) Understanding

- essential features of the claims (claim tree)
- context, technical field (titel, abstract, description, examples, figures)

2) Search tools

- keywords (synonyms, abbreviations, truncations)
- patent classes (CPC, IPC, ...)
- *biological sequences (see special search)*
- citation analysis (search report)
- applicant, inventors

3) Search strategy

- intuitive
- search concepts (operators: AND, OR, ...)

	Search concepts			
	Feature 1	Feature 2	Feature 3	Feature 4
Keywords				
IPC				
CPC				
additional				

4) Databases

- Which databases do you use in your searches ?
- patent literature
- non-patent literature (scientific-technical journals...)

Example : [WO2017160711](#) (A1)

- 1) Understanding
- 2) Search tools – keywords

Abstract:

The present disclosure relates to **compositions and methods for treating** at least one symptom of a **mental disorder** or a disease of the central nervous system in **human** patients. The present disclosure teaches treatment of the disease **by increasing** the amount of endogenous **gamma-aminobutyric acid** in the **patient's gut** via administering **bacteria capable of producing gamma-aminobutyric acid inside the human gut**.

Claims:

1. A **therapeutic composition**, comprising at least one **purified bacteria population**, which is capable of **producing gamma-aminobutyric acid (GABA)** in a subject in need thereof.

24. A **method of treating a disease** or disorder in a subject in need thereof, the method comprising **administering** to the subject a therapeutic composition comprising at least one **purified bacterial population** consisting of bacteria capable of **producing GABA in a subject** in need thereof.

25. The method of claim 24, wherein the disease or disorder is a **mental disease or disorder**.

Example : [WO2017160711](#) (A1) — 2017-09-21

- 2) Search tools – keywords
- 3) Search strategy – concept

Feature table (example)

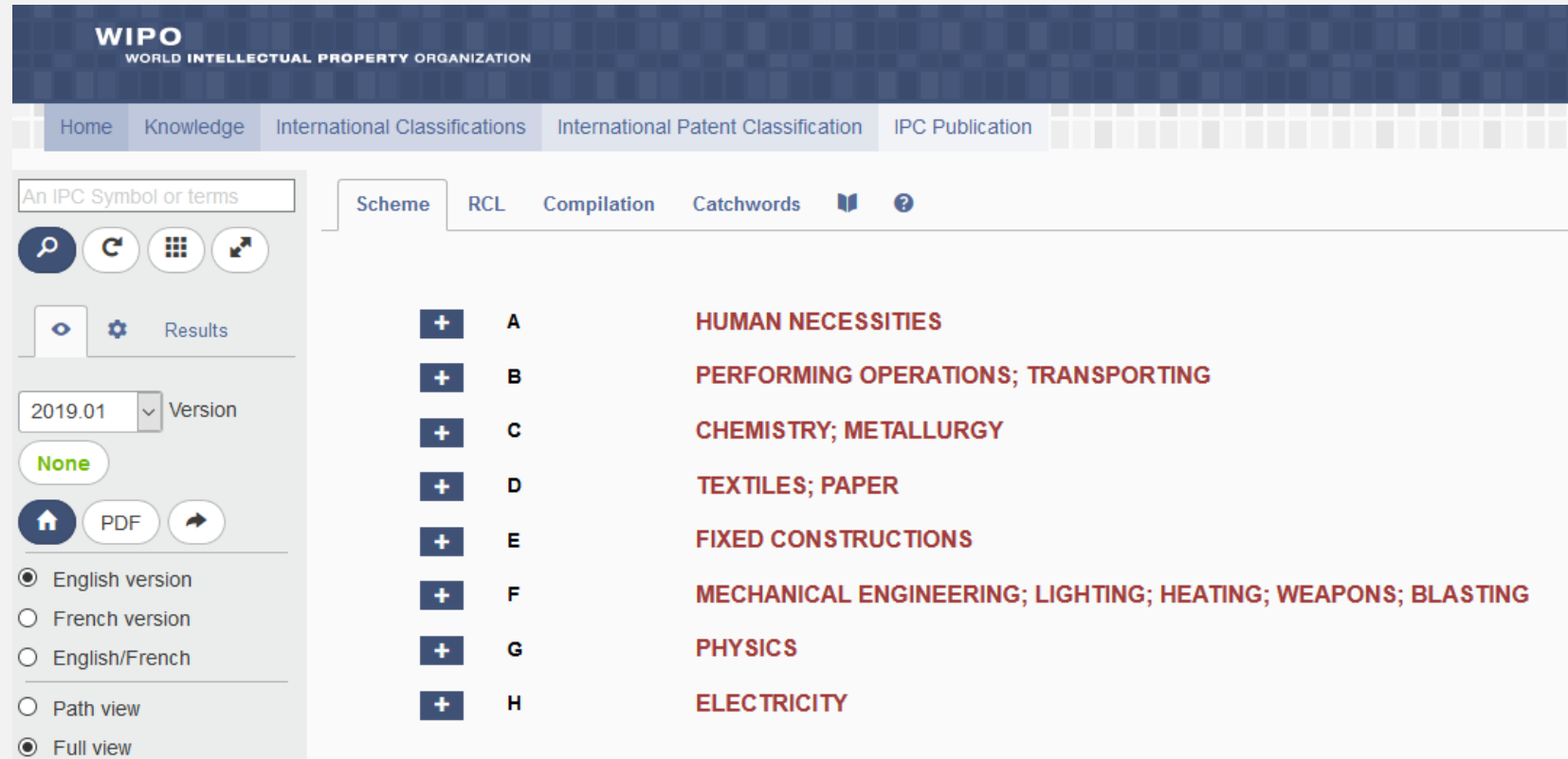
	Disease	Substance	Bacteria	Digestive tract
Keywords	CNS brain Mental Psychological	Gamma- or γ -aminobutyric acid Aminobutyrate GABA	bacteria microorganism microflora Microbiom	gut intestine digestive tract
IPC/CPC				
Additional				

2) Search tools – classes

Search for classes

Key classification systems

- **International Patent Classification (IPC)**
global coverage, WIPO



WIPO
WORLD INTELLECTUAL PROPERTY ORGANIZATION

Home Knowledge International Classifications International Patent Classification IPC Publication

An IPC Symbol or terms

Scheme RCL Compilation Catchwords ?

Results

2019.01 Version

None

PDF

English version
 French version
 English/French
 Path view
 Full view

+	A	HUMAN NECESSITIES
+	B	PERFORMING OPERATIONS; TRANSPORTING
+	C	CHEMISTRY; METALLURGY
+	D	TEXTILES; PAPER
+	E	FIXED CONSTRUCTIONS
+	F	MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING
+	G	PHYSICS
+	H	ELECTRICITY

<http://www.wipo.int/classifications/ipc/en/>

2) Search tools – classes

Search for classes

Key classification systems

- **International Patent Classification (IPC)**
global coverage, WIPO
- **Cooperative Patent Classification (CPC)**
developed by EPO, USPTO

Cooperative Patent Classification

Search for View section **Index** | A | B | C | D | E | F | G | H | Y



Symbol	Classification and description		
<input type="checkbox"/> A	HUMAN NECESSITIES	<input type="button" value="s"/>	
<input type="checkbox"/> B	PERFORMING OPERATIONS; TRANSPORTING	<input type="button" value="s"/>	<input type="button" value="i"/>
<input type="checkbox"/> C	CHEMISTRY; METALLURGY	<input type="button" value="s"/>	<input type="button" value="i"/>
<input type="checkbox"/> D	TEXTILES; PAPER	<input type="button" value="s"/>	
<input type="checkbox"/> E	FIXED CONSTRUCTIONS	<input type="button" value="s"/>	
<input type="checkbox"/> F	MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING	<input type="button" value="s"/>	<input type="button" value="i"/>
<input type="checkbox"/> G	PHYSICS	<input type="button" value="s"/>	<input type="button" value="i"/>
<input type="checkbox"/> H	ELECTRICITY	<input type="button" value="s"/>	<input type="button" value="i"/>
<input type="checkbox"/> Y	GENERAL TAGGING OF NEW TECHNOLOGICAL DEVELOPMENTS; GENERAL TAGGING OF CROSS-SECTIONAL TECHNOLOGIES SPANNING OVER SEVERAL SECTIONS OF THE IPC; TECHNICAL SUBJECTS COVERED BY FORMER USPC CROSS-REFERENCE ART COLLECTIONS [XRACs] AND DIGESTS	<input type="button" value="s"/>	<input type="button" value="i"/>

https://worldwide.espacenet.com/classification?locale=en_EP

2) Search tools – classes

Search for classes


Key classification systems

- **International Patent Classification (IPC)**
global coverage, WIPO
- **Cooperative Patent Classification (CPC)**
developed by EPO, USPTO

Classes of reference document (first page on patent document (51))

chose suitable classes

MODULATION OF THE GUT MICROBIOME TO TREAT MENTAL DISORDERS OR DISEASES OF THE CENTRAL NERVOUS SYSTEM

Page bookmark	WO2017160711 (A1) - MODULATION OF THE GUT MICROBIOME TO TREAT MENTAL DISORDERS OR DISEASES OF THE CENTRAL NERVOUS SYSTEM
Inventor(s):	STRANDWITZ PHILIP [US]; LEWIS KIM [US] ±
Applicant(s):	HOLOBIOME INC [US] ±
Classification:	- international: A61K35/74 ; A61K35/742 ; A61K35/745 ; A61P25/00 ; A61P25/18 ; A61P25/22 ; A61P25/24 ; A61P43/00 - cooperative: A61K35/74 ; A61K35/742 ; A61K35/745 ; Y02A50/473
Application number:	WO2017US22091 20170313  Global Dossier
Priority number(s):	US201662307991P 20160314
Also published as:	AU2017234120 (A1) → CA3016911 (A1)

Example : [WO2017160711](#) (A1) — 2017-09-21

3) Search strategy – concept

Feature table (example)

	Disease	Substance	Bacteria	Digestive tract
Keywords	CNS brain Mental Psychological	Gamma- or γ -aminobutyric acid Aminobutyrate GABA	Bacteria microorganism microflora Microbiom	Gut Intestine digestive tract
IPC/CPC	A61P25/00	C12P13/005	A61K35/74 A61K35/745 A61K2035/11	?
...				

Combine keywords with classes:

- same features «OR» combination
- different features «AND» combination

Example : [WO2017160711](#) (A1) — 2017-09-21

3) Search strategy – concept
– intuitive

Feature table (example)

	Disease	Substance	Bacteria	Digestive tract
Keywords	CNS brain Mental Psychological	Gamma- or γ -aminobutyric acid Aminobutyrate GABA	Bacteria microorganism microflora Microbiom	Gut Intestine digestive tract
IPC/CPC	A61P25/00	C12P13/005	A61K35/74 A61K35/745 A61K2035/11	?
Additional	<ul style="list-style-type: none"> • Is a structure / sequence search necessary ? • Is there a search report ? • Search for cited and citing document, by Authors, Inventors, ... • Controlled terms (STN), Manuel codes (Derwent, Clarivate) ... 			

For prior art searches don't forget to use the right cut-off date

Where to perform the search ?

4) Databases – open access



Europäisches
Patentamt
European
Patent Office
Office européen
des brevets

Espacenet
Patent search

www.espacenet.com

<https://worldwide.espacenet.com/beta>



LENS.ORG
Solving The Problem Of Problem Solving™

Free, Open and Private Innovation Cartography

www.lens.org

www.ncbi.nlm.nih.gov/pubmed/



<https://patentscope.wipo.int/>



<https://patents.google.com/advanced>

<https://scholar.google.com/>



www.freepatentsonline.com

> 100 mio documents, > 100 patent offices, CPC
(not tested so far – anyone ?)

> 115 mio documents, scholarly data, *biosequence*
cross-link to PubMed (NPL, biosequences)

> 74 mio documents, PCT full-text, IPC

> 120 mio documents, >100 patent offices, cross-link
to google scholar (NPL)

(> 90 mio US, EP, DE, JP, PCT)

Patent search using Lens :

<https://www.lens.org/lens/new-search?type=PATENT&view=boolean>

	Disease	Substance	Bacteria	Digestive tract
Keywords	CNS brain Mental Psychological	Gamma- or γ -aminobutyric acid Aminobutyrate GABA	Bacteria microorganism microflora Microbiom	Gut Intestine digestive tract
IPC/CPC	A61P25/00	C12P13/005	A61K35/74 A61K35/745 A61K2035/11	?

Search concept with classes only

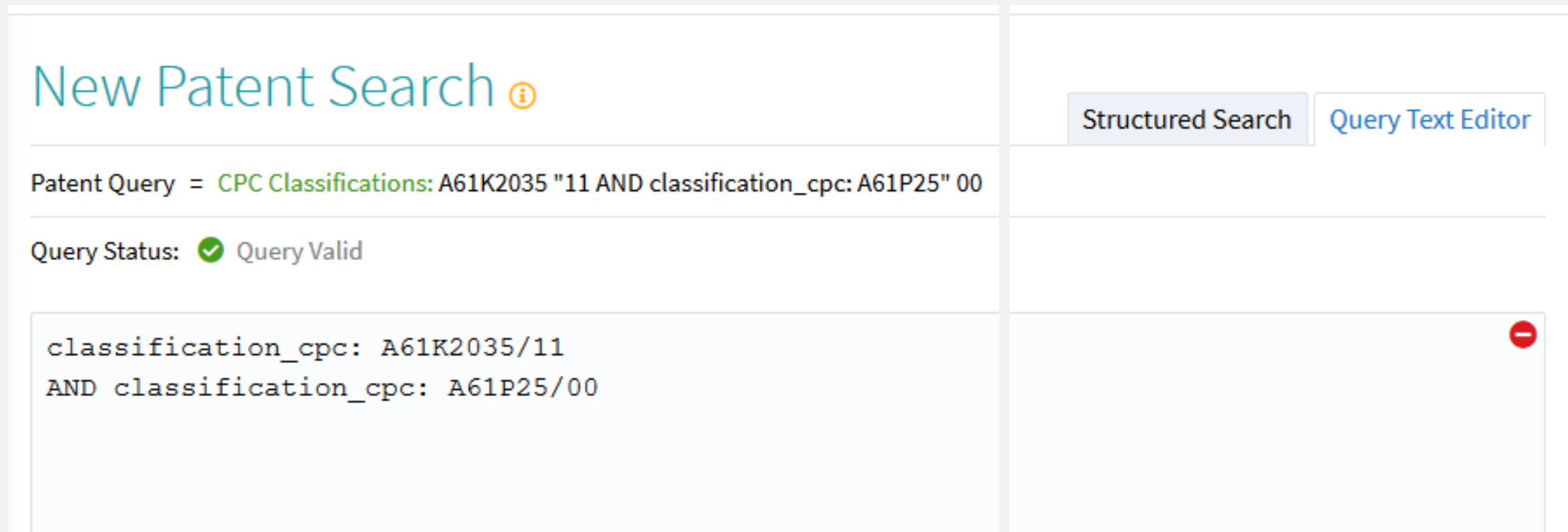
A61K2035/11 (CPC) Medicinal preparations comprising living prokaryotic cells

AND

A61P25/00 (CPC) Drugs for disorders of the nervous system

Patent search using Lens with patent classes:


<https://www.lens.org/lens/new-search?type=PATENT&view=boolean>



The screenshot shows the 'New Patent Search' interface on the LENS.ORG website. The page title is 'New Patent Search' with an information icon. There are two tabs: 'Structured Search' (selected) and 'Query Text Editor'. The 'Patent Query' field contains the text: 'CPC Classifications: A61K2035 "11 AND classification_cpc: A61P25" 00'. Below this, the 'Query Status' is 'Query Valid' with a green checkmark icon. A text area at the bottom shows the query in a code-like format: 'classification_cpc: A61K2035/11 AND classification_cpc: A61P25/00'. A red minus sign icon is visible in the bottom right corner of the text area.



Patent Results





Patents (1) = **CPC Classifications:** A61K2035 ("11 AND classification_cpc: A61P25" 00) 

Patent Filters: Group by Simple Families = (On )

Patents

Cited Works

  Expand All  Save Query  Share Results  Export Results  Cited by Works  Group Families  Hide Preview Analysis  Sort by Relev

- Nutritional Compositions Containing Butyrate And Uses Thereof
 - Published: Jun 14, 2018 Filed: Dec 12, 2016 **Earliest Priority: Dec 12 2016** Family: 3 Cited Works: 0 Cited by: 0 Cites: 0 Sequences: 64
- # Additional Info:  Full text  Sequence
- Owner: Mead Johnson Nutrition Company Applicant: Mead Johnson Nutrition Co
- Patent Application  US 2018/0161292 A1  096-077-042-399-266

Free search engines for scientific literature

<https://www.ncbi.nlm.nih.gov/pubmed>



<https://www.lens.org/lens/new-search?type=SCHOLAR>



<https://scholar.google.ch/>



<https://oatd.org/>



<https://www.deepl.com/translator>



4) Databases – open access

(scientific literature, first submissions of biosequences)

(scholarly works cross-linked to patents)

(scientific literature)

(theses and dissertations in various languages)

(language translator)

Article types

- Clinical Trial
- Review
- Customize ...

Text availability

- Abstract
- Free full text
- Full text

Publication dates

- 5 years
- 10 years
- Custom range...

Species

- Humans
- Other Animals

[Clear all](#)

[Show additional filters](#)

Format: Summary ▾ **Sort by:** Best Match ▾ **Per page:** 20 ▾

Send to ▾

Search results

Items: 1 to 20 of 11771

<< First < Prev Page **1** of 589 [Next >](#) [Last >>](#)

- [The Gut Microbiome and Mental Health: Implications for Anxiety- and Trauma-Related Disorders.](#)
1. Malan-Muller S, Valles-Colomer M, Raes J, Lowry CA, Seedat S, Hemmings SMJ. OMICS. 2018 Feb;22(2):90-107. doi: 10.1089/omi.2017.0077. Epub 2017 Aug 2. Review. PMID: 28767318 [Similar articles](#)
- [Brain-Gut-Microbiota Axis and Mental Health.](#)
2. Dinan TG, Cryan JF. Psychosom Med. 2017 Oct;79(8):920-926. doi: 10.1097/PSY.0000000000000519. Review. PMID: 28806201 [Similar articles](#)
- [Can gut microbes play a role in mental disorders and their treatment?](#)
3. Latalova K, Hajda M, Prasko J. Psychiatr Danub. 2017 Mar;29(1):28-30. PMID: 28291971 **Free Article** [Similar articles](#)

Custom date range

1970 01 01 to 2016 12 31

Apply

...Too many results → add a feature (e.g. GABA)

Article types
 Clinical Trial
 Review
 Customize ...

Text availability
 Abstract
 Free full text
 Full text

Publication dates
 5 years
 10 years
 From 1970/01/01 to 2016/12/31

Species
 Humans
 Other Animals

[Clear all](#)

Format: Summary ▾ Sort by: Best Match ▾ Per page: 20 ▾ Send to ▾

Search results
 Items: 1 to 20 of 10452

<< First < Prev Page 1 of 523 Next > Last >>

i Filters activated: Publication date from 1970/01/01 to 2016/12/31. [Clear all](#) to show 11809 items.

[Gut instincts: microbiota as a key regulator of brain development, ageing and neurodegeneration.](#)

1. Dinan TG, Cryan JF.
 J Physiol. 2017 Jan 15;595(2):489-503. doi: 10.1113/JP273106. Epub 2016 Dec 4. Review.
 PMID: 27641441 **Free PMC Article**
[Similar articles](#)

[The Importance of Diet and Gut Health to the Treatment and Prevention of Mental Disorders.](#)

2. Dawson SL, Dash SR, Jacka FN.
 Int Rev Neurobiol. 2016;131:325-346. doi: 10.1016/bs.im.2016.08.009. Epub 2016 Sep 28. Review.
 PMID: 27793225
[Similar articles](#)



PubMed

[Create RSS](#) [Create alert](#) [Advanced](#)

Format: Abstract Send to ▾

Filters activated: Publication date from 1970/01/01 to 2016/12/31. [Clear all](#) to show 9 items.

[Neurogastroenterol Motil.](#) 2014 Aug;26(8):1155-62. doi: 10.1111/nmo.12378. Epub 2014 Jun 1.

Correlation between the human fecal microbiota and depression.

[Naseribafrouei A¹](#), [Hestad K](#), [Avershina E](#), [Sekelja M](#), [Linløkken A](#), [Wilson R](#), [Rudi K](#).

Author information

Abstract

BACKGROUND: Depression is a chronic syndrome with a pathogenesis linked to various genetic, biological, and environmental factors. Several links between gut microbiota and depression have been established in animal models. In humans, however, few correlations have yet been demonstrated. The aim of our work was therefore to identify potential correlations between human fecal microbiota (as a proxy for gut microbiota) and depression.

METHODS: We analyzed fecal samples from 55 people, 37 patients, and 18 non-depressed controls. Our analyses were based on data generated by Illumina deep sequencing of 16S rRNA gene amplicons.

KEY RESULTS: We found several correlations between depression and fecal microbiota. The correlations, however, showed opposite directions even for closely related Operational Taxonomic Units (OTU's), but were still associated with certain higher order phylogroups. The order Bacteroidales showed an overrepresentation ($p = 0.05$), while the family Lachnospiraceae showed an underrepresentation ($p = 0.02$) of OTU's associated with depression. At low taxonomic levels, there was one clade consisting of five OTU's within the genus *Oscillibacter*, and one clade within *Alistipes* (consisting of four OTU's) that showed a significant association with depression ($p = 0.03$ and 0.01 , respectively).

CONCLUSIONS & INFERENCES: The *Oscillibacter* type strain has valeric acid as its main metabolic end product, a homolog of neurotransmitter GABA, while *Alistipes* has previously been shown to be associated with induced stress in mice. In conclusion, the taxonomic correlations detected here may therefore correspond to mechanistic models.

Full text links
 Full Text Online
 Wiley Online Library

New Scholar Search

Structured Search

Query Text Editor

Scholar Query = mental (disorder (microbiota GABA))

Search

Field

Predicate: AND OR

All Fields

mental disorder microbiota GABA



Publication Date

Date Range Year Published

1950



2016



ORCID Lookup

Enter Name or ORCID ID



Identifier Type

- | | |
|---|-----------------------------------|
| <input type="checkbox"/> Microsoft Academic | <input type="checkbox"/> Crossref |
| <input type="checkbox"/> PubMed | <input type="checkbox"/> Core |
| <input type="checkbox"/> PubMed Central | |

Flags

- | | |
|---|--|
| <input type="checkbox"/> Open Access | <input type="checkbox"/> Cited by Patent |
| <input type="checkbox"/> Cited by Scholarly Works | <input type="checkbox"/> Abstract |
| <input type="checkbox"/> Indexed Full Text | <input type="checkbox"/> Substance |
| <input type="checkbox"/> Funding | <input type="checkbox"/> Clinical Trials |
| <input type="checkbox"/> Affiliation | <input type="checkbox"/> Field of Study |
| <input type="checkbox"/> Keywords | <input type="checkbox"/> MeSH Term |

Publication Type

- | | |
|---|--|
| <input type="checkbox"/> Journal Article | <input type="checkbox"/> Book Chapter |
| <input type="checkbox"/> Conference Proceedings | <input type="checkbox"/> Book |
| <input type="checkbox"/> Conference Proceedings Article | <input type="checkbox"/> Libguide |
| <input type="checkbox"/> Report | <input type="checkbox"/> Dataset |
| <input type="checkbox"/> Journal Issue | <input type="checkbox"/> Reference Entry |



IGE | IPI

Filters ⓘ

Date Range

Articles

Year Published Date Range

1950 2016

Clear Refine

- Flags
- Institution
- Institution Country/Region ⓘ
- Author
- Identifier Type
- Funding
- Journal
- Conference Name
- Publication Type
- Subject ⓘ
- MeSH Heading ⓘ
- Field of Study ⓘ
- Chemical Substance Name ⓘ

Search Strategies and Databases

Scholar Results

LENS.ORG
Solving The Problem Of Problem Solving™

Free, Open and Private Innovation Cartography

Scholarly Works (109) = (GABA (mental (disorder microbiota)))

Scholar Filters: Year published = (1950 - 2016)

Works in Set	Works Cited by Patents	Citing Patents	Patent Citations
109	14	32	39

Scholarly Works Citing Patents

Expand All Save Query Share Results Export Results Cited by Patents Hide Analysis Preview Sort by Relevance

- Fermented foods, **microbiota**, and **mental** health: ancient practice meets nutritional psychiatry
 Eva Michelle Selhub , Alan C Logan , Alison C Bested
 Journal of Physiological Anthropology, Issue: 1, Volume: 33, Pages: 2-2. | Jan 15, 2014
 Additional Info: [Open Access](#) [Full Text](#) [Affiliation](#) [Field of Study](#)
 0 Patent Citations 73 Scholarly Citations Reference Count: 172
 Full Text match: /content/33/1/2REVIEW Open Access Fermented foods, **microbiota**, and **mental** health: ancient practice meets ... of investi- gation related to fermented foods, intestinal **microbiota**, and **mental** outlook. We argue ... of depression and other **mental** health **disorders** [9-11]. Among the variables that might afford protective
 Journal Article [073-453-151-310-365](#) [3904694](#) [81915121](#) [24422720](#) [10.1186/1880-6805-33-2](#) [2101799146](#) [Find full-text at your institution](#)
- Mood by microbe: towards clinical translation.
 Timothy G Dinan , John F Cryan
 Genome Medicine, Issue: 1, Volume: 8, Pages: 36-36. | Apr 6, 2016
 Additional Info: [Open Access](#) [Full Text](#) [Funding](#) [Affiliation](#) [Field of Study](#)
 0 Patent Citations 26 Scholarly Citations Reference Count: 11

Futher information on biological molecules, organisms...

4) Databases – open access

<http://www.uniprot.org>

(proteins, genes, organisms, sequences)



<https://www.genenames.org/cgi-bin/search>

(human nucleic acid, genes, proteins, sequences)



<https://www.ebi.ac.uk/>

(genes, proteins, chemicals, sequences)



<http://www.imgt.org/mAb-DB/>

(monoclonal antibody database, sequences)



Individual training

Excercise max. 20min

**Prior art search for the following claim set
priority: 2010-05-15**

Claims:

1. A process for the preparation of the a healing agent for use in cement-based materials and structures, characterized in that a porous particle, such as expanded clay or sintered fly ash, is loaded with bacterial spores and an organic chemical biomineral precursor compound, preferably selected from calcium formiate, calcium acetate and other carboxylic acid calcium salt, by contacting in a first case said porous particles with the bacterial spore-containing suspension and in a second case with a solution of said precursor compound, followed by drying said suspension and solution-entrained particles at room temperature and storing the same at room temperature until further use.
2. The process according to claim 1, characterized in that expanded clay particles are loaded with *Bacillus pseudofirmus*.
3. The process according to claim 1, characterized in that expanded clay particles are loaded with *Sporosarcina pasteurii* spores.

Individual training

Excercise max. 20min

Prior art search for the following claim set
priority: 2010-05-15

Tasks:

- Define search concepts
- List keywords and classifications for each search concept
- Plan and apply search strategy for your search engine of choice
- Review search results for novelty destroying documents within the priority date limitation
 - Basic: documents disclosing the features of claim 1 (X-document) in patent and non-patent literature
 - Advanced: documents disclosing also the additional features according to claims 2 or 3.
- *If claim 1 is novel, find documents to combine missing features for inventiveness (Y-documents)*
- *Discuss results with your neighbour*

Freely available patent search engines

https://worldwide.espacenet.com/advancedSearch?locale=en_EP

<https://patentscope.wipo.int/search/de/search.jsf>

<http://appft.uspto.gov/netahtml/PTO/search-bool.html>

https://www.google.com/advanced_patent_search

<http://www.freepatentsonline.com/search.html>

<https://www.lens.org/lens/>

Commercially available patent search engine

<https://www.patbase.com/login.asp>

<https://www.questel.com/>

Patent classification searches

https://worldwide.espacenet.com/classification?locale=en_EP

<http://www.wipo.int/classifications/ipc/en/>

Free scientific search engines

<https://oatd.org/>

<https://www.ncbi.nlm.nih.gov/pubmed>

<https://scholar.google.ch/>

<http://www.uniprot.org/>

<https://www.genenames.org/cgi-bin/search>

<https://www.ebi.ac.uk/>

<https://www.wikigenes.org/>

<http://www.imgt.org/mAb-DB/>

<https://www.deepl.com/translator>

4) Databases

(theses and dissertations)

(scientific literature, sequences)

(scientific literature)

(proteins, genes, sequences)

(proteins, genes, sequences)

(proteins, genes, sequences)

(proteins, genes)

(monoclonal Antibody Db)

(language translator)