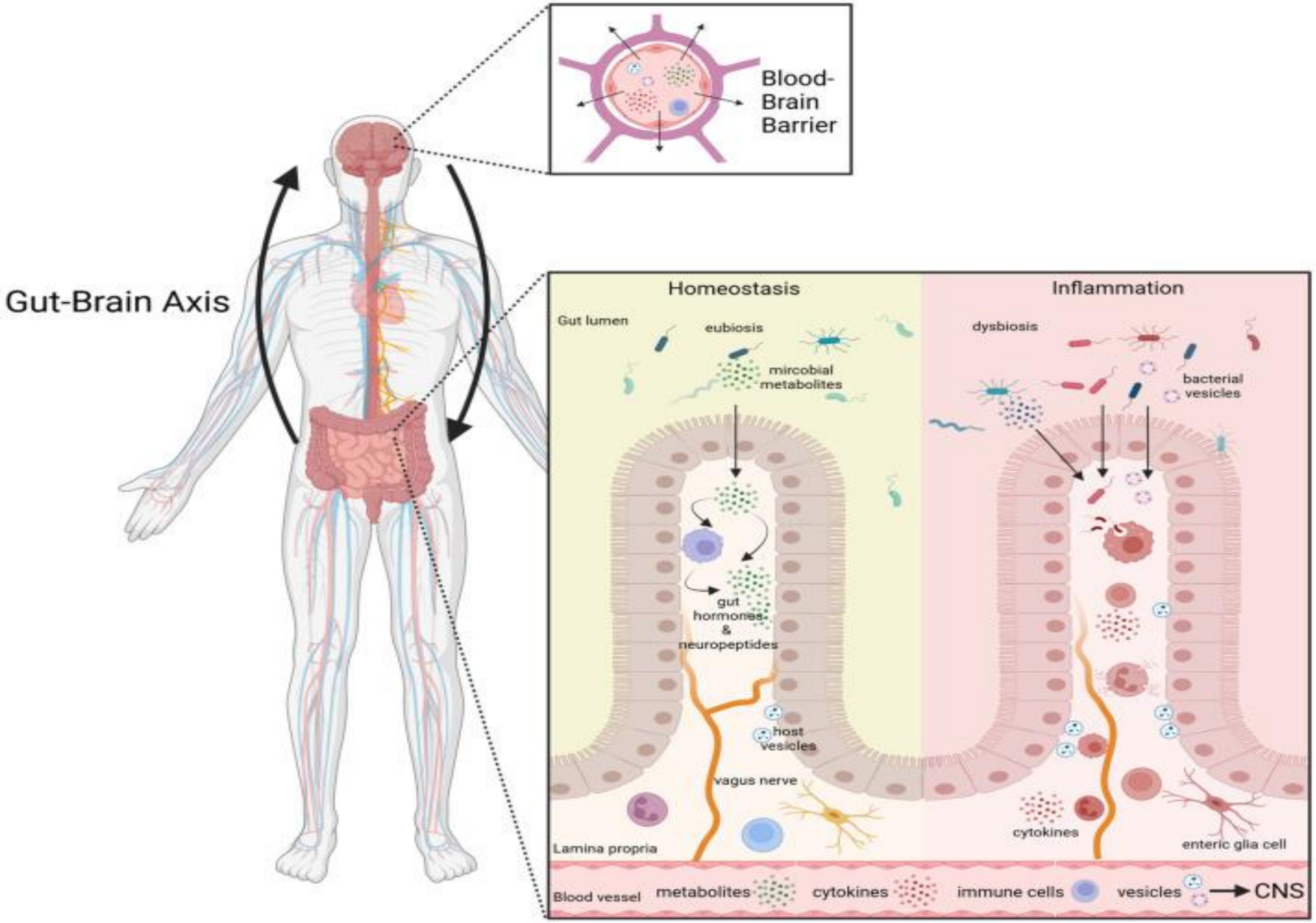
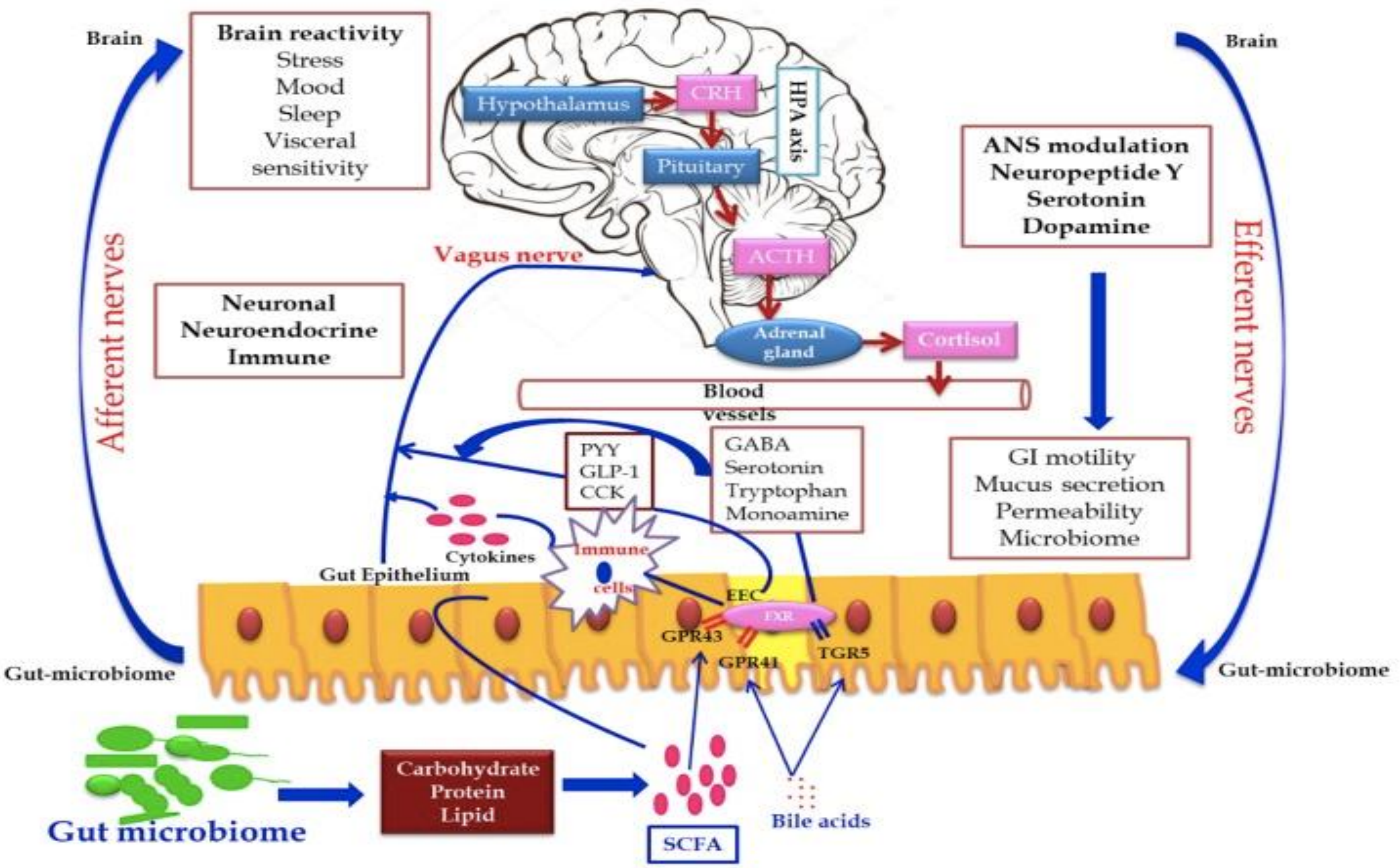
Beyin – Bağırsak Aksı ve Nörolojik Hastalıklarla İlişkisi

Doç. Dr. Recep ALP
Nöroloji Uzmanı,
Uyku Hekimi
Tekirdağ

Beyin-bağırsak aksı



BEYİN – BAĞIRSAK AKSI



Sivamaruthi, B. S., Suganthy, N., Kesika, P., & Chaiyasut, C. (2020). The Role of Microbiome, Dietary Supplements, and Probiotics in Autism Spectrum Disorder. *International journal of environmental research and public health*, *17*(8), 2647. https://doi.org/10.3390/ijerph17082647

Mikrobioyom

GİZLİ METABOLİK ORGANIMIZ*

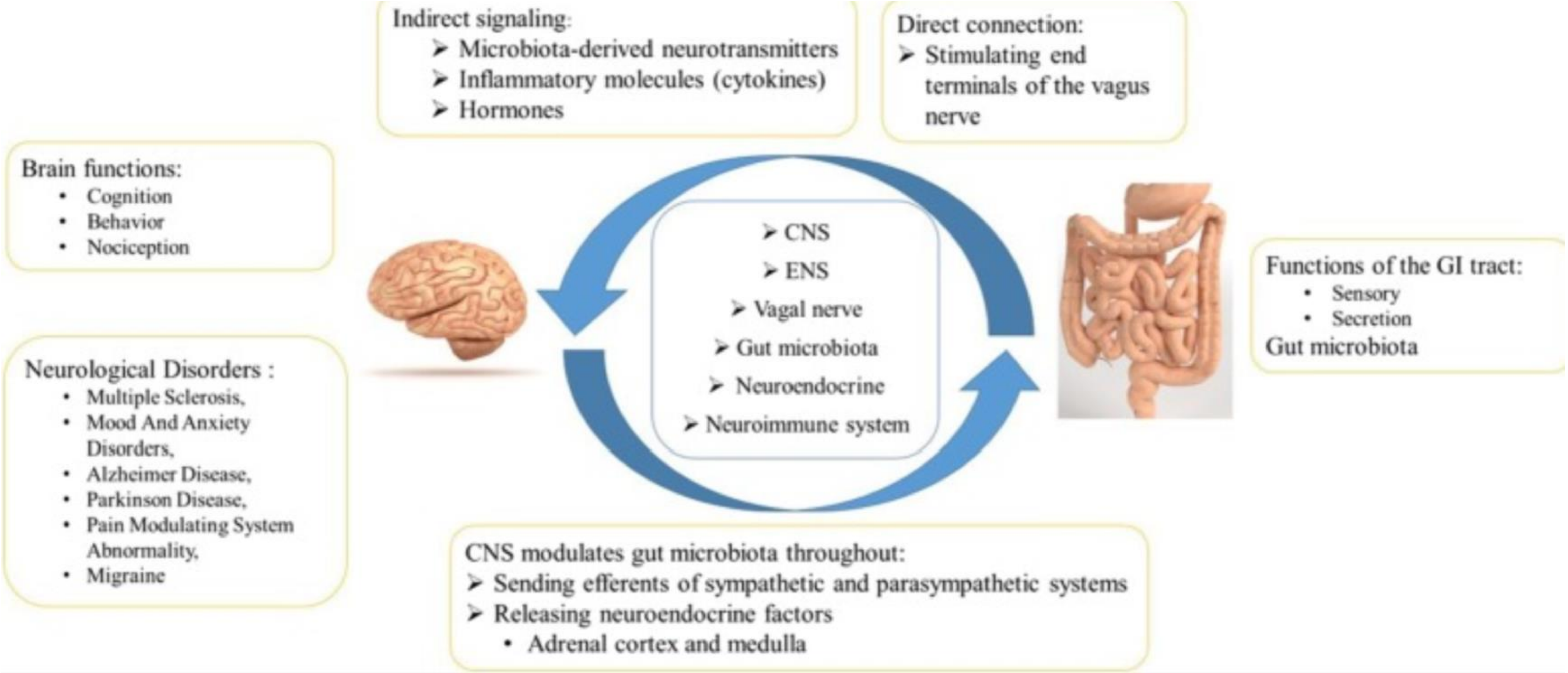
- Firmicutes, Bacteroidetes, Actinobacteria, Proteobacteria, Fusobacteria, Verrucomicrobia ve Cyanobacteria, insan gastrointestinal sistemindeki yedi baskın bakteri şubesidir;

- Bunların arasında Bacteroidetes ve Firmicutes %90'dan fazlasını oluşturur,

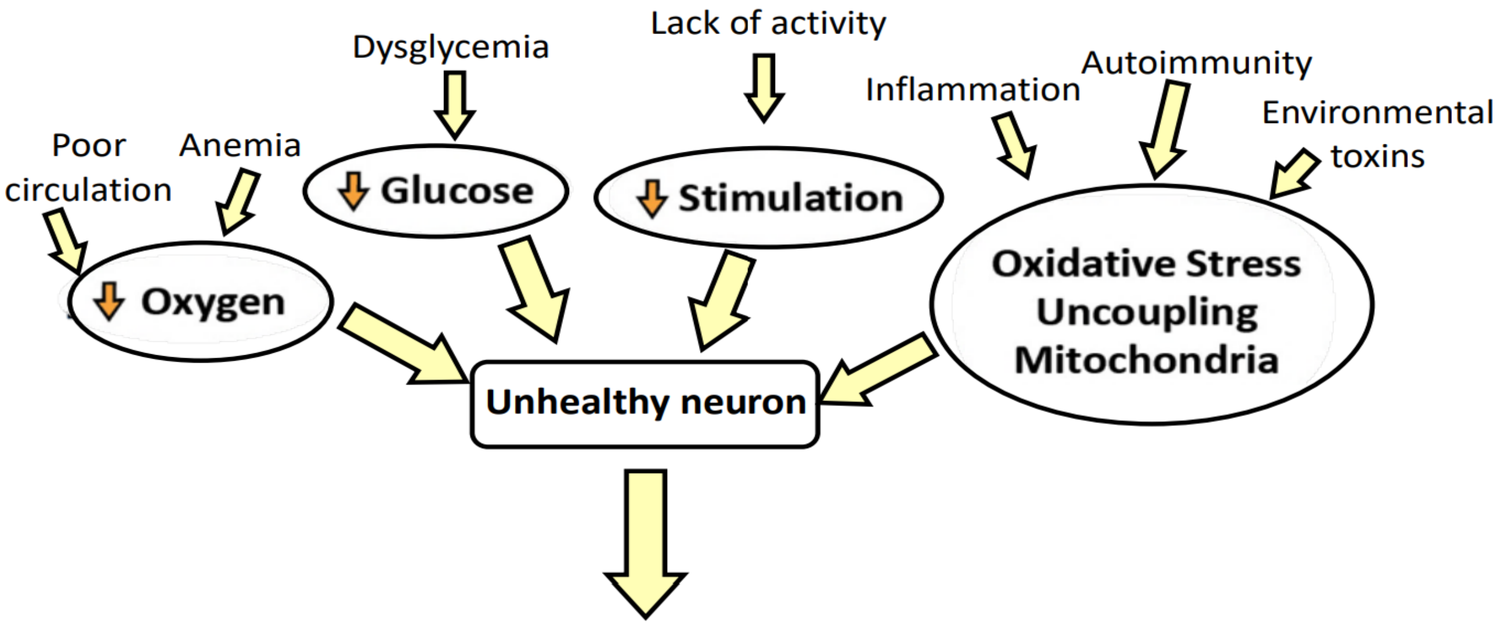
- Virüsler,
- Mantarlar,

- Parazitler

*Kinashi, Y., & Hase, K. (2021). Partners in Leaky Gut Syndrome: Intestinal Dysbiosis and Autoimmunity. *Frontiers in immunology*, *12*, 673708. https://doi.org/10.3389/fimmu.2021.673708

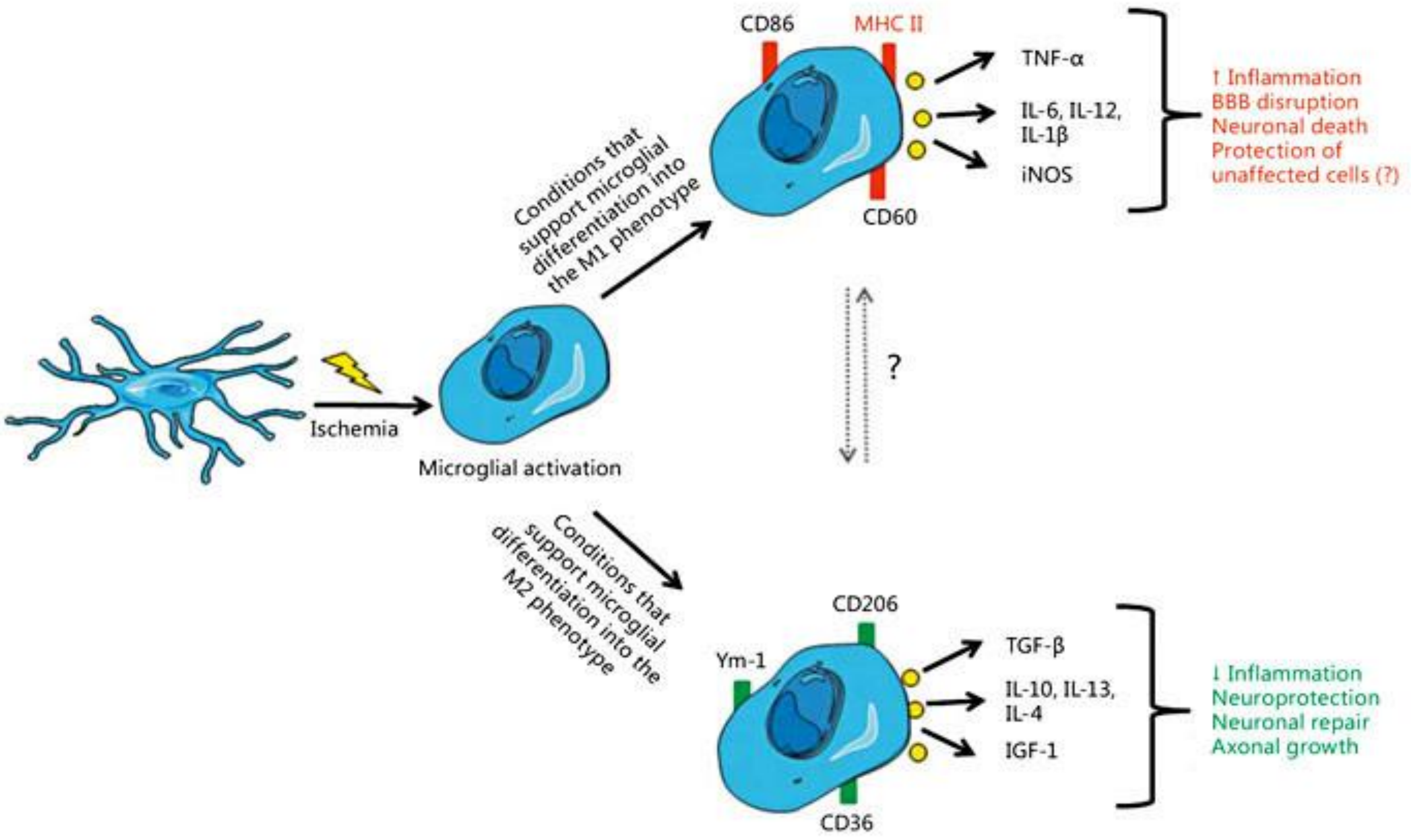

Indirect signaling:
Microbiota-derived neurotransmitters
Inflammatory molecules (cytokines)
Hormones
Direct connection:
Stimulating end terminals of the vagus nerve
Brain functions:
Cognition
Behavior
Nociception
CNS
ENS
Vagal nerve
Gut microbiota
Neuroendocrine
Neuroimmune system
Functions of the GI tract:
Sensory
Secretion
Gut microbiota
Neurological Disorders :
Multiple Sclerosis,
Mood And Anxiety Disorders,
Alzheimer Disease,
Parkinson Disease,
Pain Modulating System Abnormality,
Migraine
CNS modulates gut microbiota throughout:
Sending efferents of sympathetic and parasympathetic systems
Releasing neuroendocrine factors
Adrenal cortex and medulla

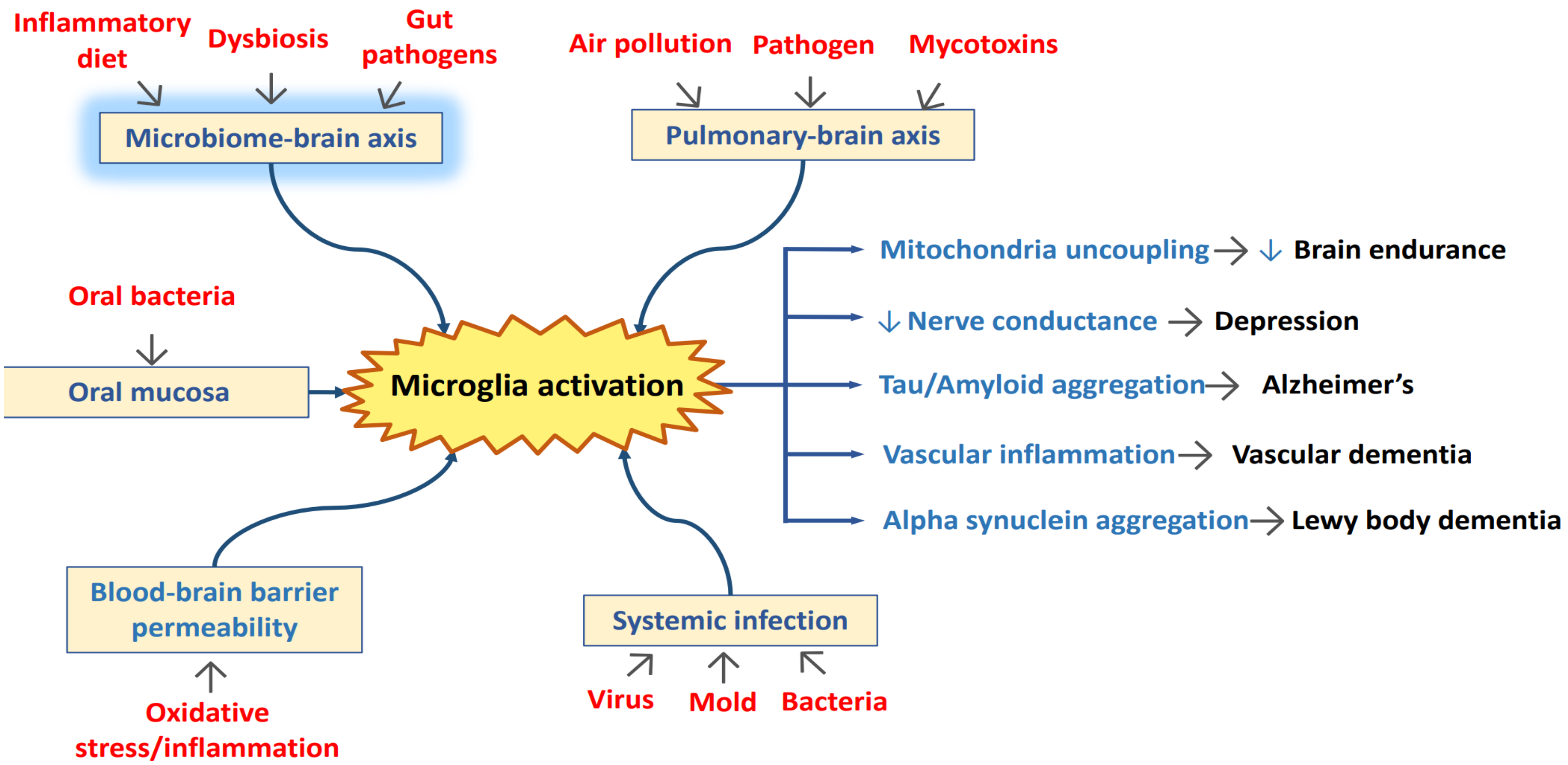
Nöron hasarı ve nedenleri

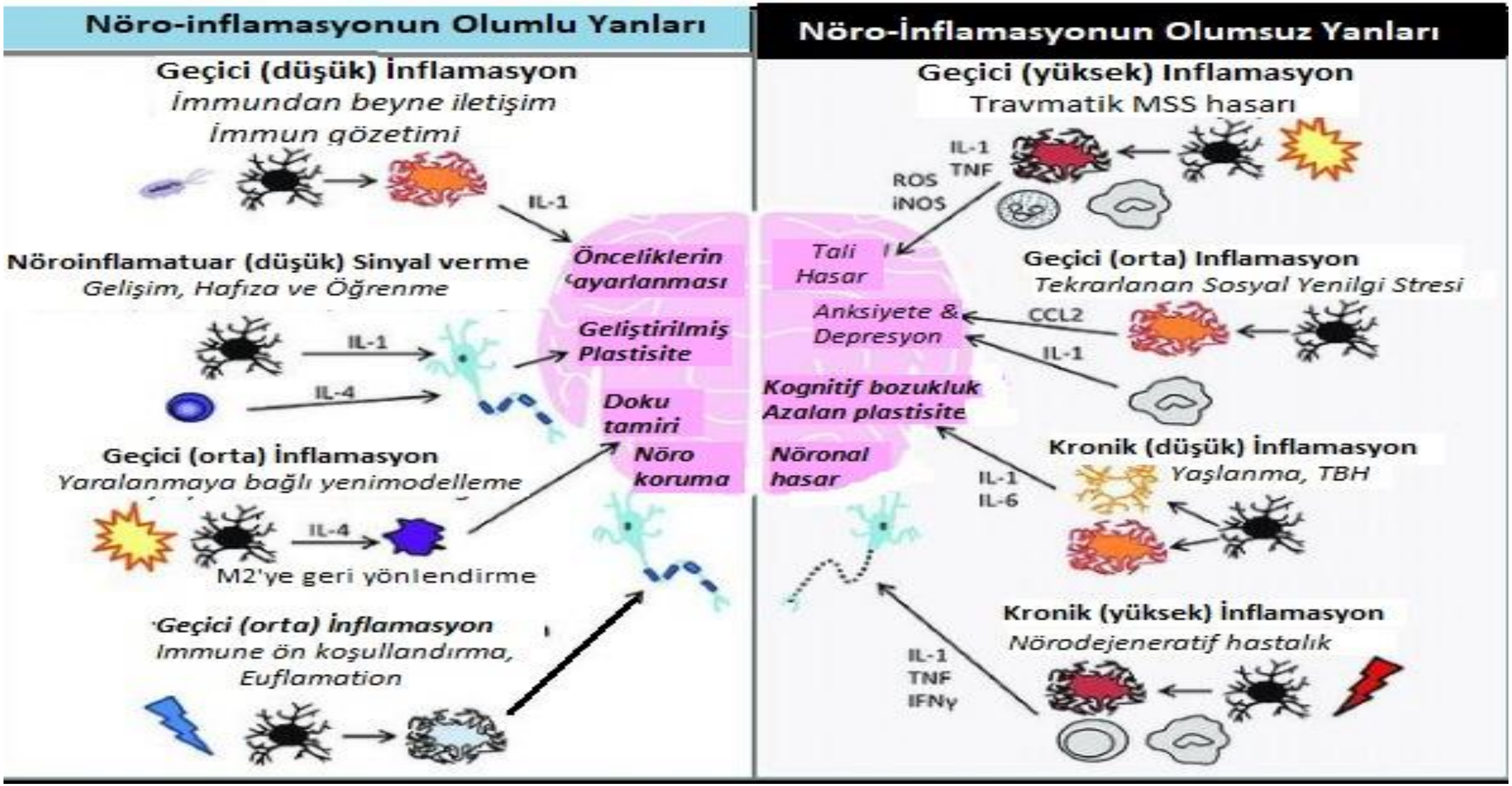


- Neuronal resting membrane potential close to threshold
- Decreased production of ATP, leading to poor neuronal endurance

- Mikroglial aktivasyon



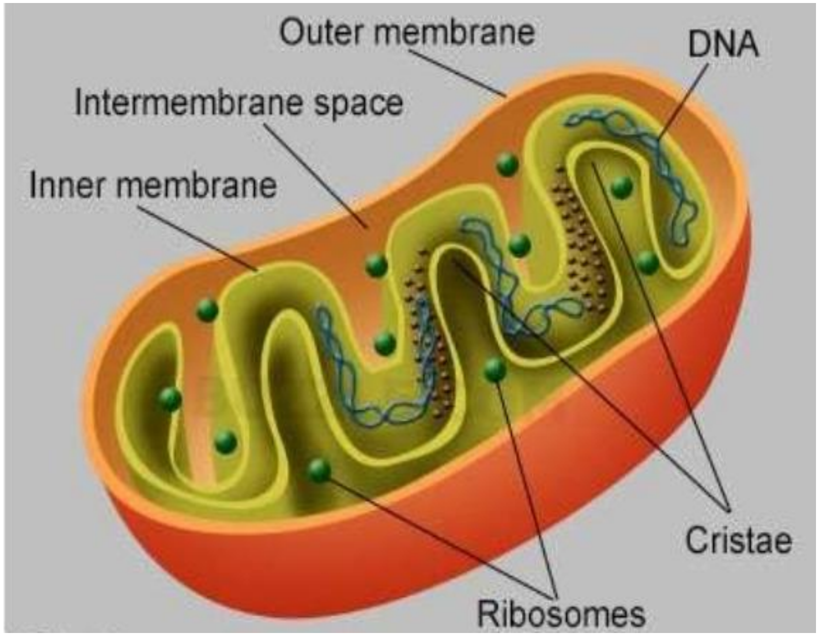

Inflammatory diet
Dysbiosis
Gut pathogens
Microbiome-brain axis
Air pollution
Pathogen
Mycotoxins
Pulmonary-brain axis
Oral bacteria
Oral mucosa
Microglia activation
Mitochondria uncoupling → ↓ Brain endurance
↓ Nerve conductance → Depression
Tau/Amyloid aggregation → Alzheimer’s
Vascular inflammation → Vascular dementia
Alpha synuclein aggregation → Lewy body dementia
Blood-brain barrier permeability
Oxidative stress/inflammation
Systemic infection
Virus
Mold
Bacteria

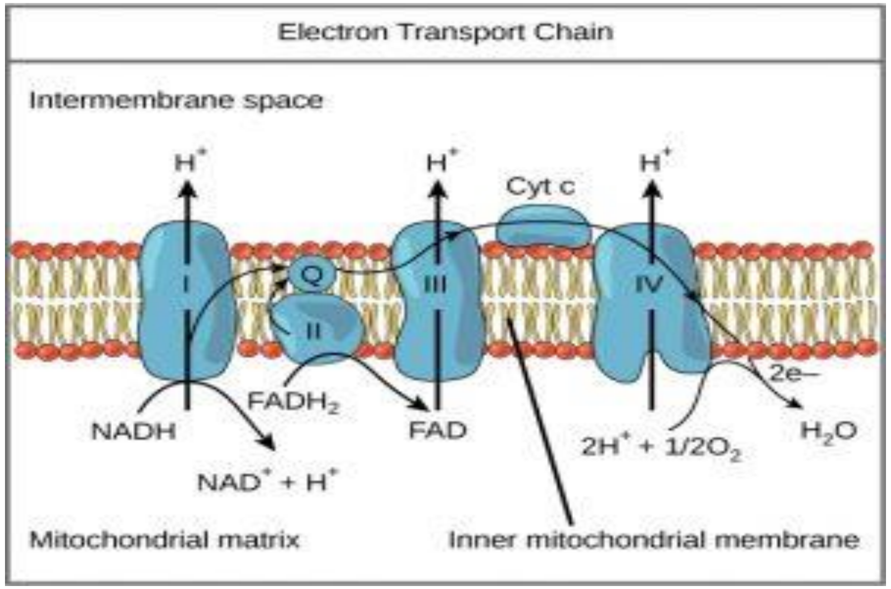


Nöro-inflamasyonun Olumlu Yanları
Nöro-İnflamasyonun Olumsuz Yanları
Geçici (düşük) İnflamasyon
İmmundan beyne iletişim
İmmun gözetimi
IL-1
Nöroinflamatuar (düşük) Sinyal verme
Gelişim, Hafıza ve Öğrenme
IL-1
IL-4
Geçici (orta) İnflamasyon
Yaralanmaya bağlı yenimodelleme
IL-4
M2'ye geri yönlendirme
Geçici (orta) İnflamasyon
Immune ön koşullandırma,
Euflamation
Önceliklerin ayarlanması
Geliştirilmiş Plastisite
Doku tamiri
Nöro koruma
Tali Hasar
Anksiyete & Depresyon
Kognitif bozukluk
Azalan plastisite
Nöronal hasar
Geçici (yüksek) Inflamasyon
Travmatik MSS hasarı
IL-1
TNF
ROS
iNOS
Geçici (orta) Inflamasyon
Tekrarlanan Sosyal Yenilgi Stresi
CCL2
IL-1
Kronik (düşük) İnflamasyon
Yaşlanma, TBH
IL-1
IL-6
Kronik (yüksek) İnflamasyon
Nörodejeneratif hastalık
IL-1
TNF
IFNγ

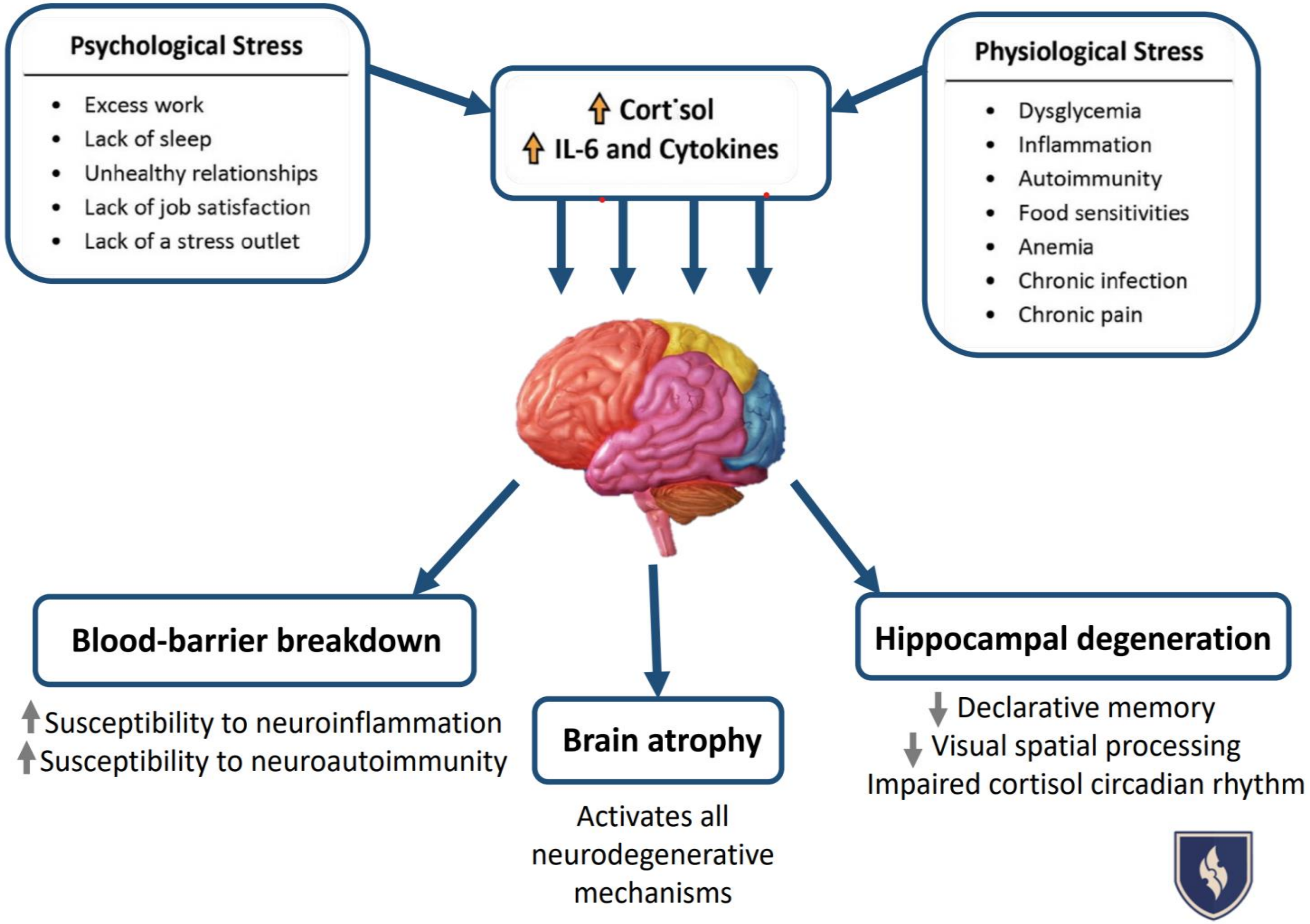
- Hücrenin kaderini enerji belirler!!!

- MİTOKONDRİ---ETS





Kronik stres ve nöron



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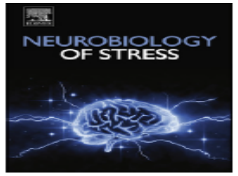

The microbiome: A key regulator of stress and neuroinflammation

Kieran Rea [a], Timothy G. Dinan [a, b], John F. Cryan [a, c, *]

[a] APC Microbiome Institute, University College Cork, Cork, Ireland
[b] Department of Psychiatry and Neurobehavioural Science, University College Cork, Cork, Ireland
[c] Department of Anatomy and Neuroscience, University College Cork, Cork, Ireland

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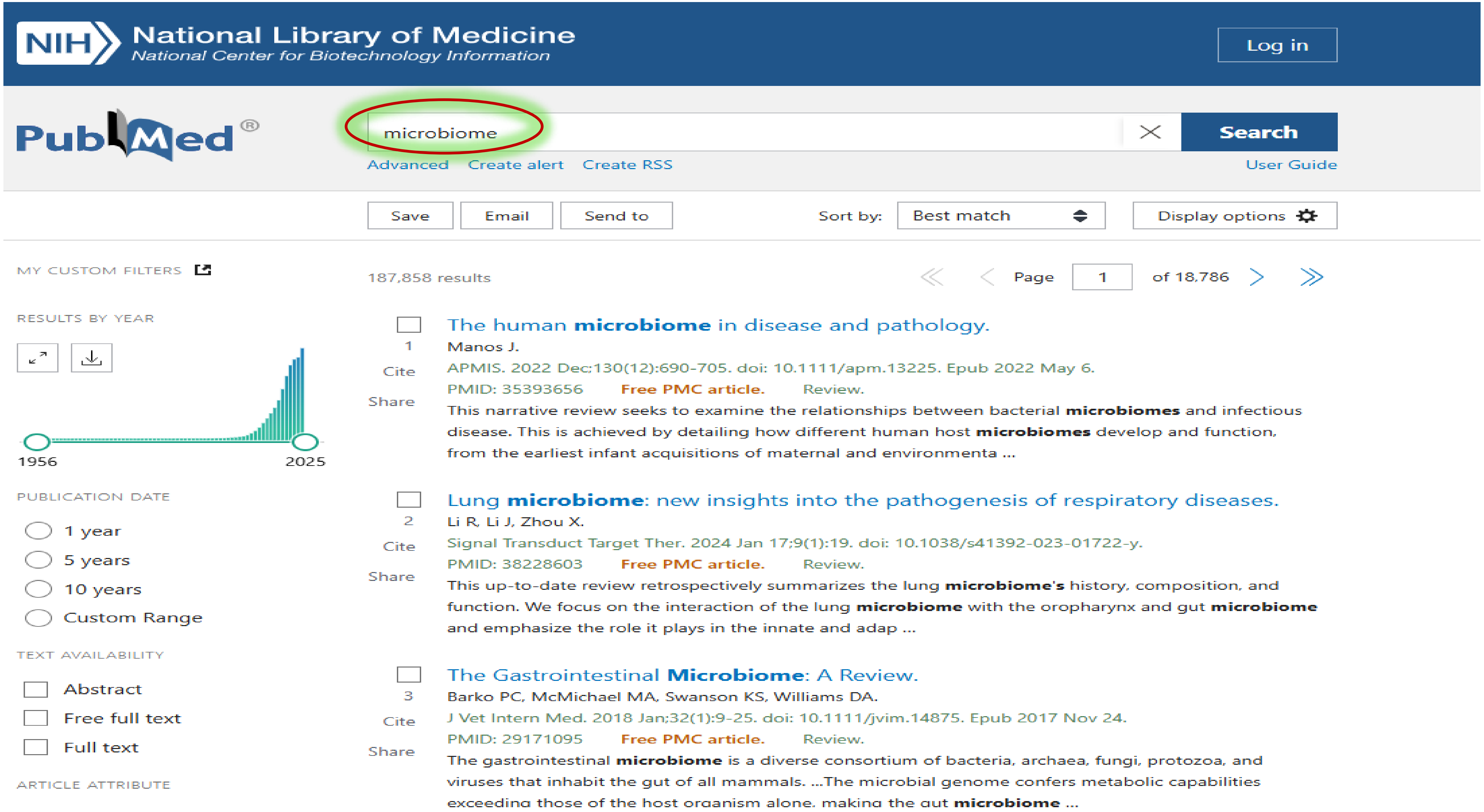
ABSTRACT

There is a growing emphasis on the relationship between the complexity and diversity of the microorganisms that inhabit our gut (human gastrointestinal microbiota) and health/disease, including brain health and disorders of the central nervous system. The microbiota-gut-brain axis is a dynamic matrix of tissues and organs including the brain, glands, gut, immune cells and gastrointestinal microbiota that communicate in a complex multidirectional manner to maintain homeostasis. Changes in this environment can lead to a broad spectrum of physiological and behavioural effects including hypothalamic-pituitary-adrenal (HPA) axis activation, and altered activity of neurotransmitter systems and immune function. While an appropriate, co-ordinated physiological response, such as an immune or stress response are necessary for survival, a dysfunctional response can be detrimental to the host contributing to the development of a number of CNS disorders.

In this review, the involvement of the gastrointestinal microbiota in stress-mediated and immune-mediated modulation of neuroendocrine, immune and neurotransmitter systems and the consequential behaviour is considered. We also focus on the mechanisms by which commensal gut microbiota can regulate neuroinflammation and further aim to exploit our understanding of their role in stress-related disorders as a consequence of neuroinflammatory processes.

- İnsan hücre sayısının 10 katı bakteri
  - 2. beyin
  - Bakteriler, virüsler, parazitler, mantarlar
  - 100.000 < genetik materyal
  - Nörotrasmitter üretimi

- **NMDA (N metil D Aspartat)**
  - Glutamat,D-serin → Aktivasyon
    - Sinaptik plastisite, bilişsel fonksiyon düzenleme
  - Aşırı aktivasyon → Aktivasyon nörotoksisitesi
    - Lactobacillus+bifidobacterium
      - Glutamat → GABA (inhibitör)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The human microbiome in disease and pathology.
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PMID: 35393656 Free PMC article. Review.
This narrative review seeks to examine the relationships between bacterial microbiomes and infectious disease. This is achieved by detailing how different human host microbiomes develop and function, from the earliest infant acquisitions of maternal and environmenta ...
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Lung microbiome: new insights into the pathogenesis of respiratory diseases.
Li R, Li J, Zhou X.
Signal Transduct Target Ther. 2024 Jan 17;9(1):19. doi: 10.1038/s41392-023-01722-y.
PMID: 38228603 Free PMC article. Review.
This up-to-date review retrospectively summarizes the lung microbiome's history, composition, and function. We focus on the interaction of the lung microbiome with the oropharynx and gut microbiome and emphasize the role it plays in the innate and adap ...
3
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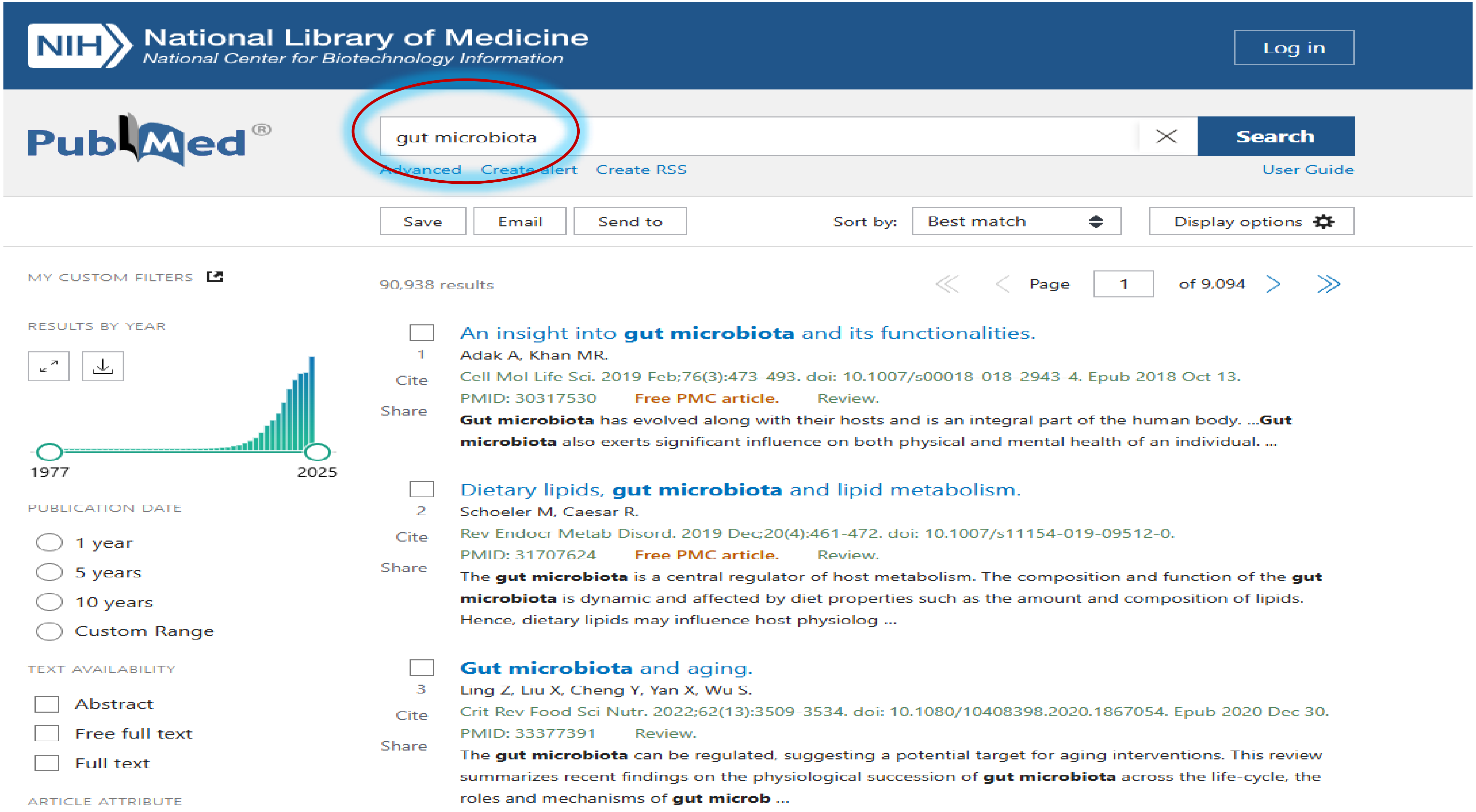
The Gastrointestinal Microbiome: A Review.
Barko PC, McMichael MA, Swanson KS, Williams DA.
J Vet Intern Med. 2018 Jan;32(1):9-25. doi: 10.1111/jvim.14875. Epub 2017 Nov 24.
PMID: 29171095 Free PMC article. Review.
The gastrointestinal microbiome is a diverse consortium of bacteria, archaea, fungi, protozoa, and viruses that inhabit the gut of all mammals. ...The microbial genome confers metabolic capabilities exceeding those of the host organism alone, making the gut microbiome ...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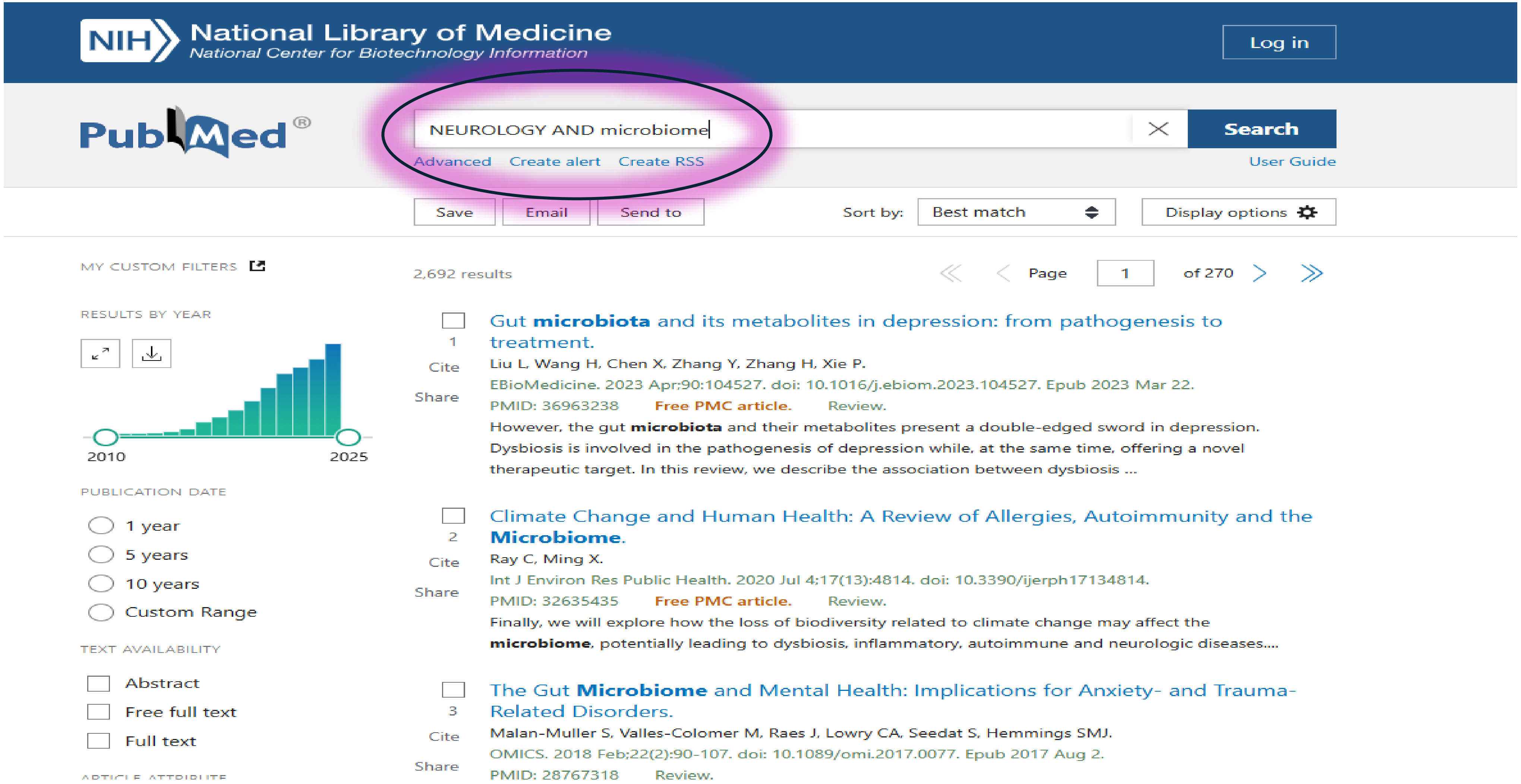
An insight into gut microbiota and its functionalities.
Adak A, Khan MR.
Cell Mol Life Sci. 2019 Feb;76(3):473-493. doi: 10.1007/s00018-018-2943-4. Epub 2018 Oct 13.
PMID: 30317530 Free PMC article. Review.
Gut microbiota has evolved along with their hosts and is an integral part of the human body. ...Gut microbiota also exerts significant influence on both physical and mental health of an individual. ...
2 Cite Share
Dietary lipids, gut microbiota and lipid metabolism.
Schoeler M, Caesar R.
Rev Endocr Metab Disord. 2019 Dec;20(4):461-472. doi: 10.1007/s11154-019-09512-0.
PMID: 31707624 Free PMC article. Review.
The gut microbiota is a central regulator of host metabolism. The composition and function of the gut microbiota is dynamic and affected by diet properties such as the amount and composition of lipids. Hence, dietary lipids may influence host physiolog ...
3 Cite Share
Gut microbiota and aging.
Ling Z, Liu X, Cheng Y, Yan X, Wu S.
Crit Rev Food Sci Nutr. 2022;62(13):3509-3534. doi: 10.1080/10408398.2020.1867054. Epub 2020 Dec 30.
PMID: 33377391 Review.
The gut microbiota can be regulated, suggesting a potential target for aging interventions. This review summarizes recent findings on the physiological succession of gut microbiota across the life-cycle, the roles and mechanisms of gut microb ...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Gut microbiota and its metabolites in depression: from pathogenesis to treatment.
Liu L, Wang H, Chen X, Zhang Y, Zhang H, Xie P.
EBioMedicine. 2023 Apr;90:104527. doi: 10.1016/j.ebiom.2023.104527. Epub 2023 Mar 22.
PMID: 36963238 Free PMC article. Review.
However, the gut microbiota and their metabolites present a double-edged sword in depression. Dysbiosis is involved in the pathogenesis of depression while, at the same time, offering a novel therapeutic target. In this review, we describe the association between dysbiosis ...
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Climate Change and Human Health: A Review of Allergies, Autoimmunity and the Microbiome.
Ray C, Ming X.
Int J Environ Res Public Health. 2020 Jul 4;17(13):4814. doi: 10.3390/ijerph17134814.
PMID: 32635435 Free PMC article. Review.
Finally, we will explore how the loss of biodiversity related to climate change may affect the microbiome, potentially leading to dysbiosis, inflammatory, autoimmune and neurologic diseases....
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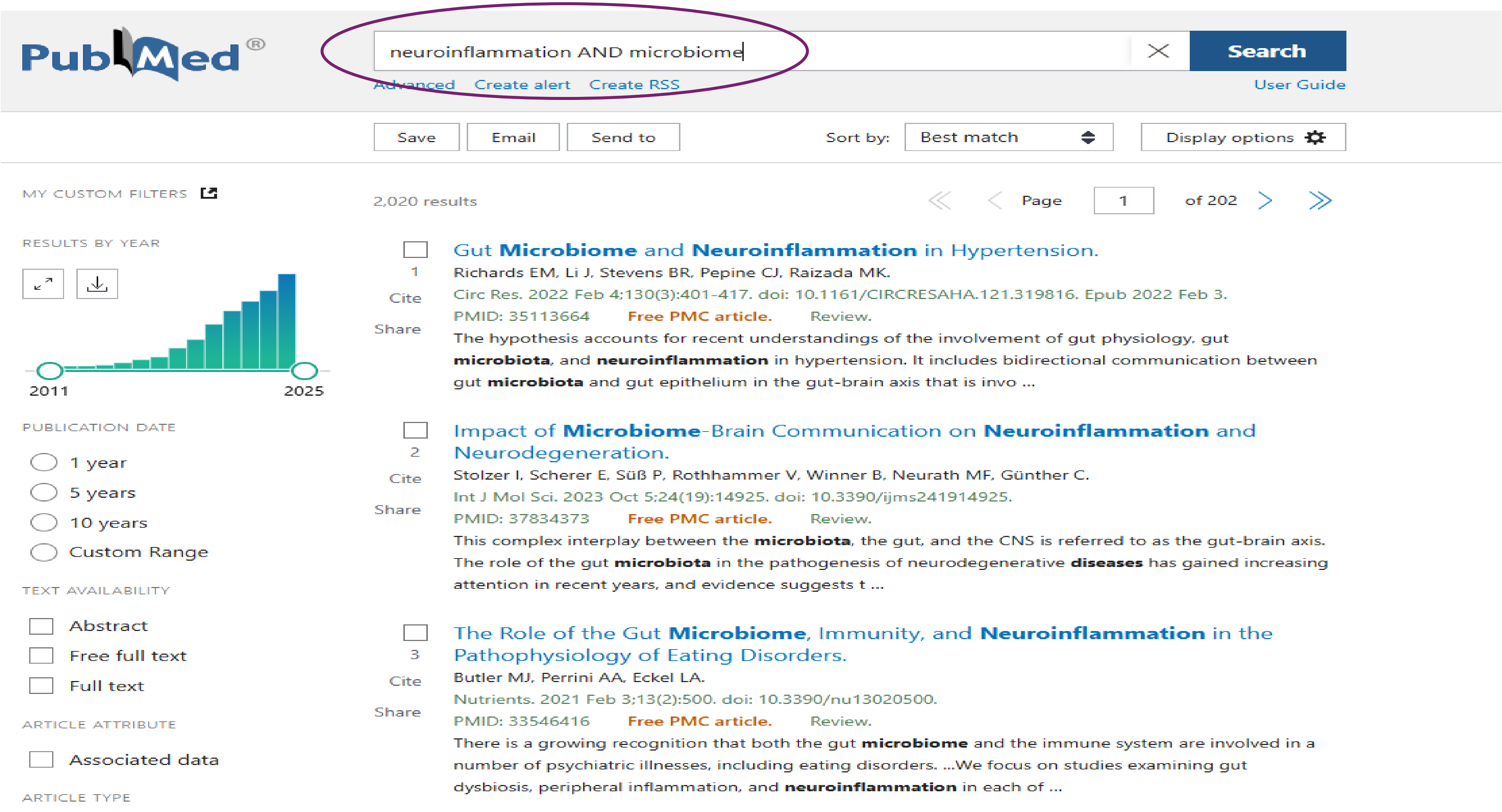
The Gut Microbiome and Mental Health: Implications for Anxiety- and Trauma-Related Disorders.
Malan-Muller S, Valles-Colomer M, Raes J, Lowry CA, Seedat S, Hemmings SMJ.
OMICS. 2018 Feb;22(2):90-107. doi: 10.1089/omi.2017.0077. Epub 2017 Aug 2.
PMID: 28767318 Review.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Gut Microbiome and Neuroinflammation in Hypertension.
Richards EM, Li J, Stevens BR, Pepine CJ, Raizada MK.
Circ Res. 2022 Feb 4;130(3):401-417. doi: 10.1161/CIRCRESAHA.121.319816. Epub 2022 Feb 3.
PMID: 35113664 Free PMC article. Review.
The hypothesis accounts for recent understandings of the involvement of gut physiology, gut microbiota, and neuroinflammation in hypertension. It includes bidirectional communication between gut microbiota and gut epithelium in the gut-brain axis that is invo ...
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Impact of Microbiome-Brain Communication on Neuroinflammation and Neurodegeneration.
Stolzer I, Scherer E, Süß P, Rothhammer V, Winner B, Neurath MF, Günther C.
Int J Mol Sci. 2023 Oct 5;24(19):14925. doi: 10.3390/ijms241914925.
PMID: 37834373 Free PMC article. Review.
This complex interplay between the microbiota, the gut, and the CNS is referred to as the gut-brain axis. The role of the gut microbiota in the pathogenesis of neurodegenerative diseases has gained increasing attention in recent years, and evidence suggests t ...
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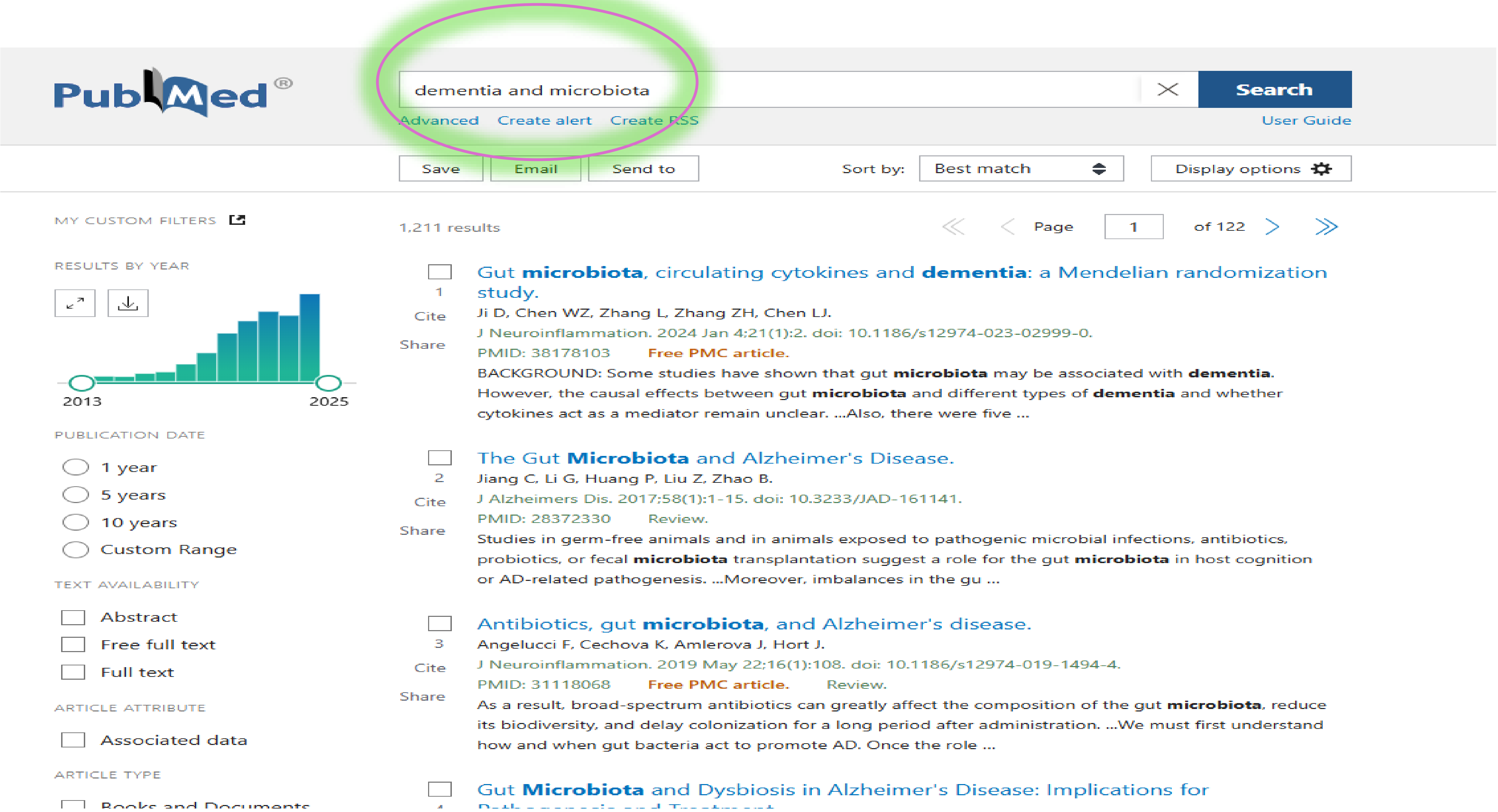
The Role of the Gut Microbiome, Immunity, and Neuroinflammation in the Pathophysiology of Eating Disorders.
Butler MJ, Perrini AA, Eckel LA.
Nutrients. 2021 Feb 3;13(2):500. doi: 10.3390/nu13020500.
PMID: 33546416 Free PMC article. Review.
There is a growing recognition that both the gut microbiome and the immune system are involved in a number of psychiatric illnesses, including eating disorders. ...We focus on studies examining gut dysbiosis, peripheral inflammation, and neuroinflammation in each of ...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1 Cite Share
Gut microbiota, circulating cytokines and dementia: a Mendelian randomization study.
Ji D, Chen WZ, Zhang L, Zhang ZH, Chen LJ.
J Neuroinflammation. 2024 Jan 4;21(1):2. doi: 10.1186/s12974-023-02999-0.
PMID: 38178103 Free PMC article.
BACKGROUND: Some studies have shown that gut microbiota may be associated with dementia. However, the causal effects between gut microbiota and different types of dementia and whether cytokines act as a mediator remain unclear. ...Also, there were five ...
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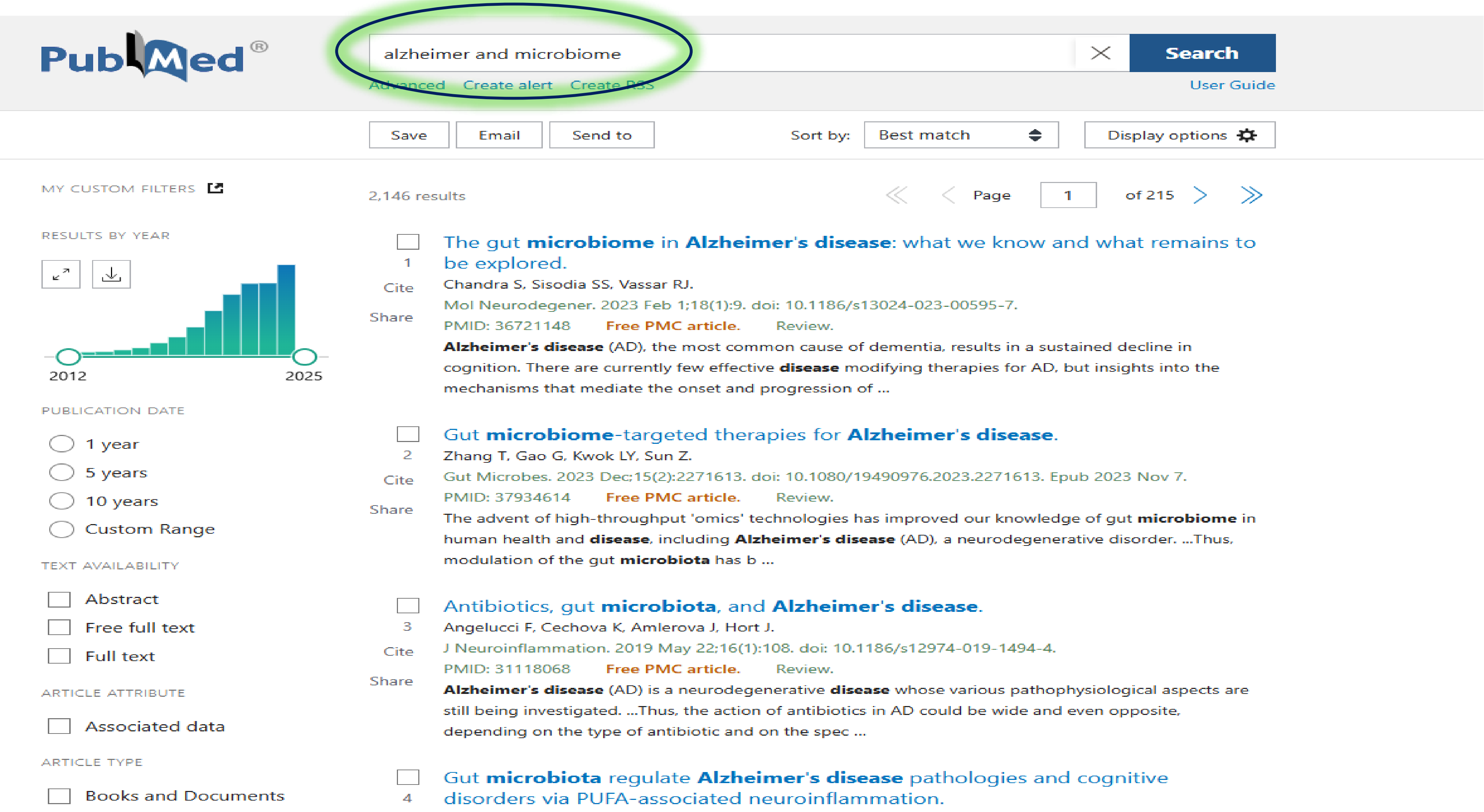
The Gut Microbiota and Alzheimer's Disease.
Jiang C, Li G, Huang P, Liu Z, Zhao B.
J Alzheimers Dis. 2017;58(1):1-15. doi: 10.3233/JAD-161141.
PMID: 28372330 Review.
Studies in germ-free animals and in animals exposed to pathogenic microbial infections, antibiotics, probiotics, or fecal microbiota transplantation suggest a role for the gut microbiota in host cognition or AD-related pathogenesis. ...Moreover, imbalances in the gu ...
3 Cite Share
Antibiotics, gut microbiota, and Alzheimer's disease.
Angelucci F, Cechova K, Amlerova J, Hort J.
J Neuroinflammation. 2019 May 22;16(1):108. doi: 10.1186/s12974-019-1494-4.
PMID: 31118068 Free PMC article. Review.
As a result, broad-spectrum antibiotics can greatly affect the composition of the gut microbiota, reduce its biodiversity, and delay colonization for a long period after administration. ...We must first understand how and when gut bacteria act to promote AD. Once the role ...
Gut Microbiota and Dysbiosis in Alzheimer's Disease: Implications for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The gut microbiome in Alzheimer's disease: what we know and what remains to be explored.
Chandra S, Sisodia SS, Vassar RJ.
Mol Neurodegener. 2023 Feb 1;18(1):9. doi: 10.1186/s13024-023-00595-7.
PMID: 36721148 Free PMC article. Review.
Alzheimer's disease (AD), the most common cause of dementia, results in a sustained decline in cognition. There are currently few effective disease modifying therapies for AD, but insights into the mechanisms that mediate the onset and progression of ...
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Gut microbiome-targeted therapies for Alzheimer's disease.
Zhang T, Gao G, Kwok LY, Sun Z.
Gut Microbes. 2023 Dec;15(2):2271613. doi: 10.1080/19490976.2023.2271613. Epub 2023 Nov 7.
PMID: 37934614 Free PMC article. Review.
The advent of high-throughput 'omics' technologies has improved our knowledge of gut microbiome in human health and disease, including Alzheimer's disease (AD), a neurodegenerative disorder. ...Thus, modulation of the gut microbiota has b ...
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Antibiotics, gut microbiota, and Alzheimer's disease.
Angelucci F, Cechova K, Amlerova J, Hort J.
J Neuroinflammation. 2019 May 22;16(1):108. doi: 10.1186/s12974-019-1494-4.
PMID: 31118068 Free PMC article. Review.
Alzheimer's disease (AD) is a neurodegenerative disease whose various pathophysiological aspects are still being investigated. ...Thus, the action of antibiotics in AD could be wide and even opposite, depending on the type of antibiotic and on the spec ...
4
Gut microbiota regulate Alzheimer's disease pathologies and cognitive disorders via PUFA-associated neuroinflammation.

Alzheimer(AD)

Meta-analizdeki on önemli cinsten altı cins— *Adlercreutzia, Eubacterium nodatum grubu, Eisenbergiella, Eubacterium fissicatena grubu, Gordonibacter* ve *Prevotella k*oruyucu olarak;

Dört cins— *Collinsella, Bacteroides, Lachnospira* ve *Veillonella* —AD için bir risk faktörü olarak tanımlandı.

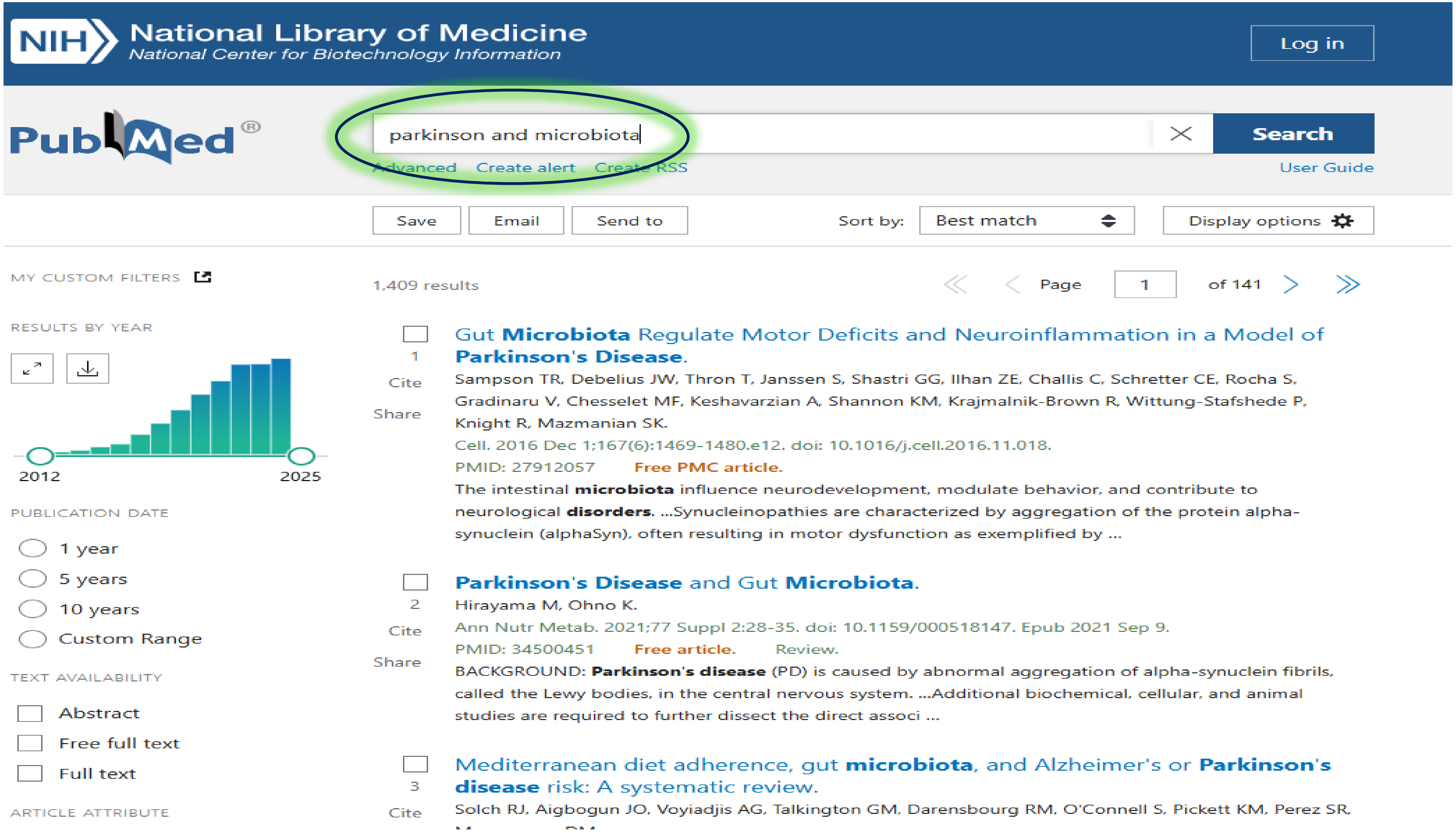
Meta-analizde, *Eisenbergiella* AD için en güçlü koruyucu faktör olarak belirlendi (p = 1,39 × 10-6 ^{ve} OR = 0,857 (95% CI 0,805-0,912)) ve *Collinsella* AD için en güçlü risk faktörü olarak belirlendi *(*p = 4,47 × 10-8 ^{ve} OR = 1,188 (95% CI 1,117-1,264).

Cammann, D., Lu, Y., Cummings, M.J. et al. Genetic correlations between Alzheimer's disease and gut microbiome genera. Sci Rep 13, 5258 (2023). https://doi.org/10.1038/s41598-023-31730-5.

- AD hastalarında Bifidobacterium ve Lactobacillus gibi belirli yararlı bakteri türlerinde azalma tanımlanmıştır.

- AD, Bacteroidetes ve proinflamatuar Escherichia ve Shigella'nın daha yüksek bolluğu ile ilişkilidir.

Zhuang, Z. Q., Shen, L. L., Li, W. W., Fu, X., Zeng, F., Gui, L., Lü, Y., Cai, M., Zhu, C., Tan, Y. L., Zheng, P., Li, H. Y., Zhu, J., Zhou, H. D., Bu, X. L., & Wang, Y. J. (2018). Gut Microbiota is Altered in Patients with Alzheimer's Disease. Journal of Alzheimer's disease : JAD, 63(4), 1337–1346. https://doi.org/10.3233/JAD-180176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Gut Microbiota Regulate Motor Deficits and Neuroinflammation in a Model of Parkinson's Disease.
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Sampson TR, Debelius JW, Thron T, Janssen S, Shastri GG, Ilhan ZE, Challis C, Schretter CE, Rocha S, Gradinaru V, Chesselet MF, Keshavarzian A, Shannon KM, Krajmalnik-Brown R, Wittung-Stafshede P, Knight R, Mazmanian SK.
Cell. 2016 Dec 1;167(6):1469-1480.e12. doi: 10.1016/j.cell.2016.11.018.
PMID: 27912057 Free PMC article.
The intestinal microbiota influence neurodevelopment, modulate behavior, and contribute to neurological disorders. ...Synucleinopathies are characterized by aggregation of the protein alpha-synuclein (alphaSyn), often resulting in motor dysfunction as exemplified by ...
Parkinson's Disease and Gut Microbiota.
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Hirayama M, Ohno K.
Ann Nutr Metab. 2021;77 Suppl 2:28-35. doi: 10.1159/000518147. Epub 2021 Sep 9.
PMID: 34500451 Free article. Review.
BACKGROUND: Parkinson's disease (PD) is caused by abnormal aggregation of alpha-synuclein fibrils, called the Lewy bodies, in the central nervous system. ...Additional biochemical, cellular, and animal studies are required to further dissect the direct associ ...
Mediterranean diet adherence, gut microbiota, and Alzheimer's or Parkinson's disease risk: A systematic review.
3 Cite
Solch RJ, Aigbogun JO, Voyiadjis AG, Talkington GM, Darensbourg RM, O'Connell S, Pickett KM, Perez SR,

Ref.	Sample size	Control factors	Method	Microbiota alterations	Alpha diversity	Beta diversity
[86]	PD: 72 non-PD: 72	Onset age > 50 years; age- and sex-matched; no endocrine diseases	16S rRNA V1-3	Family increased: Lactobacillaceae, Verrucomicrobiaceae, Bradyrhizobiaceae, Clostridiales Incertae Sedis IV, Ruminococcaceae; family decreased: Prevotellaceae	nd	sd
[87]	PD: 31 non-PD: 28	Early, L-DOPA-naïve PD; only male; age-matched; diet and smoking habits considered	shotgun metagenomic	Family/genus increased: Verrucomicrobiaceae (genus *Akkermansia*); family/genus decreased: Prevotellaceae (genus *Prevotella*), Erysipelotrichaceae (genus *Eubacterium*); species increased: *Akkermansia muciniphila, Alistipes shahii;* species decreased: *Prevotella copri, Eubacterium bioforme, Clostridium saccharolyticum*	nd	sd
[88]	PD: 24 healthy: 14	Age-, sex-, BMI-matched; no diabetes, infectious diseases or special diets	16S rRNA V3-5	Family increased: Enterobacteriaceae, Veillonellaceae, Erysipelotrichaceae, Coriobacteriaceae, Streptococcaceae, Moraxellaceae, Enterococcaceae; genus increased: *Acidaminococcus, Acinetobacter, Enterococcus, Escherichia-Shigella, Megamonas, Megasphaera, Proteus, Streptococcus;* genus decreased: *Blautia, Faecalibacterium, Ruminococcus*	nd	sd
[89]	PD: 76 RBD: 21 healthy: 78	Comorbidities and comedication were documented	16S/18S rRNA V4	Family increased: Verrucomicrobiaceae; genus increased: *Akkermansia*	nd	sd
[90]	PD: 45 healthy: 45	Spouses as control; no serious chronic illnesses (e.g., diabetes); IBS excluded	16S rRNA V3-4	Genus increased: *Clostridium IV, Holdemania, Clostridium XVIII, Butyricicoccus, Anaerotruncus, Aquabacterium, Sphingomonas*	sd (>)	sd
[91]	PD: 64 Control: 64	Age- and sex-matched; dietary habits and medications assessed	16S rRNA V3-4	Family decreased: Prevotellaceae; genus increased: *Bifidobacterium;* genus decreased: *Roseburia*	nd	sd
[92]	PD: 193 PSP: 22 MSA: 22 non-PD: 113	39 drug-naïve PD; age-, BMI-, region-matched; spouses as control; dietary habits assessed; autoimmune disease and advanced-stage PD excluded	16S rRNA V3-4	Family increased: Verrucomicrobiaceae, Enterobacteriaceae, Christensenellaceae, Lactobacillaceae, Coriobacteriaceae, Bifidobacteriaceae; family decreased: Lachnospiraceae; genus increased: *Akkermansia, Parabacteroides;* genus decreased: *Roseburia*	sd (>)	sd
[93]	PD: 197 healthy: 103	Age 40–85 years, onset age 40–80 years, disease duration ≤ 12 years; age-matched; medications, diet, and demographics collected	16S rRNA V4	Family increased: Christensenellaceae, Desulfovibrionaceae; family decreased: Lachnospiraceae; genus increased: *Bilophila, Akkermansia;* genus decreased: *Roseburia, Faecalibacterium*	nd	sd
[94]	Training set PD: 40 healthy: 40	Spouses as partial control; no serious illness (e.g. heart failure); no chronic disease (e.g., diabetes); lifestyle factors and medications considered	shotgun metagenomic	Family increased: Carnobacteriaceae, Lactobacillaceae, Rikenellaceae, Streptococcaceae, Synergistaceae Genus increased: *Alistipes, Enterobacter, Gordonibacter, Granulicatella, Holdemania, Lactobacillus, Streptococcus*	sd (>)	sd

PD

- Roseburia , Fusicatenibacter , Blautia , Anaerostipes (Lachnospiraceae familyası) ve Faecalibacterium (Ruminococcaceae familyası) cinslerinin daha düşük bolluğu.
- Akkermansia'nın daha yüksek bolluğu PD hastalarında da tespit edilmiş.
- Dahası, Lactobacillus ve Bifidobacterium cinslerinin zenginleşmiş bolluğu, Faecalibacterium spp.'nin azalmış bolluğuyla bağlantılıdır

J Immunol Clin Microbiol
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DOI: 10.58854/jicm.1583436

Journal of Immunology and Clinical Microbiology

ORIGINAL ARTICLE / ÖZGÜN MAKALE

Parkinson Hastalığında SİBO (İnce Bağırsak Bakteri Aşırı Çoğalması): WOS örneği ile Bibliyometrik İnceleme

SIBO (Small Intestinal Bacterial Overgrowth) in Parkinson's Disease: Bibliometric Review with WOS Example

Selen İLHAN ALP[1]

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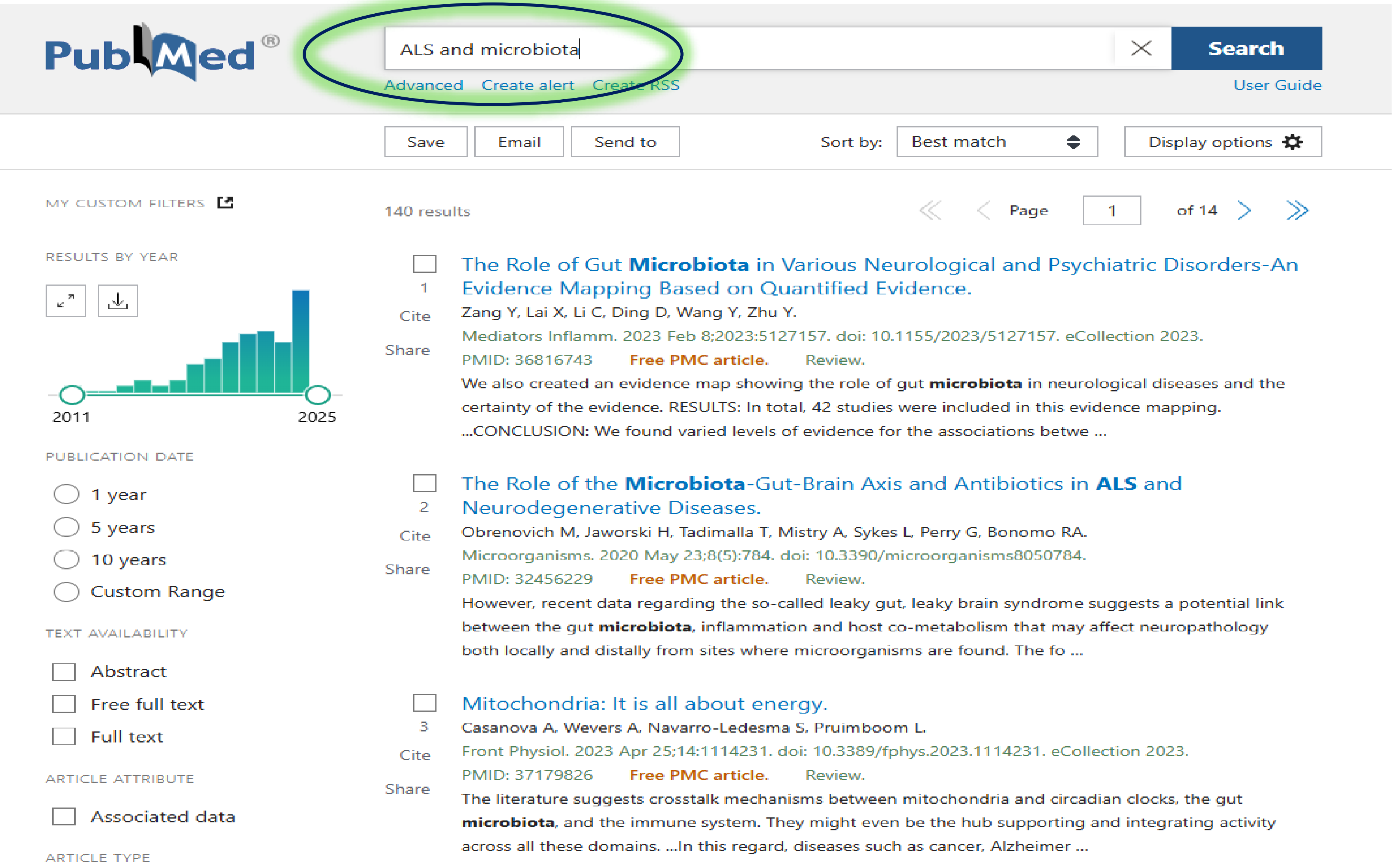
Geliş: 12.11.2024, Kabul: 31.12.2024

Öz

Amaç: Bu çalışmada Parkinson Hastalığında (PH) ince bağırsak bakteri aşırı çoğalması (SİBO) konusunda 2024 öncesi yayınlanan makalelerin niteliksel özelliklerinin araştırılması ve ileride yapılacak çalışmalar için araştırmacılara yol gösterilmesi amaçlanmıştır.
Gereç ve Yöntemler: Web of Science veri tabanında arama kriterlerine "Parkinson Disease" ve "Small İntestinal Bacterial Overgrowth" anahtar kelimeleri girilerek tespit edilen 41 makale önceden belirlenmiş olan ölçütler etrafında değerlendirilmiştir. Bu çalışmada verilerin analizinde içerik analizi tekniğinden yararlanılarak bir durum çalışma örneği ortaya konmuştur. Yayınların yılları ve tipleri, yayın yapan ülkeler ve merkezler, yayınların yer aldığı dergiler, yayın yapan araştırmacılar, yayınların atıf alma sayıları ve en fazla atıf alan yayınların incelemeleri yapılmıştır.
Bulgular: WOS veri tabanında ulaşılan 41 makaleden 26 tanesinin incelenmek istenen konuyla ilişkisi tespit edilmiştir. Bu konuda yapılan ilk yayın 2005 yılına aittir ve yayınların çoğunluğunu makaleler oluşturmaktadır. En çok yayın yapan bilim dalları klinik nöroloji ve gastroenteroloji olup en fazla yayının bulunduğu dergiler Parkinsonism and Related Disorders, Movevemet Disorders ve Gastroenterology'dir. Kanada, Çin ve USA en fazla yayının üretildiği ülkeler olup en fazla yayın yapan merkezler sırasıyla Universty Healthy Network Toronto ve Universty of Toronto'dur. En çok atıf alan yayın olan "Gastrointestinal dysfunction in Parkinson's disease" 2015 yılında Fasona ve arkadaşları tarafından yapılmış olup Lancet Neurology 'de yayınlanmıştır.
Sonuç: Parkinson hastalığı ve SİBO ilişkisini inceleyen çalışma sayısı az olmakla birlikte son yıllarda dünya literatüründe konuya olan ilginin arttığı tespit edilmiştir. Bu konuda ülkemizdeki merkezlere ait yayın bulunmamakla birlikte ülkemizde yayınlanan dergilerde de herhangi bir yayına rastlanmaması dikkat çekmektedir. Bu konudaki araştırmaların Parkinson Hastalığının etyopatogenezine ışık tutacak ve hastaların klinik bulgularında iyileşmeye katkıda bulunabilecek sonuçlar elde etme potansiyelinden dolayı özellikle genç araştırmacılar tarafından tercih edilebilecek için bir çalışma alanı olacağı düşüncesindeyiz.
Anahtar Kelimeler: Parkinson Hastalığı, ince bağırsak bakteri aşırı çoğalması, SİBO, bibliyometrik analiz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The Role of Gut Microbiota in Various Neurological and Psychiatric Disorders-An Evidence Mapping Based on Quantified Evidence.
Zang Y, Lai X, Li C, Ding D, Wang Y, Zhu Y.
Mediators Inflamm. 2023 Feb 8;2023:5127157. doi: 10.1155/2023/5127157. eCollection 2023.
PMID: 36816743 Free PMC article. Review.
We also created an evidence map showing the role of gut microbiota in neurological diseases and the certainty of the evidence. RESULTS: In total, 42 studies were included in this evidence mapping. ...CONCLUSION: We found varied levels of evidence for the associations betwe ...
2
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The Role of the Microbiota-Gut-Brain Axis and Antibiotics in ALS and Neurodegenerative Diseases.
Obrenovich M, Jaworski H, Tadimalla T, Mistry A, Sykes L, Perry G, Bonomo RA.
Microorganisms. 2020 May 23;8(5):784. doi: 10.3390/microorganisms8050784.
PMID: 32456229 Free PMC article. Review.
However, recent data regarding the so-called leaky gut, leaky brain syndrome suggests a potential link between the gut microbiota, inflammation and host co-metabolism that may affect neuropathology both locally and distally from sites where microorganisms are found. The fo ...
3
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Mitochondria: It is all about energy.
Casanova A, Wevers A, Navarro-Ledesma S, Pruimboom L.
Front Physiol. 2023 Apr 25;14:1114231. doi: 10.3389/fphys.2023.1114231. eCollection 2023.
PMID: 37179826 Free PMC article. Review.
The literature suggests crosstalk mechanisms between mitochondria and circadian clocks, the gut microbiota, and the immune system. They might even be the hub supporting and integrating activity across all these domains. ...In this regard, diseases such as cancer, Alzheimer ...

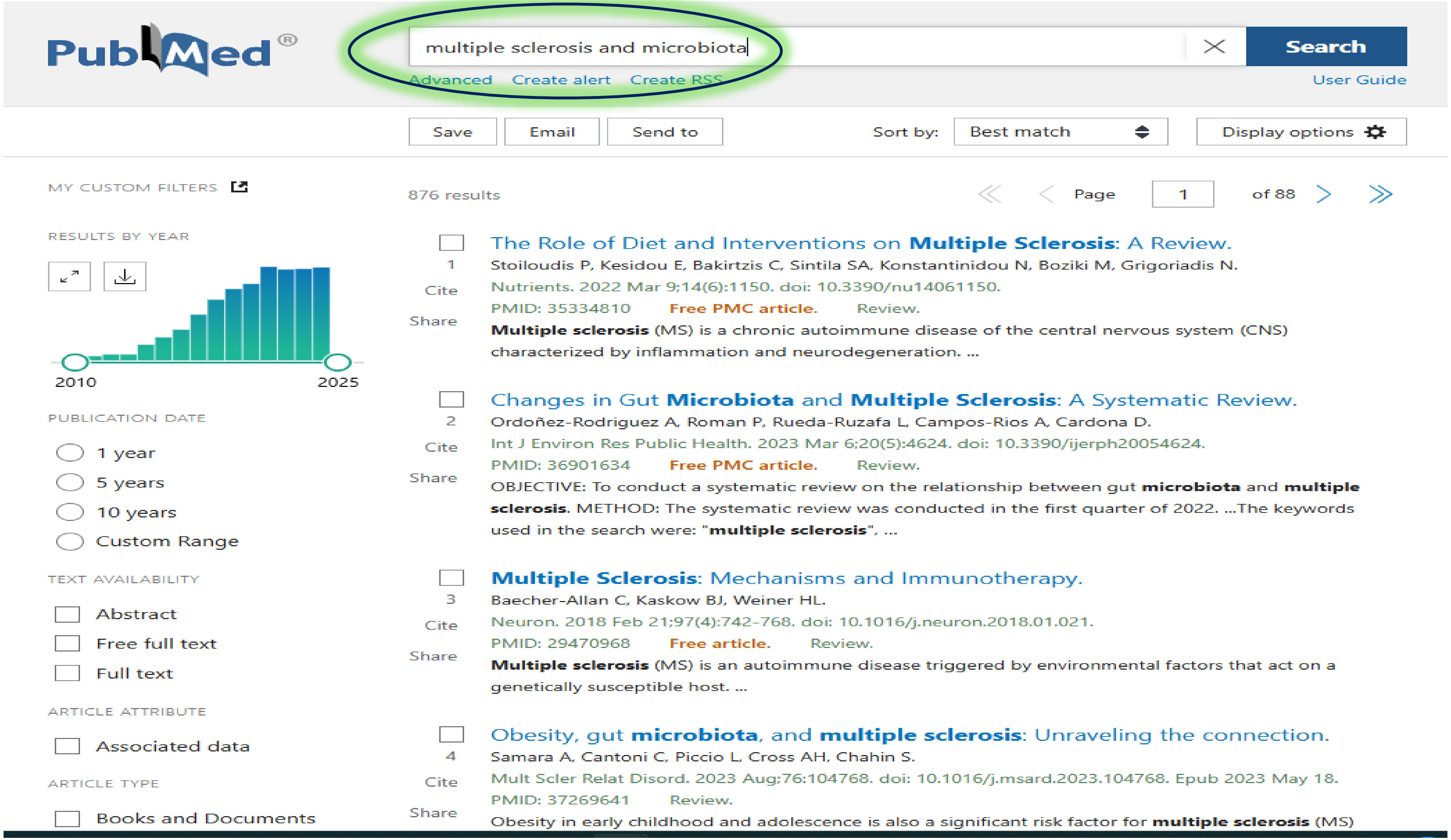
- PD ve AD çalışmaları, hem sağlıklı gruplarda hem de vaka gruplarında bağırsak mikrobiyotasında Bacteroidetes, Firmicutes ve Proteobacteria filumlarını tutarlı bir şekilde yaygın olarak tanımladı.
- Mikrobiyal disbiyoz, PD çalışmalarında özellikle vakalarda Akkermansia, Verrucomicrobiaceae, Lachnospiraceae ve Ruminococcaceae'nin yüksek bolluğu ve kontrollerde Blautia, Coprococcus, Prevotellaceae ve Roseburia'nın yüksek bolluğu ile karakterize edildi.
- Benzer şekilde, Bacteroides ve Acidobacteriota AD vakalarında bol miktarda bulunurken, Acidaminococcaceae, Firmicutes, Lachnospiraceae ve Ruminiclostridium AD kontrollerinde bol miktarda bulundu.

Heravi, F. S., Naseri, K., & Hu, H. (2023). Gut Microbiota Composition in Patients with Neurodegenerative Disorders (Parkinson's and Alzheimer's) and Healthy Controls: A Systematic Review. Nutrients, 15(20), 4365. https://doi.org/10.3390/nu15204365

- Mikrobiyal imza değerlendirmesi, Akkermansia, Lachnospiraceae, Verrucomicrobiaceae, Bifidobacterium , Ruminococcacea ve Verrucomicrobia dahil olmak üzere çeşitli mikrobiyal taksonların PD ile ve Ruminococcaceae, Bacteroides ve Actinobacteria'nın AD ile ilişkisini gösterdi.

- PD ve AD çalışmalarındaki mikrobiyal çeşitlilik değerlendirmeleri, bazı gruplarda karşılaştırılabilir alfa çeşitliliği ve diğerlerinde farklı bağırsak mikrobiyotası kompozisyonu gösterdi; birden fazla çalışmada vakalar ve kontroller arasında tutarlı beta çeşitliliği farklılıkları vardı.

Heravi, F. S., Naseri, K., & Hu, H. (2023). Gut Microbiota Composition in Patients with Neurodegenerative Disorders (Parkinson's and Alzheimer's) and Healthy Controls: A Systematic Review. Nutrients, 15(20), 4365. https://doi.org/10.3390/nu15204365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The Role of Diet and Interventions on Multiple Sclerosis: A Review.
Stoiloudis P, Kesidou E, Bakirtzis C, Sintila SA, Konstantinidou N, Boziki M, Grigoriadis N.
Nutrients. 2022 Mar 9;14(6):1150. doi: 10.3390/nu14061150.
PMID: 35334810 Free PMC article. Review.
Multiple sclerosis (MS) is a chronic autoimmune disease of the central nervous system (CNS) characterized by inflammation and neurodegeneration. ...
2
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Changes in Gut Microbiota and Multiple Sclerosis: A Systematic Review.
Ordoñez-Rodriguez A, Roman P, Rueda-Ruzafa L, Campos-Rios A, Cardona D.
Int J Environ Res Public Health. 2023 Mar 6;20(5):4624. doi: 10.3390/ijerph20054624.
PMID: 36901634 Free PMC article. Review.
OBJECTIVE: To conduct a systematic review on the relationship between gut microbiota and multiple sclerosis. METHOD: The systematic review was conducted in the first quarter of 2022. ...The keywords used in the search were: "multiple sclerosis", ...
3
Cite
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Multiple Sclerosis: Mechanisms and Immunotherapy.
Baecher-Allan C, Kaskow BJ, Weiner HL.
Neuron. 2018 Feb 21;97(4):742-768. doi: 10.1016/j.neuron.2018.01.021.
PMID: 29470968 Free article. Review.
Multiple sclerosis (MS) is an autoimmune disease triggered by environmental factors that act on a genetically susceptible host. ...
4
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Obesity, gut microbiota, and multiple sclerosis: Unraveling the connection.
Samara A, Cantoni C, Piccio L, Cross AH, Chahin S.
Mult Scler Relat Disord. 2023 Aug;76:104768. doi: 10.1016/j.msard.2023.104768. Epub 2023 May 18.
PMID: 37269641 Review.
Obesity in early childhood and adolescence is also a significant risk factor for multiple sclerosis (MS)

MS

Leaky Gut	karakterizasyonu
serum zonulin↑ laktuloz/mannitol oranı↑	Methanobrevibacter, Akkermansia↑ Butyricimonas↓

MS-Disbiosis

- Yoğun şekilde tartışılan bakterilerden biri, MS hastalarında artan bolluğu ile Akkermansia muciniphila'dır (A. muciniphila)
- Dikkat çekici olan, Akkermansia'nın daha önce obezite ile ilişkilendirilmiş olan Gram negatif, kesinlikle anaerobik, oval şekilli, hareketsiz bir bakteri olmasıdır.
- İlginç bir şekilde, Akkermansia'nın bağışıklık tepkilerini düzenlediği ve metabolit havuzunu, özellikle bağırsaktaki bütirat seviyelerini değiştirdiği bilinmektedir.

Geerlings, S. Y., Kostopoulos, I., de Vos, W. M., & Belzer, C. (2018). Akkermansia muciniphila in the Human Gastrointestinal Tract: When, Where, and How?. Microorganisms, 6(3), 75. https://doi.org/10.3390/microorganisms6030075

MS- Akermenasia muciniphlia

- Liu ve arkadaşları, A. muciniphila'nın bir yandan EAE semptomlarını baskılayan Treg'lerin genişlemesini teşvik ettiğini göstermiştir.
- Öte yandan, A. muciniphila ve Acinetobacter calcoaceticus'un bireysel kültür özütlerini kullanan in vitro çalışmalar , bu protein lizatlarının T hücresi polarize edici koşullar altında Treg farklılaşmasını baskılarken Th1 hücrelerinin polarizasyonunu destekleyebildiğini göstermiştir .
- Dahası, MS hastalarından izole edilen Akkermansia ile kolonize edilen fareler , IL-17 üreten RORγ T hücreleriyle bağlantılı olarak azalmış EAE hastalık skorları göstermiştir ve bu da yararlı bir role işaret etmektedir.
- Dahası, Akkermansia'nın mukus bozucu işleviyle bağırsak bariyerini güçlendirme veya zayıflatmadaki rolü tartışmalıdır ve araştırılmalıdır.

Liu, S., Rezende, R. M., Moreira, T. G., Tankou, S. K., Cox, L. M., Wu, M., Song, A., Dhang, F. H., Wei, Z., Costamagna, G., & Weiner, H. L. (2019). Oral Administration of miR-30d from Feces of MS Patients Suppresses MS-like Symptoms in Mice by Expanding Akkermansia muciniphila. Cell host & microbe, 26(6), 779–794.e8. https://doi.org/10.1016/j.chom.2019.10.008

MS- tedavi desteği olarak probiyotikler

- Lavasani ve arkadaşları probiyotik bakteri türlerinin (Lactobacillus) takviyesinin T lenfositleri üzerindeki immünomodülasyon yoluyla hastalığı iyileştirebileceğini göstermiştir.
- Benzer şekilde, probiyotik suş Escherichia coli (E. coli) Nissle 1917'nin oral yoldan uygulanması, farelerde bağırsak bariyer fonksiyonunu iyileştirerek nöroinflamasyona duyarlılığı azaltır .
- Dahası, Prevotella histicola'nın uygulanması, Treg'leri düzenleyerek EAE'li farelerde hastalığın şiddetini baskılayabilir.
- Bununla uyumlu olarak, MS hastalarında, hafif proinflamatuar kapasiteye sahip yaygın olarak bulunan komensaller olan Prevotella ve Sutterella'nın bolluğu azalmıştır . Özellikle, hastalığı değiştiren terapilerle tedaviden sonra, Prevotella ve Sutterella'nın bolluğu MS hastalarında artabilir .
- MS'in aksine, Prevotella spp.'nin daha yüksek bolluğu romatoid artrit gibi farklı inflamatuar hastalıklarla ilişkilendirilmiştir. Bu, bakteri türleri ve çeşitli hastalıklar arasındaki karmaşık ve değişken etkileşimi vurgular.
- Bağırsak mikrobiyotası ve MS patolojisi arasındaki karmaşık etkileşimi anlamak, nihayetinde bu zayıflatıcı hastalık için yeni tedavilerin geliştirilmesine yol açabilecek önemli bir araştırma alanıdır.

Original Article
J Immunol Clin Microbiol. 2021;6(4):166-178

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Bibliometric Analysis of Intestinal Microbiota Publications in Multiple Sclerosis – WOS Example

Selen İlhan Alp[1]*

1 Namık Kemal Üniversitesi Sağlık Hizmetleri Yüksekokulu, Tekirdağ, Türkiye

Abstract

Background: In this study, the characteristics of the publications published on Multiple Sclerosis (MS) and intestinal microbiota were investigated.

Materials and Methods: Accordingly, a total of 145 articles in the WOS database were examined within the framework of the determined criteria. In our study, the situation was determined by using content analysis technique.

Results: Accordingly, a total of 145 articles in the WOS database were examined within the framework of the determined criteria. In this study, which is an example of a case study, content analysis technique was used in the analysis of the data. According to the findings, it was concluded that Frontiers Immunology and Multiple Sclerosis Journal were the journals in which more articles were published in the WOS database. While 2020 was the year in which the most articles were published in the WOS database, it was seen that there were no publications in the TR Index database. When the studies were evaluated according to the database, it was found that there were 83 (57%) research articles and 54 (37%) review articles. When all manual publications are evaluated, 69 (47.5) of these studies are compilations, 35 (24.1) of the research subgroups are experimental animal laboratory studies, 23 (15.8) of them are case-control, 12 (8%) ,2) were determined as clinical studies and 3 (2.1%) as cohort studies. The countries with the highest number of publications on MS and gut microbiota in the WOS database are the USA, Canada and Italy; It was determined that Turkey contributed with only one publication. In the distribution of publications by research area, neurology and immunology fields were found to be the fields with the highest number of publications.

Conclusions: In the study, the articles showed different features in terms of methodological features; In the articles, it was seen that the quantitative method and screening model were mostly preferred. However, it has been determined that there are significant differences in terms of content elements of the articles. In addition, it can be said that while the number of publications giving general information in the style of compilation is high, the number of clinical studies, randomized and cohort studies is low.

Multiple Skleroz'da Bağırsak Mikrobiyotası Konusundaki Yayınların Bibliyometrik Analizi – WOS Örneği

Özet

Amaç: Bu çalışmada Multiple Skleroz (MS) ve bağırsak mikrobiyotası konusunda 2000-2020 yılları arasında yayınlanan makalelerin niteliksel özelikleri araştırılmıştır.

Gereç ve Yöntem: Buna göre WOS veri tabanında yer alan toplamda 145 makale belirlenmiş olan ölçütler çerçevesinde incelenmiştir. Çalışmamızda içerik analizinden yaralanırlarak durum tespiti yapılmıştır.

Bulgular: Buna göre WOS veri tabanında yer alan toplamda 145 makale belirlenmiş olan ölçütler çerçevesinde incelenmiştir. Veri tabanına göre araştırmalar değerlendirildiğinde araştırma yazılarının 83(%57), derleme yazılarının ise 54(%37) adet olduğu bulunmuştur. Manüel tüm yayınlar değerlendirildiğinde ise bu çalışmaların 69(47,5)'ünün derleme, araştırma alt gruplarının ise 35(24,1)'i deneysel hayvansal laboratuvar çalışması, 23(15,8) tanesinin vaka-kontrol şeklinde, 12(%8,2) adetinin klinik araştırma, 3(%2,1)'ünün ise kohort şeklinde araştırmalar olarak belirlenmiştir. WOS veri tabanında MS ve bağırsak mikrobiyota alanında en fazla yayına sahip ülkelerin ABD, Kanada ve İtalya olduğu; Türkiye'nin ise sadece bir yayınla katkı sunduğu tespit edilmiştir. Yayınların araştırma alanına göre dağılımında nöroloji ve immünoloji alanları en fazla yayının olduğu alanlar olarak bulunmuştur.

Sonuç: Çalışmamızda incelenen makalelerin metodolojik özellikleri açısından farklılıklar gösterdiği ve çoğunlukla nicel yöntem ve tarama modellerin tercih edildiği görülmüştür. Bununla birlikte makalelerin içerik unsurları açısından belirgin farklılıklar olduğu tespit edilmiştir. Ek olarak derleme tarzında genel bilgiler veren yayınların sayısı fazla iken, klinik çalışmalar, randomize ve kohort çalışmaların sayılarının az olduğu söylenebilir.

Key words: *Multiple skleroz, mikrobiyota, bağırsak disbiyosis, bibliyometrik*

Modifiye edici tedaviler de mikrobiom üzerinde etkisi

- Cantarel B ve ark. tarafından 2015 yılında MS ve sağlıklı kontrollerde bağırsak bakterilerini karşılaştırılmış ve glatiramer asetat ve D vitamini tedavisinin mikrobiyota üzerindeki etkisini değerlendirilmiştir. Denekler, D vitamini yetersiz olan, RR-MS ve sağlıklı beyaz kadınlardı. Multipl sklerozlu hastalar tedavi edilmemiş veya glatiramer asetat alıyordu.

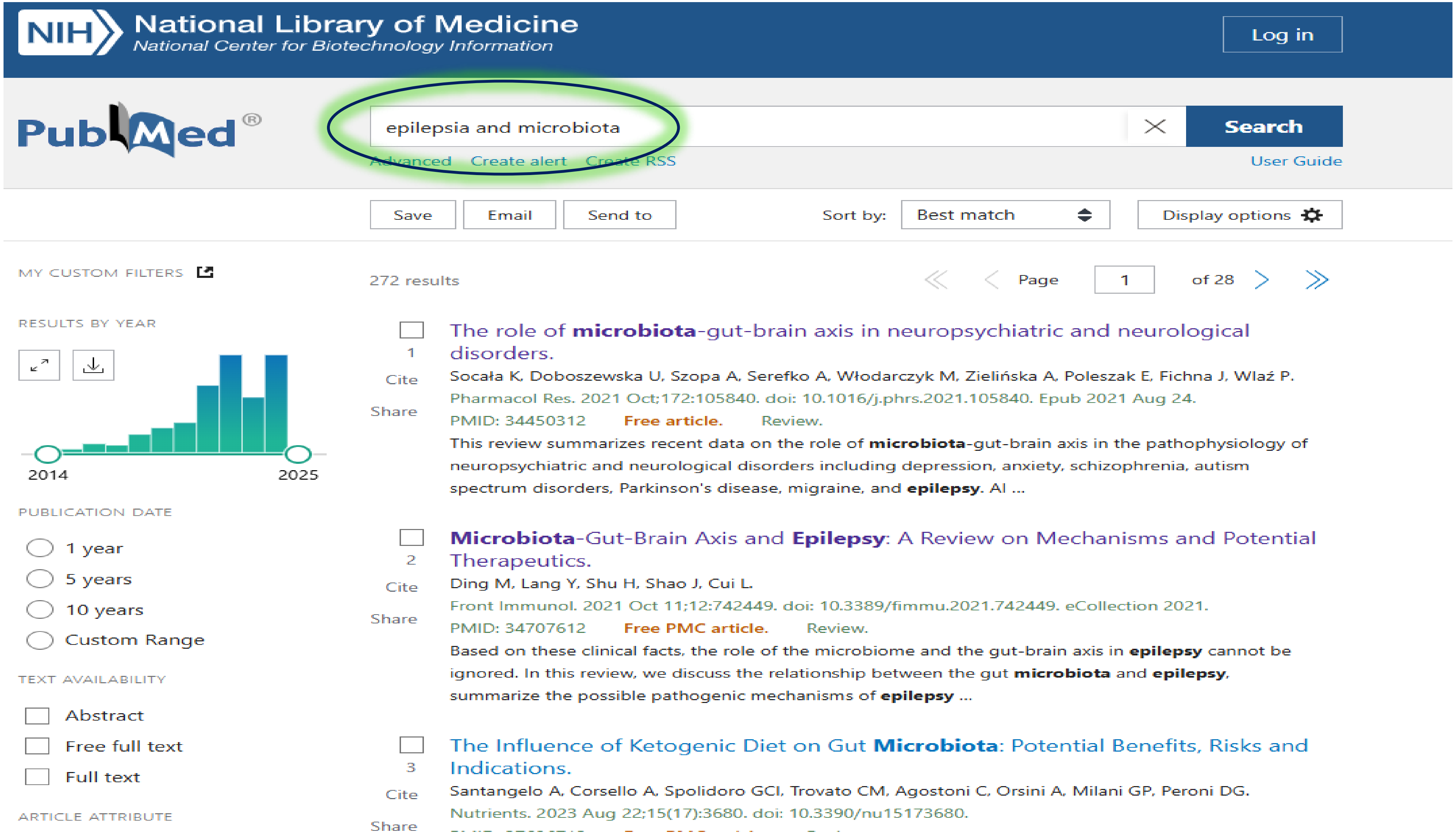
- Denekler birimlerin bolluğu, 16S rRNA'nın bir DNA mikrodizisine hibridizasyonu ile değerlendirilmiştir. başlangıçta ve 90 günlük D3 vitamini (5000 IU/d) takviyesinden sonra dışkı toplamış ve tedavi operasyonel taksonomik sonuçlarında bağırsak bakteri toplulukları örtüşürken, Faecalibacterium dahil olmak üzere bazı operasyonel taksonomik birimlerin bolluğu, multipl sklerozlu hastalarda daha düşük bulunmuştur.

- Glatiramer asetat ile edilen multipl sklerozlu hastalar, Bacteroidaceae, Faecalibacterium, Ruminococcus, Lactobacillaceae, Clostridium ve diğer Clostridiales dahil olmak üzere tedavi edilmeyen deneklerle karşılaştırıldığında topluluk kompozisyonunda farklılıklar göstermiştir.

- Diğer gruplarla karşılaştırıldığında, tedavi edilmeyen multipl sklerozlu hastalarda D vitamini takviyesi sonrası Akkermansia, Faecalibacterium ve Coprococcus cinslerinde artış görülmüştür.

- Genel bakteri toplulukları benzer olsa da, sağlıklı kontroller ve multipl sklerozlu hastalar arasında spesifik operasyonel taksonomik birimler farklılık göstermiştir.

- Glatiramer asetat ve D vitamini takviyesi, mikrobiyotadaki farklılıklar veya değişikliklerle ilişkilendirilmiştir.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The role of microbiota-gut-brain axis in neuropsychiatric and neurological disorders.
Socała K, Doboszewska U, Szopa A, Serefko A, Włodarczyk M, Zielińska A, Poleszak E, Fichna J, Wlaź P.
Pharmacol Res. 2021 Oct;172:105840. doi: 10.1016/j.phrs.2021.105840. Epub 2021 Aug 24.
PMID: 34450312 Free article. Review.
This review summarizes recent data on the role of microbiota-gut-brain axis in the pathophysiology of neuropsychiatric and neurological disorders including depression, anxiety, schizophrenia, autism spectrum disorders, Parkinson's disease, migraine, and epilepsy. Al ...
2
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Microbiota-Gut-Brain Axis and Epilepsy: A Review on Mechanisms and Potential Therapeutics.
Ding M, Lang Y, Shu H, Shao J, Cui L.
Front Immunol. 2021 Oct 11;12:742449. doi: 10.3389/fimmu.2021.742449. eCollection 2021.
PMID: 34707612 Free PMC article. Review.
Based on these clinical facts, the role of the microbiome and the gut-brain axis in epilepsy cannot be ignored. In this review, we discuss the relationship between the gut microbiota and epilepsy, summarize the possible pathogenic mechanisms of epilepsy ...
3
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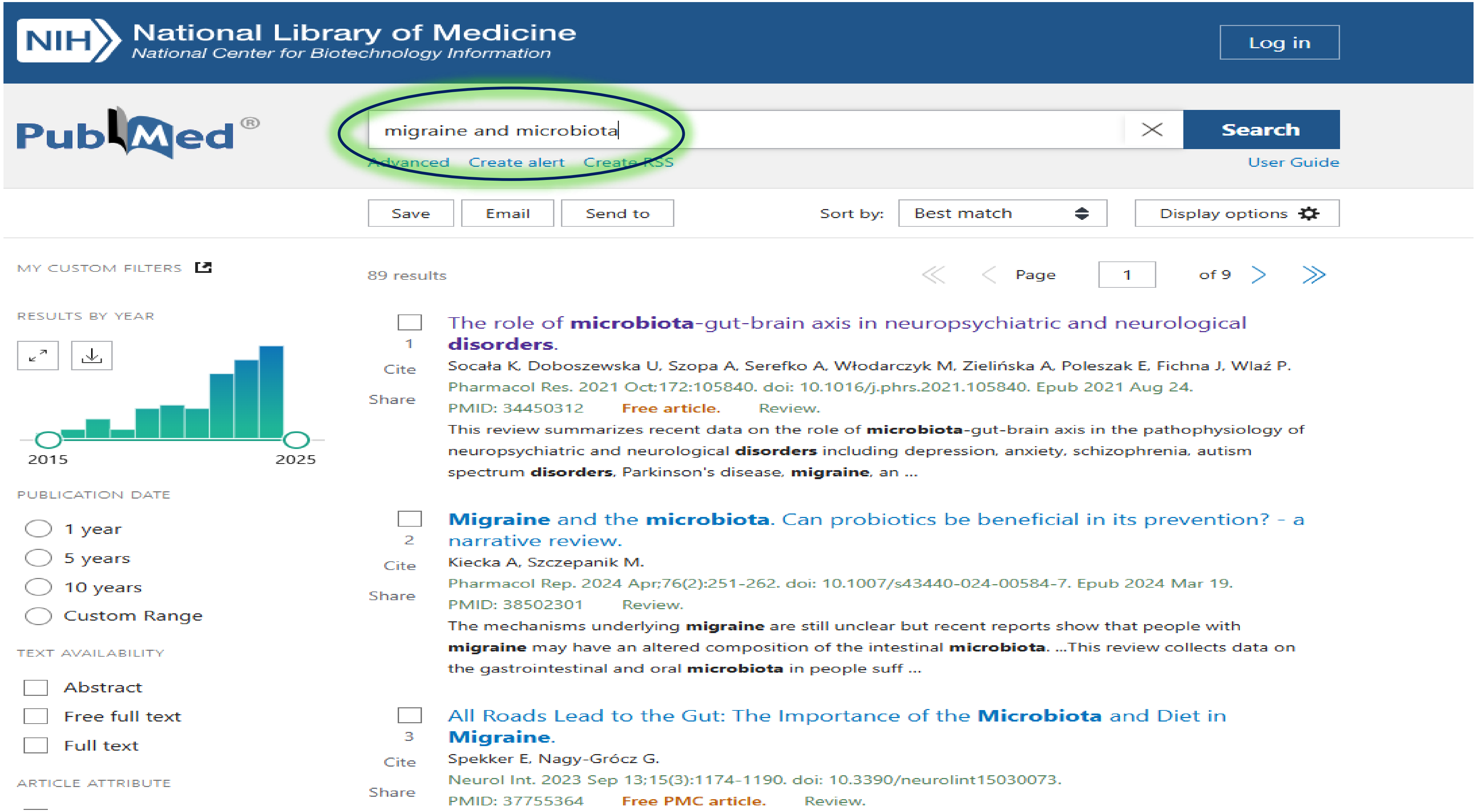
The Influence of Ketogenic Diet on Gut Microbiota: Potential Benefits, Risks and Indications.
Santangelo A, Corsello A, Spolidoro GCI, Trovato CM, Agostoni C, Orsini A, Milani GP, Peroni DG.
Nutrients. 2023 Aug 22;15(17):3680. doi: 10.3390/nu15173680.

Epilepsili hastalarda (ilaç dirençli/ilaç duyarlı) bağırsak mikrobiyotası üzerine daha önce yapılmış çalışmaların özeti.

Yazar	Yıl	Deneysel tasarım türü	Hasta Grubu	Yaş	Temel Bulgular
Gong ve diğerleri (35)	2020	Kesitsel çalışma	Keşif Kohortu (n=55 EP ve *n* = 46 HC) ve Doğrulama Kohortu (*n* = 13 EP ve *n* = 10 HC)	EP: 26,33 ± 12,05 HC: 28,5 ± 4,27	HC: tipik bir insan çeşitliliği profili EP: düşük alfa çeşitliliği; Şube: ↑Actinobacteria ve Verrucomicrobia; ↓Proteobacteria Cins: ↑ *Prevotella_9* , *Blautia* , *Bifidobacterium* DRE: Şube: ↑Actinobacteria, Verrucomicrobia ve Nitrospirae Cins: ↑ *Blautia* , *Bifidobacterium* , *Subdoligranulum* , *Dialister* ve *Anaerostipes*
Şafak ve diğerleri (36)	2020	Kesitsel çalışma	İdiyopatik fokal epilepsi (*n* = 30) ve HC (*n* = 10)	EP: 41,3 ± 12,2 HC: 1,7 ± 6,8	HC:↑Firmicutes (*Blautia* , *Coprococcus* , *Faecalibacterium* ve *Ruminococcus*), Bacteroidetes (*Bacteroides* ve *Parabacteroides*), Actinobacteria (*Bifidobacterium* ve *Collinsellagenus*) EP:↑Proteobacteria (*Campylobacter* , *Delftia* , *Haemophilus* , *Lautropia* , *Neisseria*), Fusobacteria
Peng ve diğerleri (37)	2018	Kesitsel çalışma	DRE (*n* = 42), DSE (*n* = 49), HC (*n* = 65)	DRE: 28,4 ± 12,4 DSE: 5,1 ± 14,6 HC: 29,4 ± 13,8	DSE ve HC: ↑Bacteroidetes; DRE grubu: ↓ Bacteroidetes, ↑Firmicutes ve ↑Verrucomicrobia
Lee ve diğerleri (38)	2020	İleriye dönük çalışma	Tedavi edilemeyen epilepsi (*n* = 8), HC (*n* = 32)	EP: 3,49 ± 1,76	EP:↓Bacteroidetes, Proteobacteria;↑Actinobacteria ↓Mikrobiyota zenginlik endeksleri İnatçı epilepsi için biyobelirteçler:↑ *E. faecium* , *B. longum, E. lenta;* ↑ABCT
Lee ve diğerleri (39)	2021	İleriye dönük çalışma	DRE (*n* = 23) *vs.* DSE (*n* = 21)	DSE: 44 ± 17,2 DRE: 41 ± 13,6	DSE:↑ *Bacteroides finegoldii* , *Ruminococcus_g2* DRE:↑ *Negativicutes* Alfa ve beta çeşitlilikleri: iki grup arasında anlamlı fark yok Normal EEG'ye sahip epilepsi hastaları: ↑ *Bifidobacterium* Normal MRI'ya sahip epilepsi hastaları: ↑ *Bacteroides finegoldii*
Xie ve diğerleri (40)	2017	İleriye dönük gözlemsel çalışma	Refrakter epilepsi (*n* = 14) *vs.* HC (*n* = 30)	EP: 1.95 ± 3.10 HC: 3 yıla kadar yaşlandırılmış	HC:↑Bacteroidetes,↑Actinobacteria EP:↑Proteobacteria,↑Firmicutes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Pharmacol Res. 2021 Oct;172:105840. doi: 10.1016/j.phrs.2021.105840. Epub 2021 Aug 24.
PMID: 34450312 Free article. Review.
This review summarizes recent data on the role of microbiota-gut-brain axis in the pathophysiology of neuropsychiatric and neurological disorders including depression, anxiety, schizophrenia, autism spectrum disorders, Parkinson's disease, migraine, an ...
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Migraine and the microbiota. Can probiotics be beneficial in its prevention? - a narrative review.
Kiecka A, Szczepanik M.
Pharmacol Rep. 2024 Apr;76(2):251-262. doi: 10.1007/s43440-024-00584-7. Epub 2024 Mar 19.
PMID: 38502301 Review.
The mechanisms underlying migraine are still unclear but recent reports show that people with migraine may have an altered composition of the intestinal microbiota. ...This review collects data on the gastrointestinal and oral microbiota in people suff ...
3
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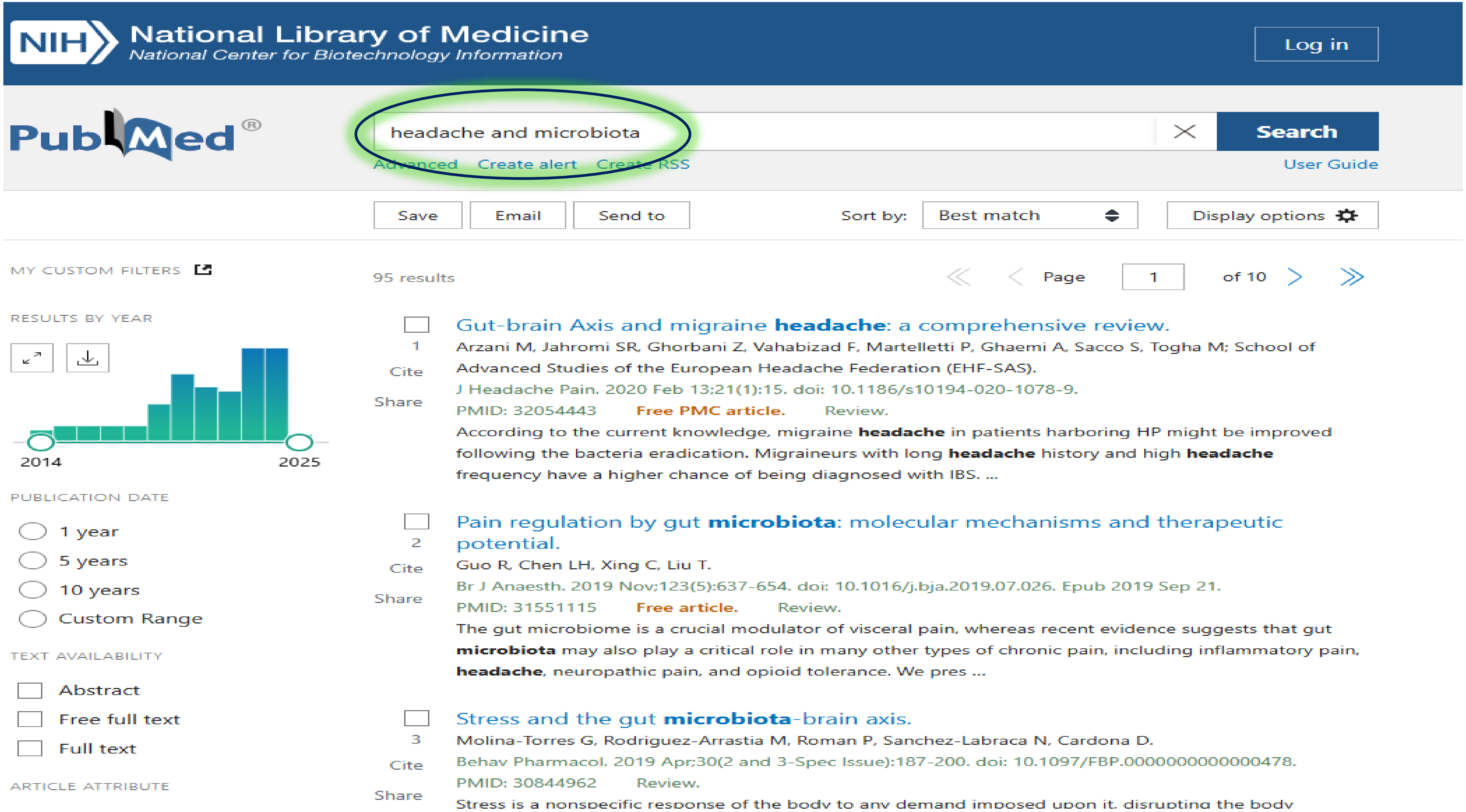
All Roads Lead to the Gut: The Importance of the Microbiota and Diet in Migraine.
Spekker E, Nagy-Grócz G.
Neurol Int. 2023 Sep 13;15(3):1174-1190. doi: 10.3390/neurolint15030073.
PMID: 37755364 Free PMC article. Review.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Gut-brain Axis and migraine headache: a comprehensive review.
Arzani M, Jahromi SR, Ghorbani Z, Vahabizad F, Martelletti P, Ghaemi A, Sacco S, Togha M; School of Advanced Studies of the European Headache Federation (EHF-SAS).
J Headache Pain. 2020 Feb 13;21(1):15. doi: 10.1186/s10194-020-1078-9.
PMID: 32054443 Free PMC article. Review.
According to the current knowledge, migraine headache in patients harboring HP might be improved following the bacteria eradication. Migraineurs with long headache history and high headache frequency have a higher chance of being diagnosed with IBS. ...
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Pain regulation by gut microbiota: molecular mechanisms and therapeutic potential.
Guo R, Chen LH, Xing C, Liu T.
Br J Anaesth. 2019 Nov;123(5):637-654. doi: 10.1016/j.bja.2019.07.026. Epub 2019 Sep 21.
PMID: 31551115 Free article. Review.
The gut microbiome is a crucial modulator of visceral pain, whereas recent evidence suggests that gut microbiota may also play a critical role in many other types of chronic pain, including inflammatory pain, headache, neuropathic pain, and opioid tolerance. We pres ...
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Stress and the gut microbiota-brain axis.
Molina-Torres G, Rodriguez-Arrastia M, Roman P, Sanchez-Labraca N, Cardona D.
Behav Pharmacol. 2019 Apr;30(2 and 3-Spec Issue):187-200. doi: 10.1097/FBP.0000000000000478.
PMID: 30844962 Review.
Stress is a nonspecific response of the body to any demand imposed upon it, disrupting the body

- Migrenlilerde,
  - SİBO çok yaygın, Klinik gözlemlemiz de bu şekilde.
  - Düşük çeşitlilik ve disbiyoz genellikle migrenli hastalarda daha yaygındır. Migren hastalarında, bazı Firmicutes ve Bacteroidetes türlerinin dengesizliği gözlemlenmiştir.
  - Lactobacillus ve Bifidobacterium gibi probiyotik bakteriler, migrenin semptomlarını hafifletebilir.

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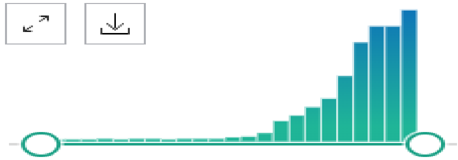

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Gut Microbiota and Their Metabolites in Stroke: A Double-Edged Sword.
Peh A, O'Donnell JA, Broughton BRS, Marques FZ.
Stroke. 2022 May;53(5):1788-1801. doi: 10.1161/STROKEAHA.121.036800. Epub 2022 Feb 9.
PMID: 35135325 Review.
Besides damaging the brain, **stroke** causes systemic changes, including to the gastrointestinal system. A growing body of evidence supports the role of the gut and its **microbiota** in **stroke**, **stroke** prognosis, and recovery. The gut **microbiota** can in ...

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Obesity and gut-microbiota-brain axis: A narrative review.
Asadi A, Shadab Mehr N, Mohamadi MH, Shokri F, Heidary M, Sadeghifard N, Khoshnood S.
J Clin Lab Anal. 2022 May;36(5):e24420. doi: 10.1002/jcla.24420. Epub 2022 Apr 14.
PMID: 35421277 Free PMC article. Review.
INTRODUCTION: Obesity is a major health problem that is associated with many physiological and mental disorders, such as diabetes, **stroke**, and depression. Gut **microbiota** has been affirmed to interact with various organs, including the brain. ...RESULTS: The gut-brai ...

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Aging Microbiota-Gut-Brain Axis in Stroke Risk and Outcome.
Honarpisheh P, Bryan RM, McCullough LD.
Circ Res. 2022 Apr 15;130(8):1112-1144. doi: 10.1161/CIRCRESAHA.122.319983. Epub 2022 Apr 14.
PMID: 35420913 Free PMC article. Review.
In the final section, the current clinical and preclinical evidence for the role of MGBA signaling in the development of **stroke** risk factors such as obesity, diabetes, hypertension, and frailty are summarized, as well as **microbiota** changes with **stroke** in expe ...

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Stroke and Vascular Cognitive Impairment: The Role of Intestinal Microbiota Metabolite TMAO.
Tu R, Xia J.

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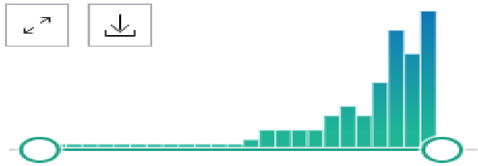

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OSA Is Associated With the Human Gut Microbiota Composition and Functional Potential in the Population-Based Swedish CardioPulmonary bioImage Study.

Baldanzi G, Sayols-Baixeras S, Theorell-Haglöw J, Dekkers KF, Hammar U, Nguyen D, Lin YT, Ahmad S, Holm JB, Nielsen HB, Brunkwall L, Benedict C, Cedernaes J, Koskiniemi S, Phillipson M, Lind L, Sundström J, Bergström G, Engström G, Smith JG, Orho-Melander M, Ärnlöv J, Kennedy B, Lindberg E, Fall T.

Chest. 2023 Aug;164(2):503-516. doi: 10.1016/j.chest.2023.03.010. Epub 2023 Mar 15.

PMID: 36925044 Free PMC article.

RESEARCH QUESTION: Does **OSA** in adults associate with the composition and functional potential of the human gut **microbiota**? ...Our findings lay the foundation for future research on the gut **microbiota**-mediated health effects of **OSA**....

2 Cite Share

Causality Investigation between Gut Microbiota, Derived Metabolites, and Obstructive Sleep Apnea: A Bidirectional Mendelian Randomization Study.

Yan W, Jiang M, Hu W, Zhan X, Liu Y, Zhou J, Ji J, Wang S, Tai J.

Nutrients. 2023 Oct 26;15(21):4544. doi: 10.3390/nu15214544.

PMID: 37960197 Free PMC article.

The analysis of the 196 gut **microbiota** revealed that genus_Ruminococcaceae (UCG009) (P(IVW) = 0.010) and genus_Subdoligranulum (P(IVW) = 0.041) were associated with an increased risk of **OSA** onset. ...Moreover, the reverse MR analysis demonstrated a suggestive associ ...

3 Cite Share

Metabolomics and microbiome profiling as biomarkers in obstructive sleep apnoea: a comprehensive review.

Zhang X, Wang S, Xu H, Yi H, Guan J, Yin S.

Eur Respir Rev. 2021 May 11;30(160):200220. doi: 10.1183/16000617.0220-2020. Print 2021 Jun 30.

PMID: 33980666 Free PMC article. Review.

INTRODUCTION: Obstructive sleep apnoea (**OSA**) is a common sleep disorder with a high social and economic burden. Thus, early prediction and diagnosis of **OSA** are important. ...CONCLUSIONS: Certain

Inflamatuar Bağırsak Hastalıkları

1

IBD öncelikle bağırsağı etkilerken, nörolojik bozukluklar dahil olmak üzere bağırsak dışı belirtilere de neden olabilir. Örneğin, IBD hastaları depresyon ve anksiyete gibi nöropsikiyatrik semptomlar yaşayabilir.

2

IBD hastalarının üçte biri anksiyete semptomlarından ve dörtte biri depresyon semptomlarından etkilenir ve aktif hastalığı olan hastalarda anksiyete ve depresyonun daha yüksek bir yaygınlığı vardır.

3

Ayrıca, ortak epidemiyolojik ve immünolojik kalıpları nedeniyle MS ve IBD arasında çift yönlü bir ilişki olduğu öne sürülmüştür.

4

Bir örnek olarak, Kosmidou ve arkadaşları tarafından yürütülen kapsamlı bir meta-analiz, MS'li hastalarda IBD geliştirme riskinin %55 arttığını, buna paralel olarak IBD tanısı almış bireylerde MS geliştirme riskinin %53 arttığını ortaya koymuştur.

Kosmidou, M., Katsanos, A. H., Katsanos, K. H., Kyritsis, A. P., Tsivgoulis, G., Christodoulou, D., & Giannopoulos, S. (2017). Multiple sclerosis and inflammatory bowel diseases: a systematic review and meta-analysis. Journal of neurology, 264, 254-259.

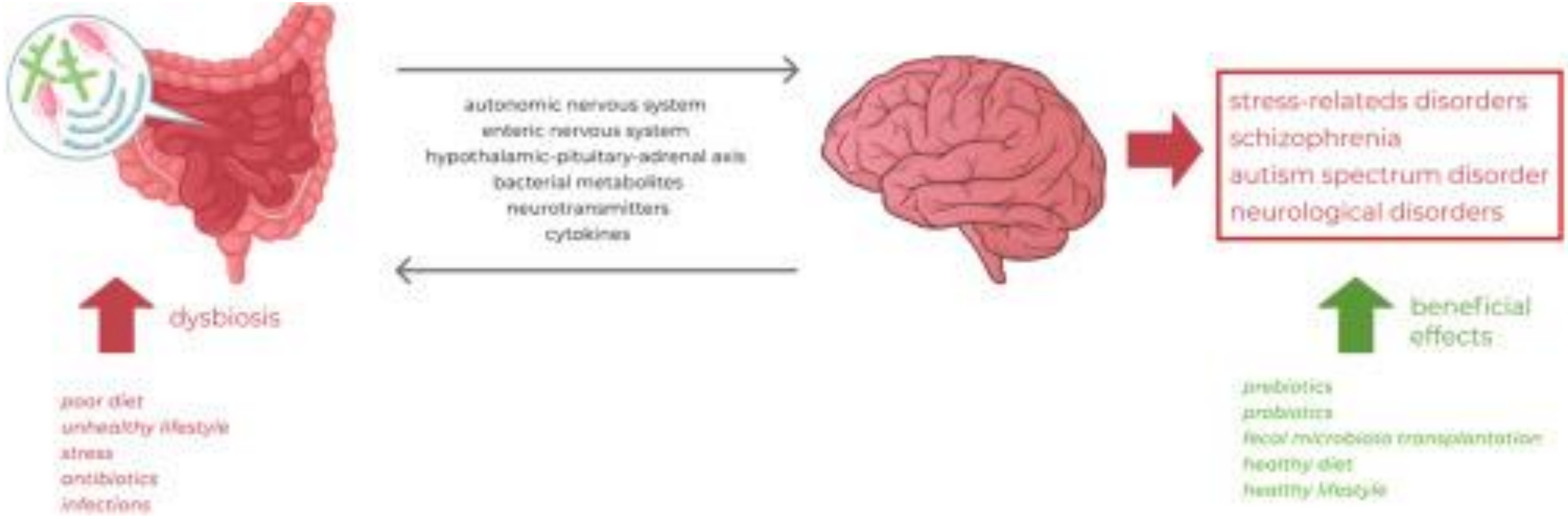
İBD-Nörolojik hastalıklar

IBD hastalarında demans, AD ve PD (özellikle artan yaşla birlikte) geliştirme riski artmıştır.

Dahası, IBD ve AD veya IBD ve PD arasında birkaç genetik ve çevresel risk faktörü paylaşılmaktadır.

Genel olarak, bu bulgular IBD hastalarının nörodejeneratif ve nöroimmünolojik bozukluklardan daha sık etkilendiğini düşündürmektedir.

Stolzer, I., Scherer, E., Süß, P., Rothhammer, V., Winner, B., Neurath, M. F., & Günther, C. (2023). Impact of Microbiome-Brain Communication on Neuroinflammation and Neurodegeneration. International journal of molecular sciences, 24(19), 14925. https://doi.org/10.3390/ijms241914925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neurological disorders
dysbiosis
poor diet
unhealthy lifestyle
stress
antibiotics
infections
beneficial effects
prebiotics
probiotics
fecal microbiota transplantation
healthy diet
healthy lifestyle

Teşekkürler….

Doç. Dr. Recep ALP
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