CONBRACANN

2ª EDIÇÃO

CONGRESSO BRASILEIRO DE CANNABIS MEDICINAL

ORGANIZAÇÃO E REALIZAÇÃO

EAD PLUS

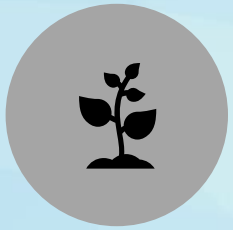
Educação em Saúde

Cannabis Medicinal no tratamento da doença de Alzheimer: existe eficácia?

Gustavo Alves Andrade dos Santos

Farmacêutico-Bioquímico, Doutor em Biotecnologia, Mestre em Farmácia; Pós Doutor em Anatomia e Cirurgia pela Faculdade de Medicina da Universidade de São Paulo (USP-Ribeirão Preto). Fez Neurobiologia (Universidade de Chicago), Farmácia Clínica (Universidade Central da Flórida), EUA; Farmácia Hospitalar (Hospital Necker) Paris, França; Pós-graduado em Farmácia Hospitalar (Faculdades Oswaldo Cruz). É Professor da Faculdade de Medicina São Leopoldo Mandic, Araras, SP; Coordenador do grupo técnico de Farmácia Hospitalar do Conselho Regional de Farmácia do Estado de São Paulo. Membro da Alzheimer´s Association International (ISTAART) e Membro da American Society of Health-System Pharmacists (ASHP). Pesquisador Assistente na UNICAMP. Autor de livros nos segmentos de Farmácia e Alzheimer. Atualmente faz seu segundo Pós-doutorado pela Faculdade de Medicina da USP de RP, linha de pesquisa: "biomarcadores salivares em Alzheimer". E pela UNICAMP atua em um projeto envolvendo "Bioativos no declínio cognitivo leve" e "Nanofármacos na demência de Alzheimer".

TRATAMENTO



CURA

REGRESSÃO

QUALIDADE DE VIDA

UNICAMP

SÃO LEOPOLDO MANDIC
Araras

USP Universidade de São Paulo
Ribeirão Preto

ALZHEIMER'S ASSOCIATION

@gusfarma

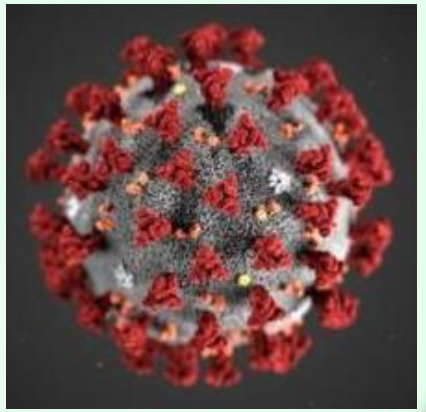
CRF SP
CONSELHO REGIONAL DE FARMÁCIA DO ESTADO DE SÃO PAULO

Declaração de conflito de Interesses

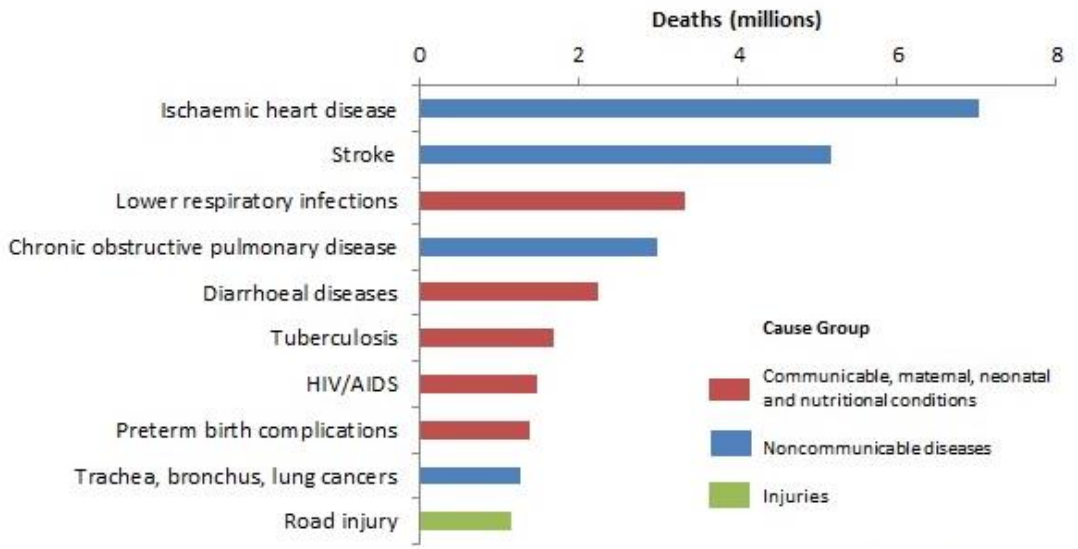
O palestrante, ***Gustavo Alves***, declara não apresentar conflitos de interesse que possam estar relacionados à sua apresentação.

~~Mal de Alzheimer~~

Uma epidemia?

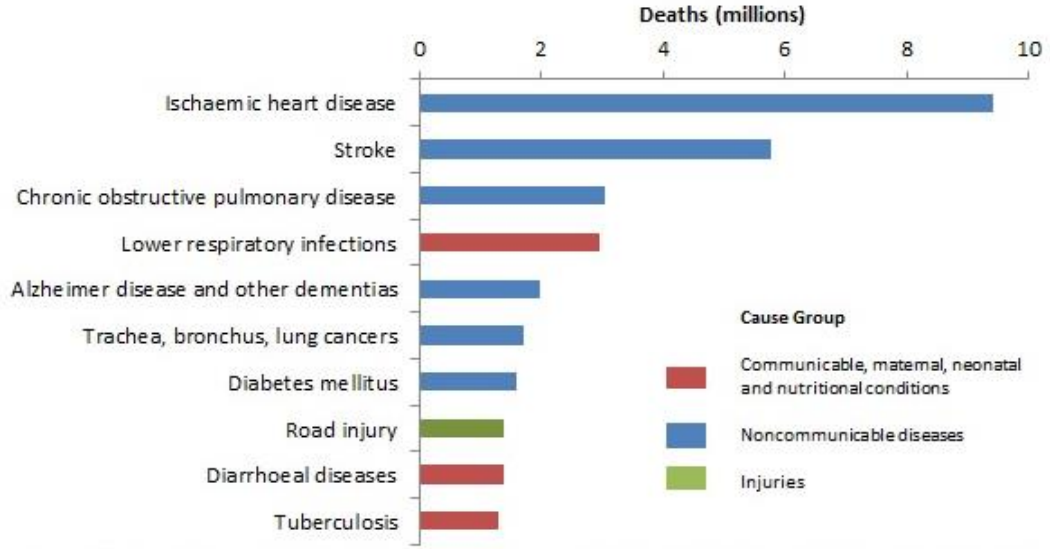


Top 10 global causes of deaths, 2000



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.

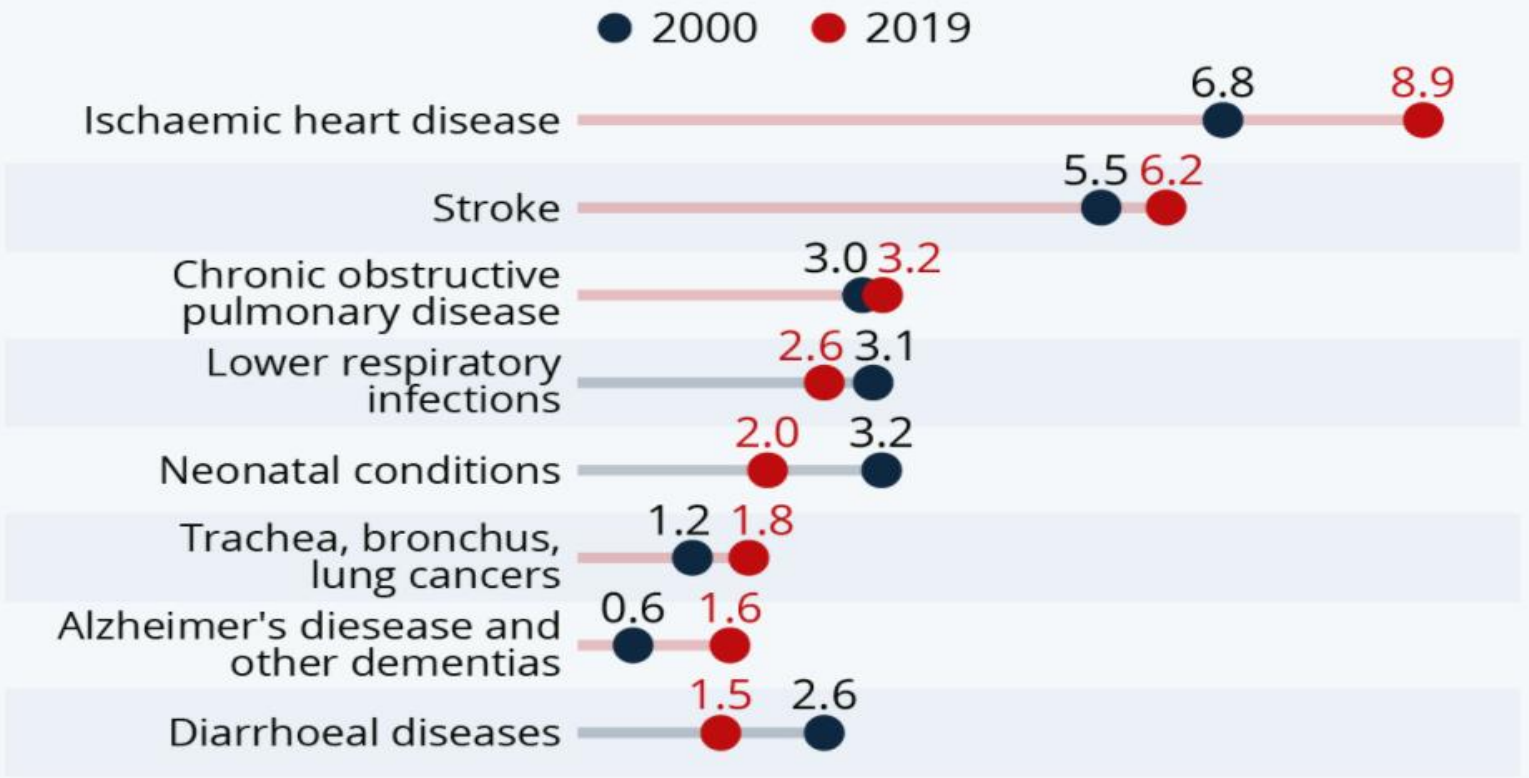
Top 10 global causes of deaths, 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.

The World's Leading Causes Of Death

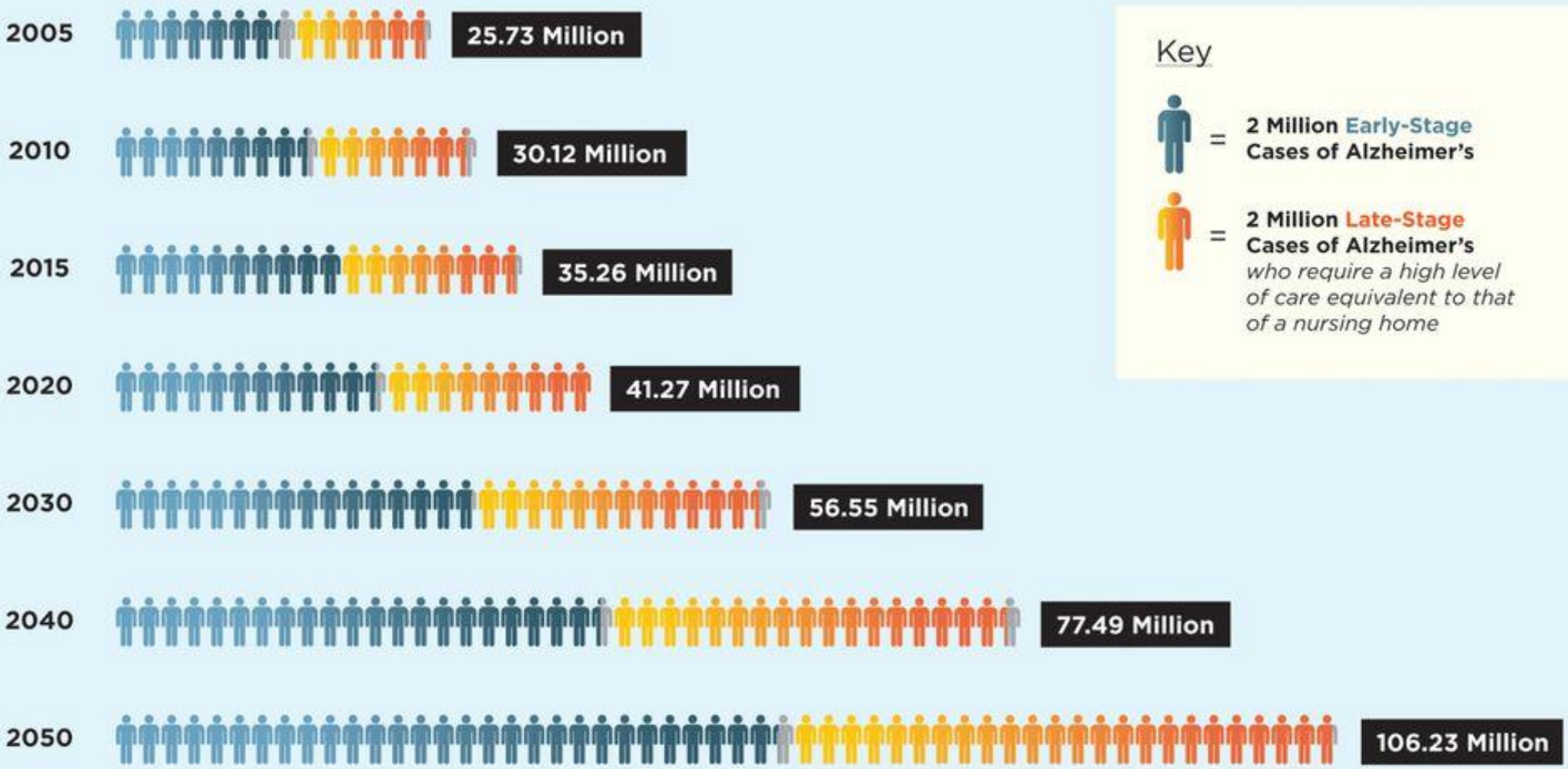
Total number of people who died from the following conditions (in millions)



Source: World Health Organization

WORLDWIDE PROJECTIONS OF ALZHEIMER'S PREVALENCE

FOR THE YEARS 2005–2050, BY STAGE OF DISEASE (IN MILLIONS)



*Adapted from "Forecasting the global burden of Alzheimer's disease," by Ron Brookmeyer, Elizabeth Johnson, Kathryn Ziegler-Graham, and H. Michael Arrighi, 2007, Alzheimer's & Dementia, volume 3, p. 189. Copyright 2007 by The Alzheimer's Association.


ALZHEIMER'S DISEASE IS THE
6TH LEADING CAUSE
OF DEATH IN THE UNITED STATES
In 2017, Alzheimer's and other dementias will cost the nation $259 billion
By 2050, these costs could rise as high as
$1.1 TRILLION
MORE THAN 5 MILLION AMERICANS ARE LIVING WITH ALZHEIMER'S
BY 2050, THIS NUMBER COULD RISE AS HIGH AS 16 MILLION
EVERY
66
SECONDS
someone in the United States develops the disease
35% of caregivers for people with Alzheimer's or another dementia report that their health has gotten worse due to care responsibilities, compared to
19% of caregivers for older people without dementia
1 IN 3
seniors dies with Alzheimer's or another dementia
Since 2000, deaths from heart disease have decreased by 14%
while deaths from Alzheimer's disease have increased by 89%
MORE THAN
15 MILLION AMERICANS
provide unpaid care for people with Alzheimer's or other dementias
IN 2016
these caregivers provided an estimated
18.2 BILLION HOURS
of care valued at over
$230 BILLION
IT KILLS MORE THAN
breast cancer and prostate cancer
COMBINED

30 milhões

1,2 milhões (2016)

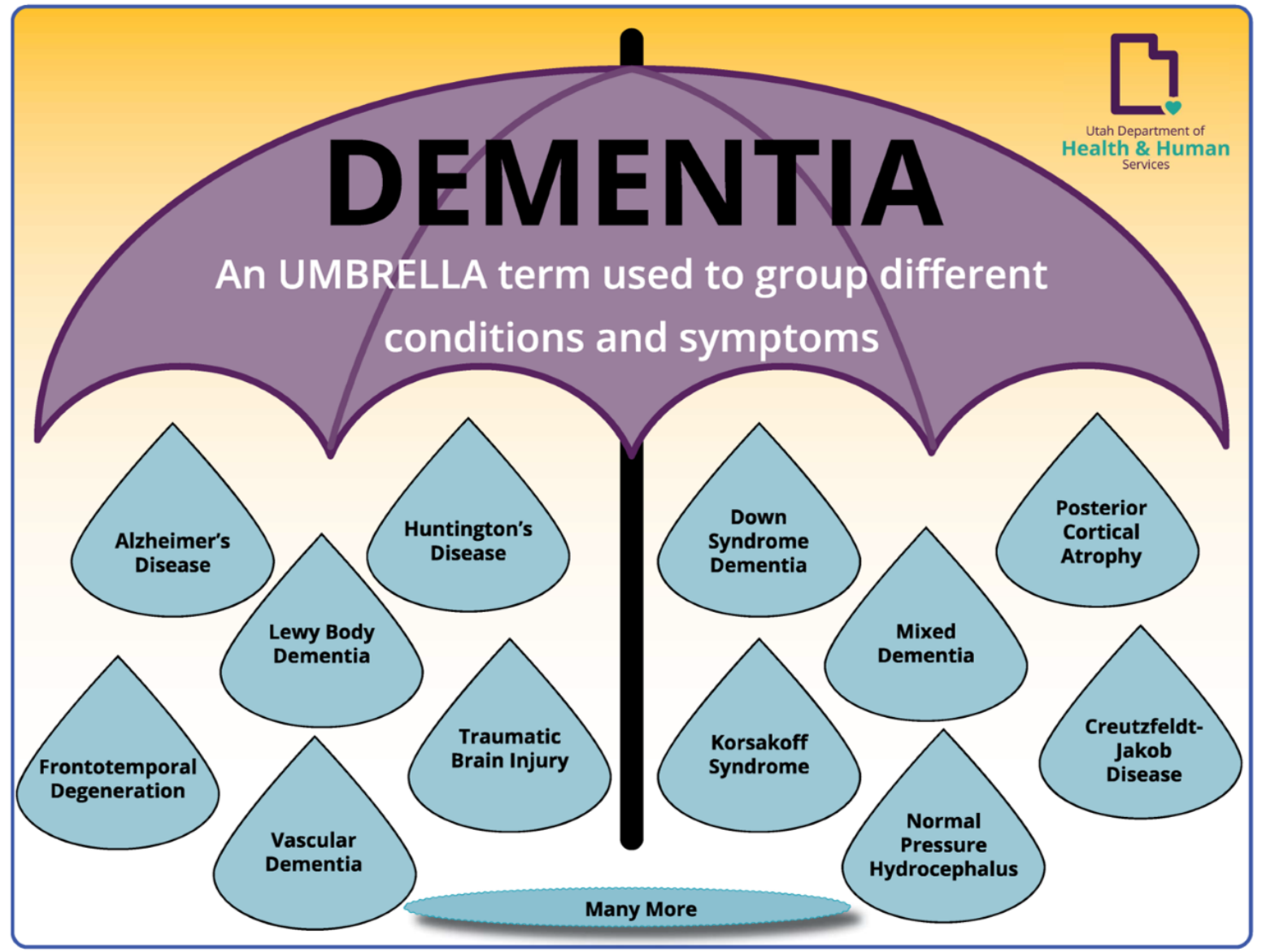
1,8 milhões (2023)

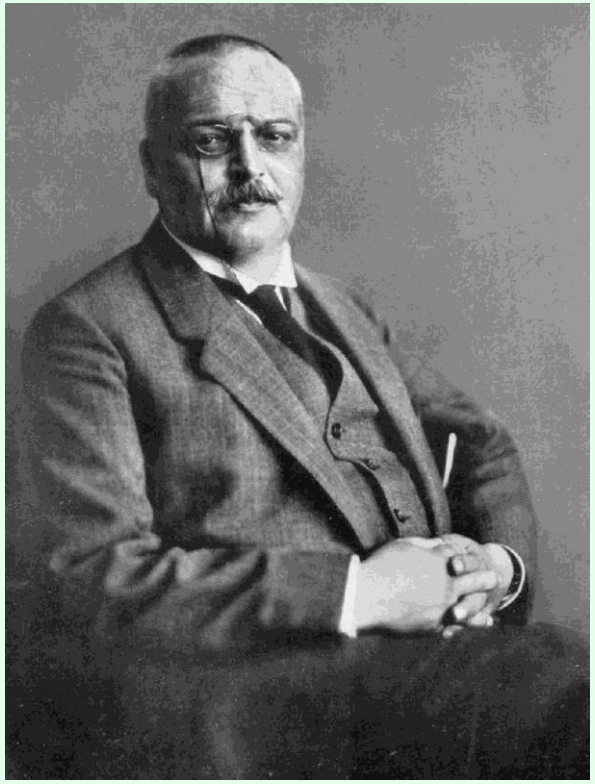
Relatório Mundial sobre o Alzheimer

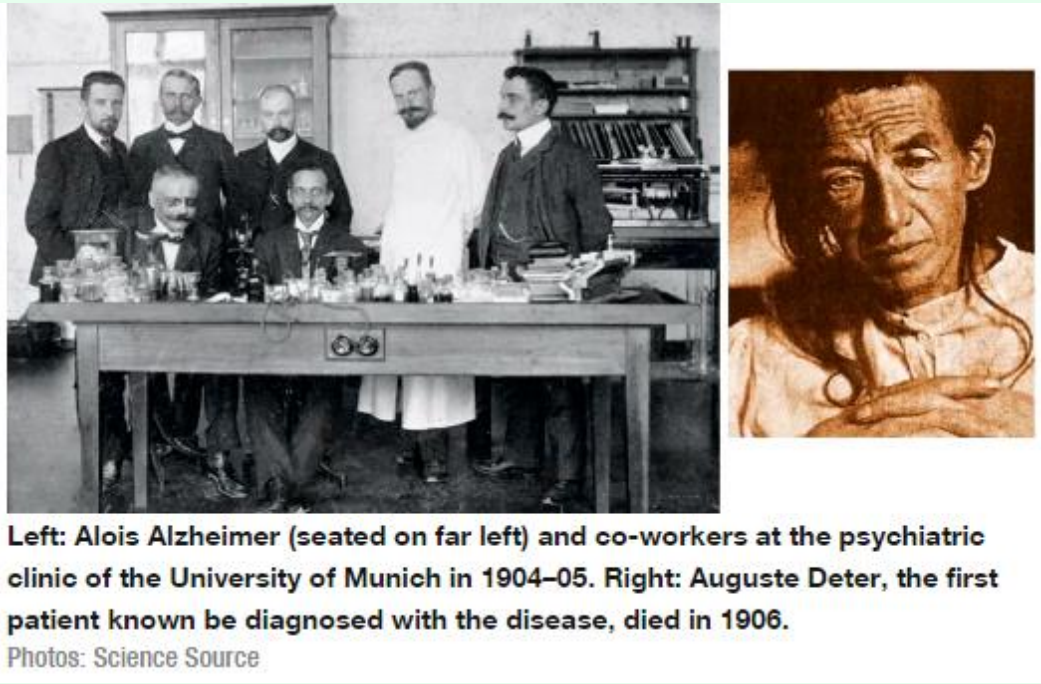
World Alzheimer Reports

The World Alzheimer Reports are a comprehensive source of global socioeconomic information on dementia. Each World Alzheimer Report is on a different topic, so the previous reports remain important sources of information with global relevance.

Crescimento do número de pessoas com demência (milhões) em países de alta renda e países de renda média e baixa

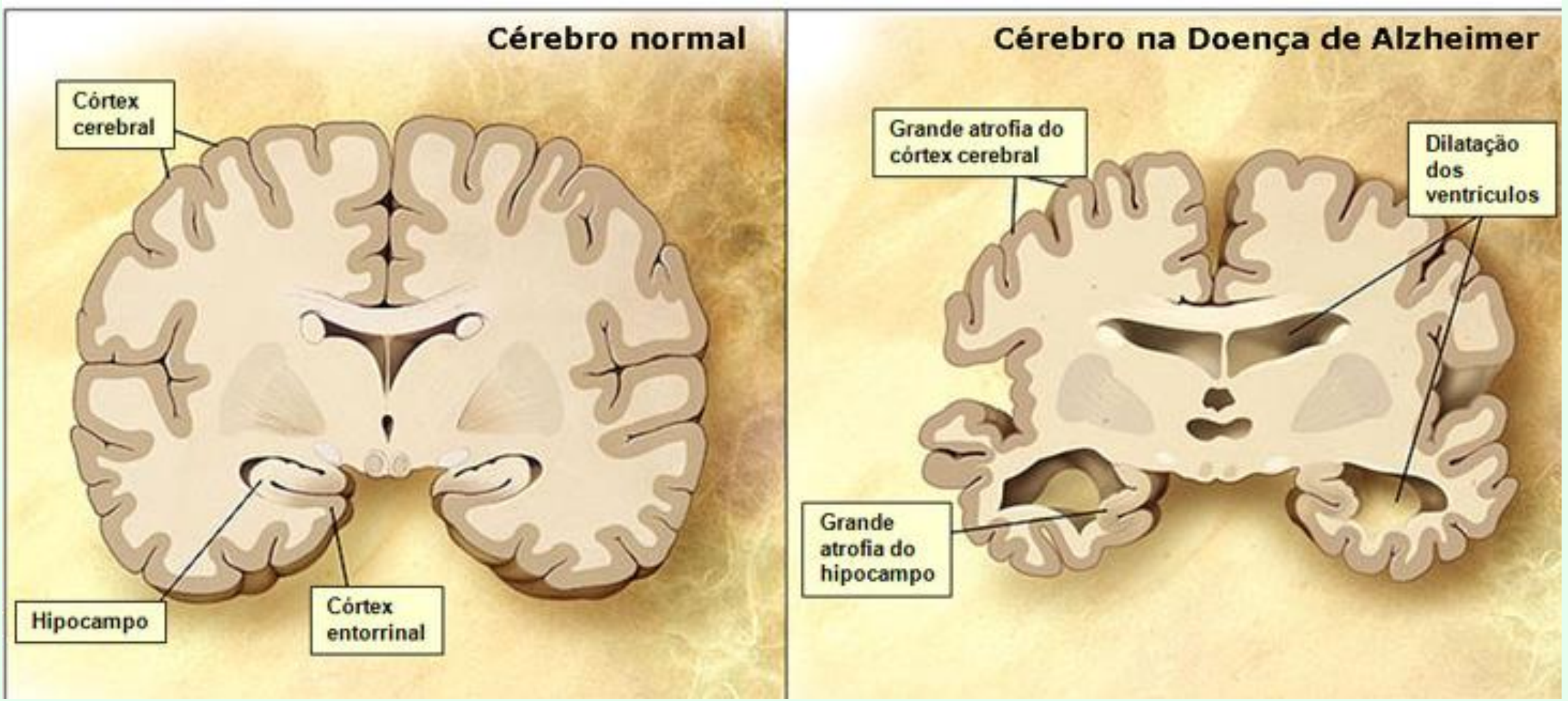

DEMENTIA
Utah Department of Health & Human Services
An UMBRELLA term used to group different conditions and symptoms
Alzheimer's Disease
Huntington's Disease
Down Syndrome Dementia
Posterior Cortical Atrophy
Lewy Body Dementia
Mixed Dementia
Frontotemporal Degeneration
Traumatic Brain Injury
Korsakoff Syndrome
Creutzfeldt-Jakob Disease
Vascular Dementia
Normal Pressure Hydrocephalus
Many More





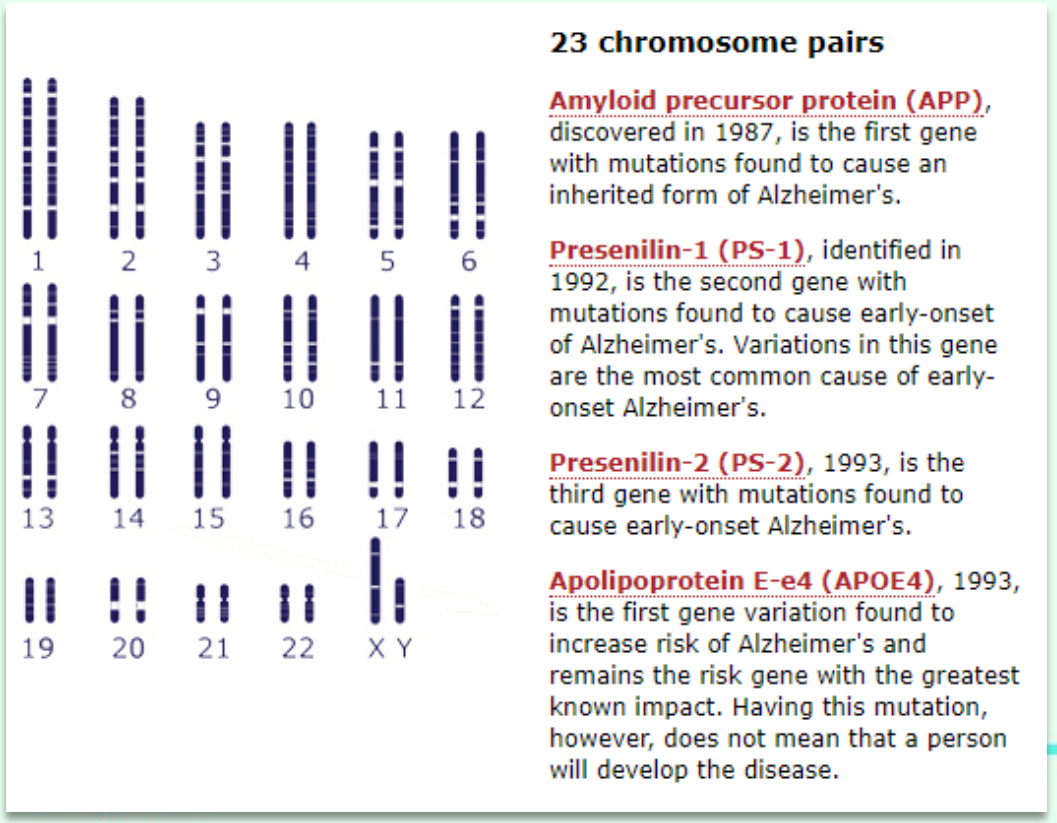
Left: Alois Alzheimer (seated on far left) and co-workers at the psychiatric clinic of the University of Munich in 1904–05. Right: Auguste Deter, the first patient known be diagnosed with the disease, died in 1906.
Photos: Science Source

- 1864/1915 – Alois Alzheimer – Marktbreit (Alemanha).
- 8/3/1906 – August D. – 51 anos de idade
- 1995 – Universidade de Frankfurt.


Cérebro normal
Córtex cerebral
Hipocampo
Córtex entorrinal
Cérebro na Doença de Alzheimer
Grande atrofia do córtex cerebral
Dilatação dos ventrículos
Grande atrofia do hipocampo

Fatores de risco para a Doença de Alzheimer?

Idade avançada: 1 a 6 % das pessoas até 65 anos de idade; 50 % até os 85 anos;
Mulheres (+++++), Homens (++++);
DM
Cardiovasculares, HAS
Obesidade
Distúrbios do colesterol
Ausência de Redes sociais
Não praticar atividades físicas
Traumas cranianos;
Maus hábitos de vida: alcoolismo, tabagismo.
Baixo nível educacional
Depressão
Genética: cromossomos 14,19 e 21.



Did you know that there are known risks for Alzheimer's disease and related dementias?

- not enough aerobic physical activity
- cigarette smoking
- excessive alcohol use
- obesity
- hypertension
- diabetes
- depression
- hearing loss

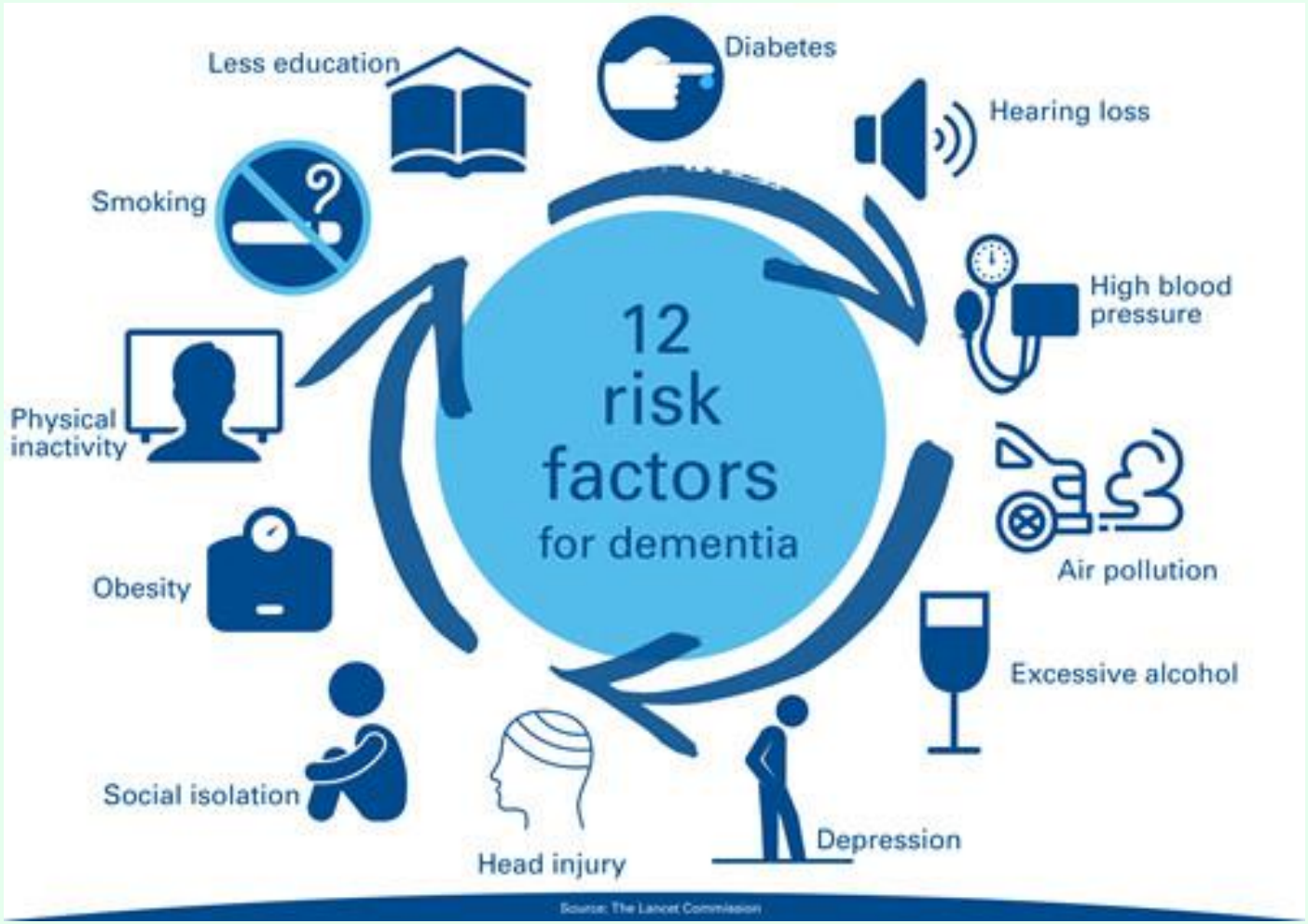
Keep your brain healthy!

Talk to your health care provider about things you can do to reduce your risk

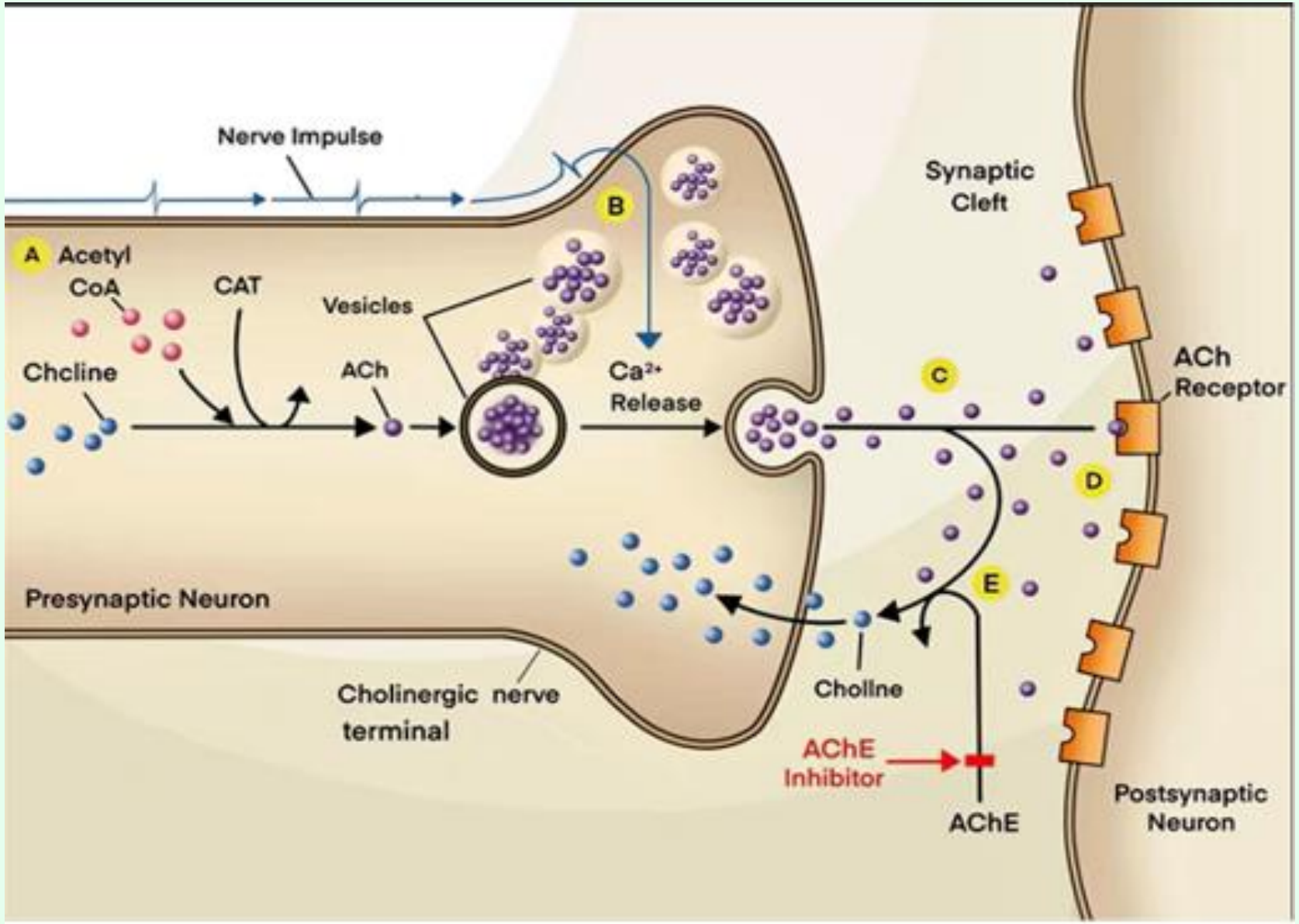
bit.ly/mm7120a2

MMWR

MAY 20, 2022



Reducing the risk - Alzheimers New Zealand


Nerve Impulse
Synaptic Cleft
A Acetyl CoA
CAT
Vesicles
B
Chcline
ACh
Ca2+ Release
C
ACh Receptor
D
E
Presynaptic Neuron
Cholinergic nerve terminal
Choline
AChE Inhibitor
AChE
Postsynaptic Neuron

Tratamento Farmacológico

Tabela 1. Características gerais dos inibidores das colinesterases.

	Tacrina	Donepezil	Rivastigmina	Galantamina
Disponível no ano	1993	1997	1998	2000
Classe química	Acridina	Piperidina	Carbamato	Alcalóide fenantreno
Seletividade cerebral	Não	Sim	Sim	Sim
Tipo de inibição da colinesterase	Reversível	Reversível	Pseudo-irreversível	Reversível
Modulação alostérica de receptor nicotínico	Não	Não	Não	Sim
Enzimas inibidas[1]	AchE BuChE	AChE	AchE BuChE	AChE

1 AchE: acetil-colinesterase; BuChE: butiril-colinesterase.

Tabela 2. Farmacologia dos inibidores das colinesterases.

Droga	Dosagem (mg/dia)	Meia-vida de eliminação	Posologia diária	Metabolização e eliminação
Tacrina	40-160	curta (3-4 h)	4 tomadas	Hepática (CYP 1A2) risco de hepatotoxicidade
Donepezil	5-10	Intermediária (7 h)	dose única	Hepática (CYP 2D6 e 3A4) Excreção renal (droga intacta)
Rivastigmina	6-12	curta* (1-2 h)	2 tomadas	Sináptica + excreção renal (baixo risco de interações)
Galantamina	12-24	longa (70 h)	2 tomadas	Hepática (CYP 2D6 e 3A4)

*CYP: isoenzima do citocromo P450. *No caso da rivastigmina, ocorre dissociação entre a meia-vida de eliminação e a meia-vida de inibição, em torno de 10 horas.*

Forlenza, 2008

Alzheimer disease: Severity, associated symptoms, and recommended treatment

Dementia category	Global Deterioration Scale (stages 1–7)	Medications
Not demented	**1** No cognitive impairment **2** Very mild decline: age-associated cognitive impairment **3** Mild cognitive impairment, minor neurocognitive decline	No indication for cognitive enhancers
Mild dementia	**4** Decreased knowledge of current and recent events Decreased ability to travel, handle finances, and manage basic activities of daily living	Cholinesterase inhibitors
Moderate dementia	**5** Unable to recall a major relevant aspect of their current life, an address or telephone number of many years, or the names of close family members Basic activities of daily living begin to be impaired	Cholinesterase inhibitors with or without an NMDA receptor antagonist
Severe dementia	**6** Occasionally forgets the name of the spouse or caregiver on whom he or she is entirely dependent Unaware of all recent events and experiences in their lives Most basic activities of daily living impaired	Cholinesterase inhibitor (donepezil) with or without an NMDA receptor antagonist
Advanced dementia	**7** Cannot speak or walk, has incontinence and difficulty swallowing	No randomized controlled trials in stage 7

NMDA = *N*-methyl-D-aspartate

Qaseem A, Snow V, Cross JT Jr, et al. Current pharmacologic treatment of dementia: a clinical practice guideline from the American College of Physicians and the American Academy of Family Physicians. Ann Intern Med 2008; 148:370–378

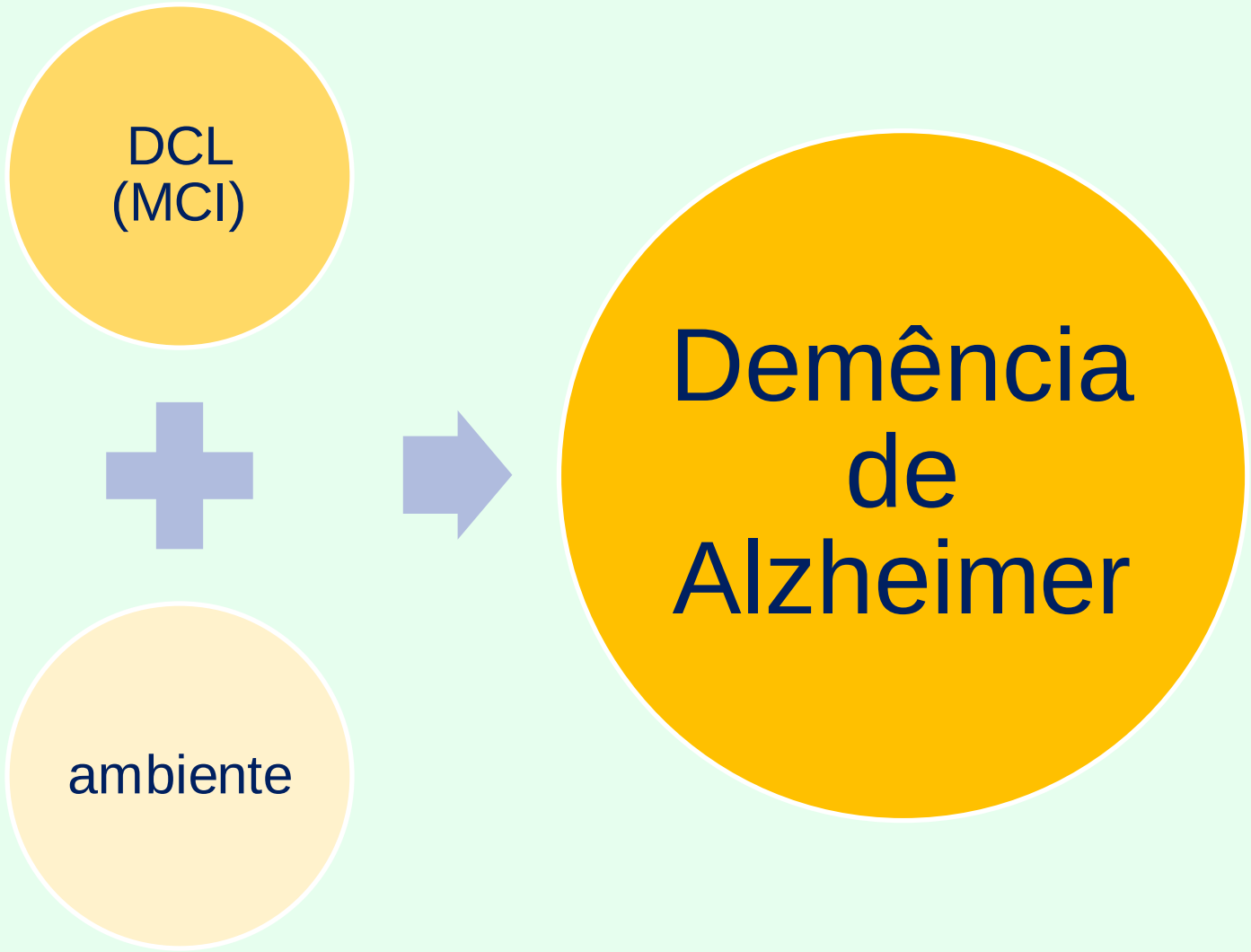
ADP

Estab.Humor

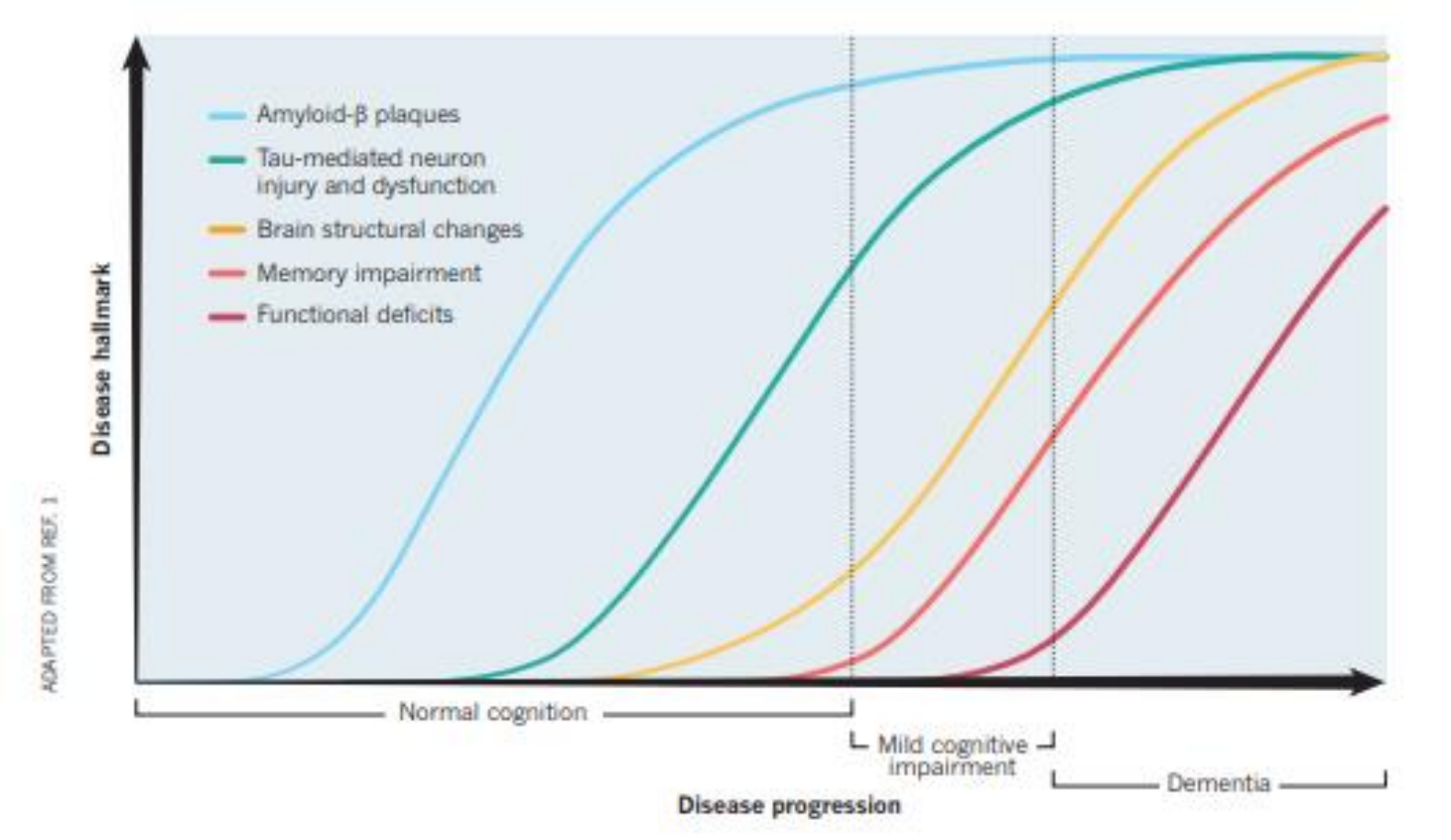
Antipsicóticos

BZDs

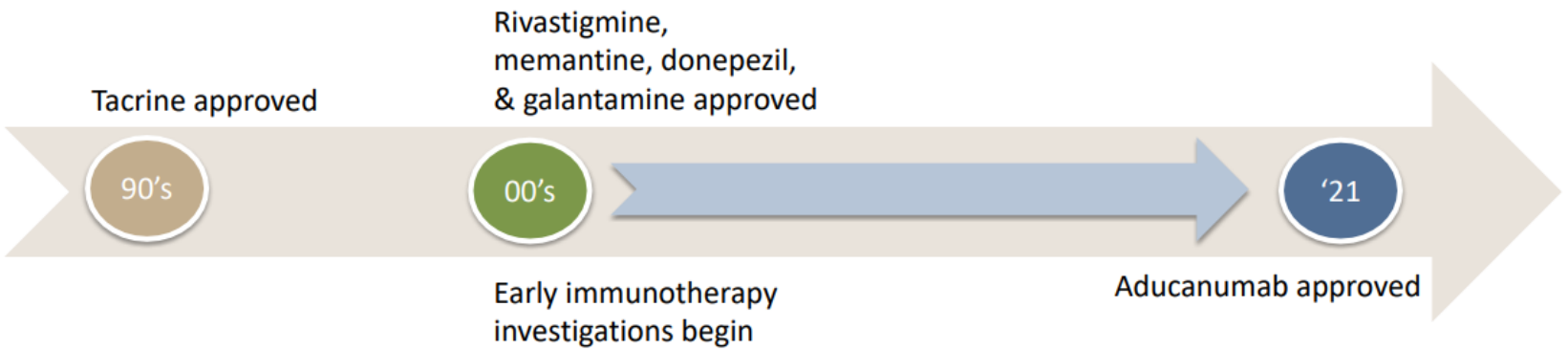
++++ cascata iatrogênica


DCL
(MCI)
ambiente
Demência
de
Alzheimer

Progressão da Doença de Alzheimer
Início na fase Prodromal.



Current Treatment Landscape



1. **Aducanumab – Approved June 2021**; continued approval contingent upon "verification of clinical benefit in confirmatory trials"
2. Donanemab – Biologics License Application pending
3. Lecanemab – Biologics License Application pending

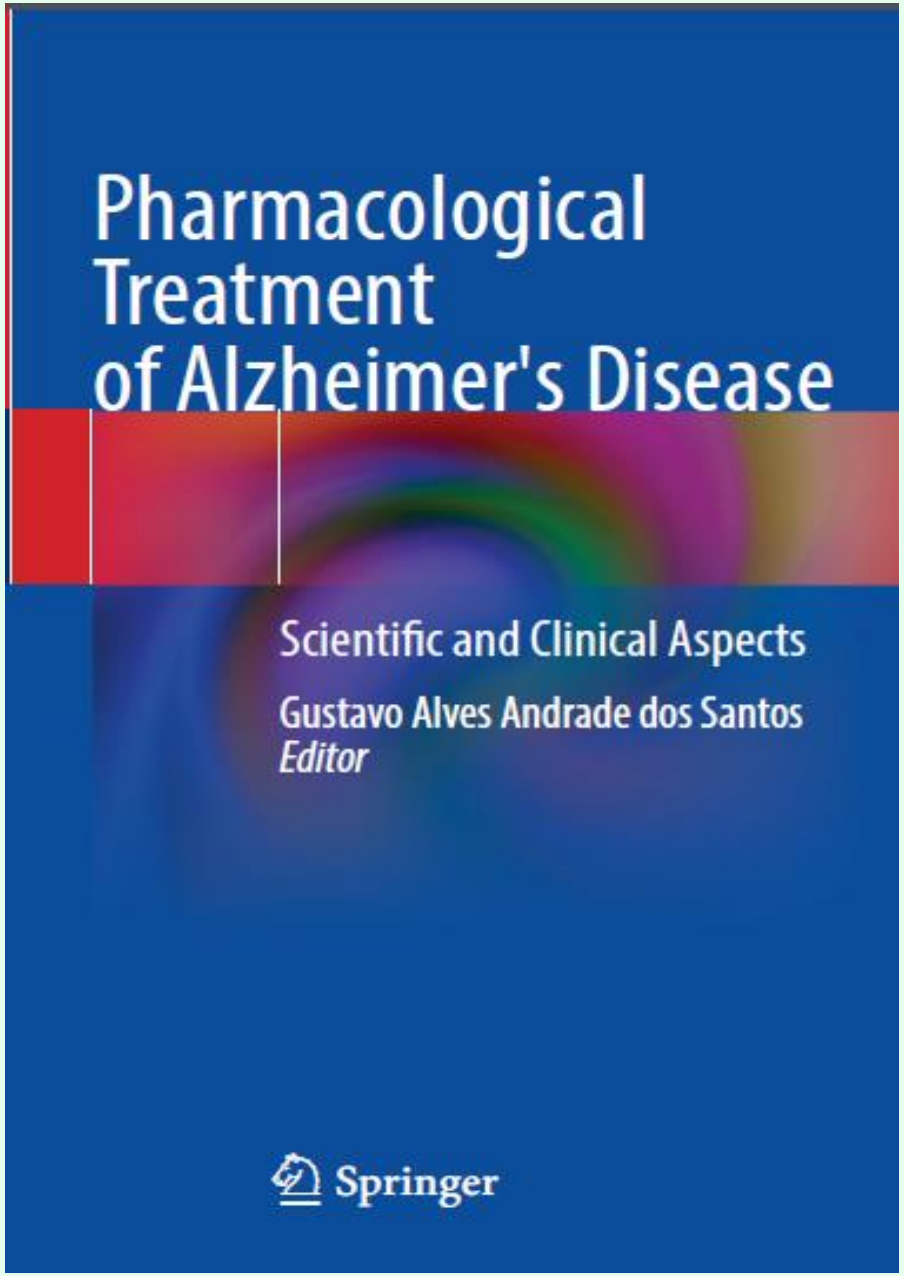
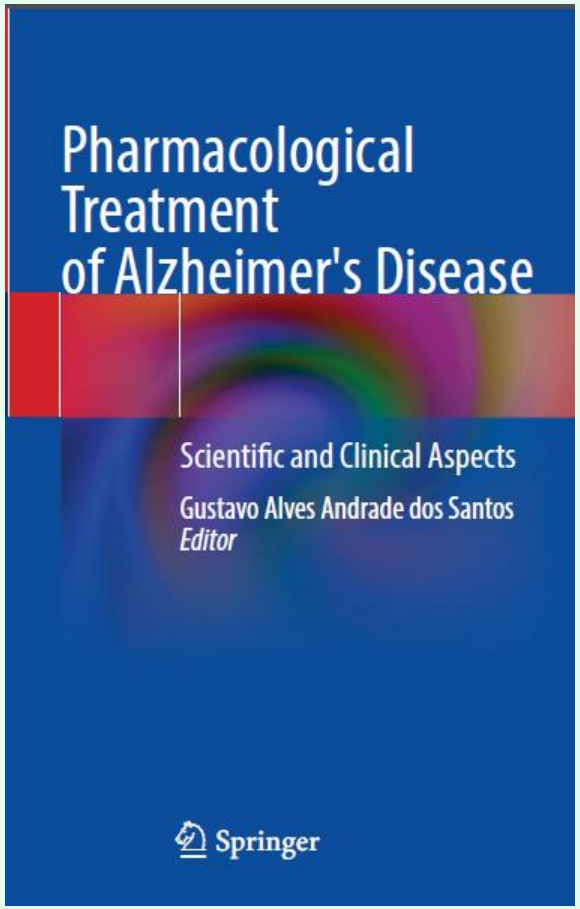
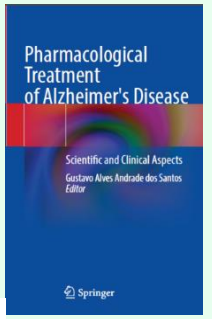

Pharmacological Treatment of Alzheimer's Disease
Scientific and Clinical Aspects
Gustavo Alves Andrade dos Santos
Editor
Springer

Table 1.6 Current status of drugs in clinical research for Alzheimer's disease [43, 68–71]

Drug	Mechanism of action (MOA)	Phase	NCT number
AAB-003 (PF-05236812)	Aβ-specific mAb	Phase I (finished)	NCT01193608
AAB-003 (PF-05236812)	Aβ-specific mAb	Phase I (finished)	NCT01193608
AADvac1	Tau vaccine	Phase II	NCT02579252
ACI-24	Aβ vaccine	Phase I	NCT02738450
ACI-35	Tau vaccine	Phase I	ISRCTN13033912
Aducanumab (BIIB037)	Aβ-specific mAb	Launched, approved by FDA	NCT02484547
ALZT-OPT1	Interferes with the inflammatory process	Phase I/II	NCT04570644
Atabecestat (JNJ-54861911)	BACE1 inhibitor	Phase III (finished)	NCT02569398
CAD106	Aβ vaccine	Phase II	NCT01097096
Cambinol	Inhibition of nSMase2 enzyme, blocks tau spread	Phase I	Unidentified
Celecoxib	Nonsteroidal anti-inflammatory drug (NSAID)	Phase III (finished)	NCT00007189
Crenezumab	Aβ-specific mAb	Phase III (finished)	NCT02670083
CSP-1103	Cytokine reduction/removal of tau and AB42; nonsteroidal anti-inflammatory drug (NSAID)	Phase III	Unidentified

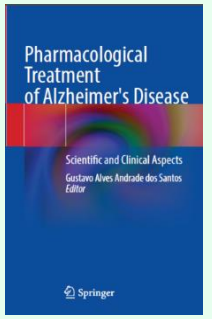




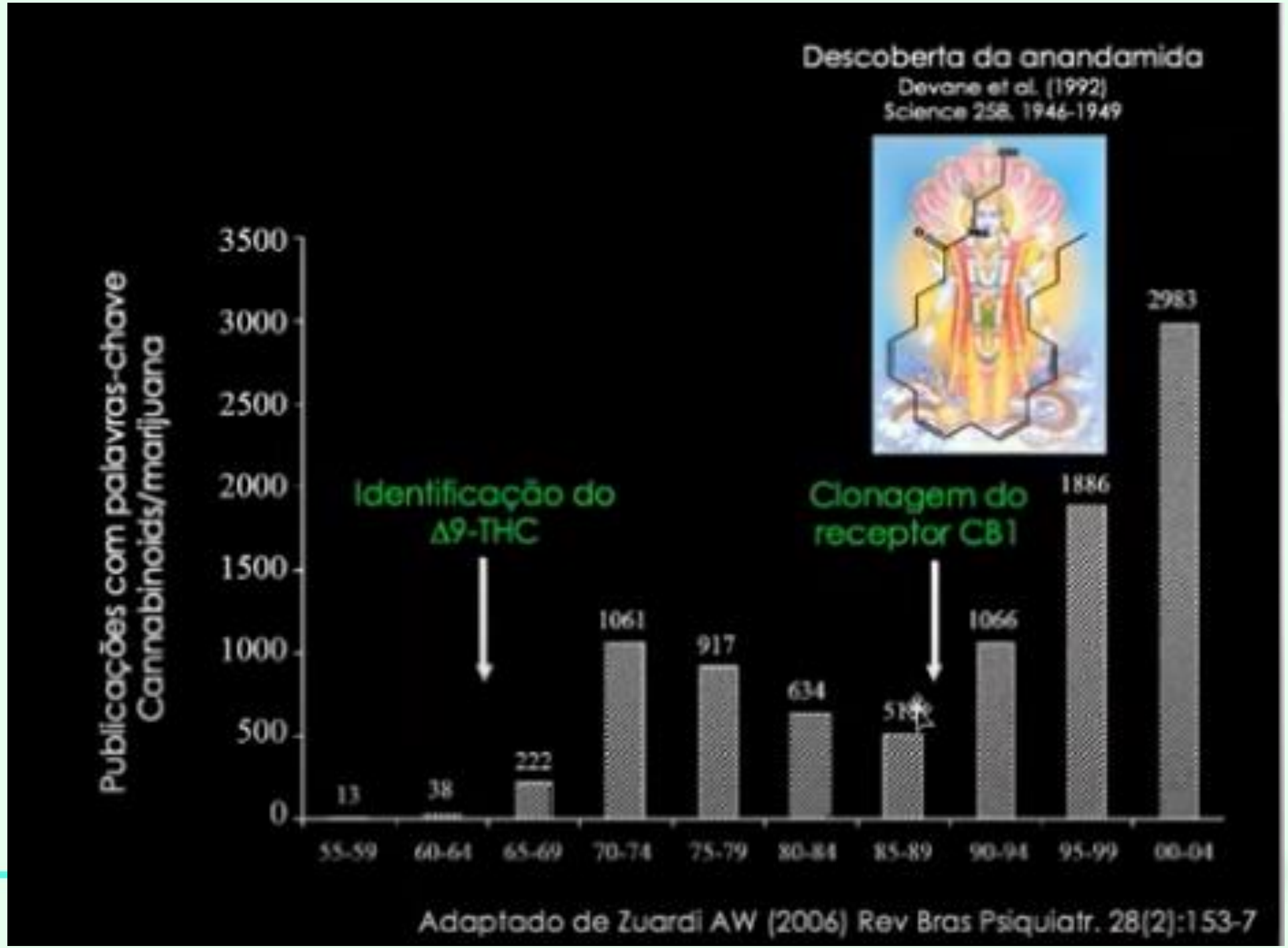
Donanemab (N3pG-Aβ)	Aβ-specific mAb	Phase II	NCT03367403
Elenbecestat (E2609)	BACE1 inhibitor	Phase III	NCT02036280
Gantenerumab	Aβ-specific mAb	Phase III	NCT03443973
Gemfibrozil	Micro RNA-107 expression regulator	Phase I	NCT02045056
GV-971	Sodium oligomannate	Phase III	NCT02293915
Intepirdine SB-742457, RVT-101	Antagonist of the serotonin receptor 6 (5-HT)6	Phase III (finished)	NCT02586909

Drug	Mechanism of action (MOA)	Phase	NCT number
Ketasyn (AC-1202)	Supplement dietary	Phase IV	NCT01122329
Lanabecestat (AZD3293)	BACE1 inhibitor	Phase III (finished)	NCT02783573
Lecanemab (BAN-2401)	Degradation of AB_{42}	Phase III	NCT03887455
LMTM (TRx0237)	Tau aggregation inhibitor	Phase III	NCT01626378
MEDI1814	Aβ-specific mAb	Phase I	NCT02036645
MK-8931 Verubecestat	BACE1 inhibitor	Phase III (finished)	NCT01953601
Naproxen	Nonsteroidal anti-inflammatory drug (NSAID)	Phase III (finished)	NCT00007189
Neflamapimod (VX-745)	p38a kinase inhibitor	Phase II	NCT02423122
Rosiglitazone	Type II diabetes drug	Phase III (finished)	NCT00490568
Simvastatin	Inhibition of HMG-CoA reductase cholesterol-lowering drug	Phase IV	NCT00842920
Solanezumab (LY2062430)	Aβ-specific mAb	Phase III	NCT02760602
Umibecestat (CNP520)	BACE1 inhibitor	Phase II/III (finished)	NCT03131453
Valaciclovir	Antiviral drug	Phase II	NCT03282916

NCT number – (https://clinicaltrials.gov)
Source: Adapted from Liu et al. [43]



Fonte: National Geographic



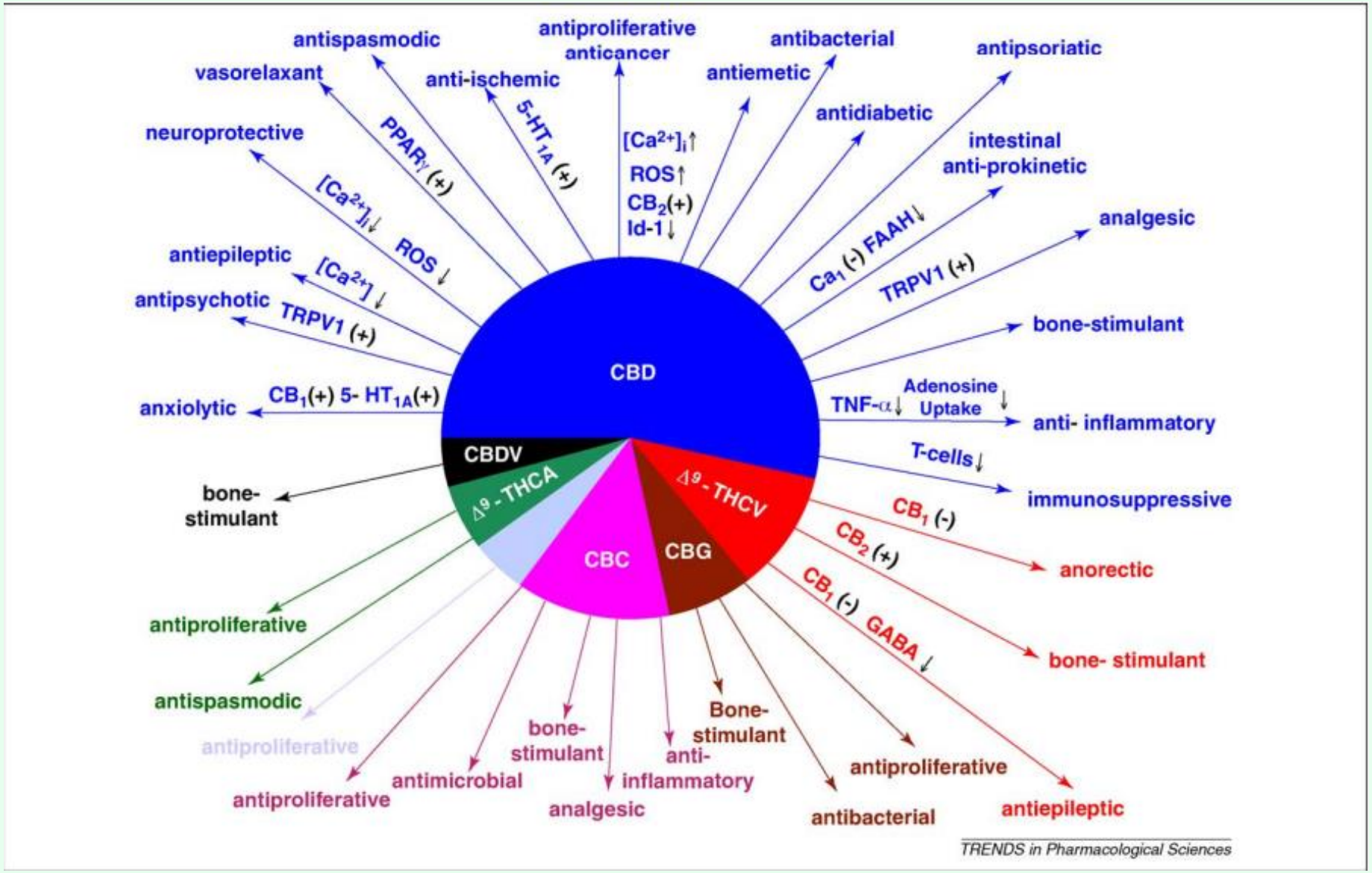
EAD PLUS
Educação em Saúde

Review

Non-psychotropic plant cannabinoids: new therapeutic opportunities from an ancient herb

Angelo A. Izzo[1,4], Francesca Borrelli[1,4], Raffaele Capasso[1,4], Vincenzo Di Marzo[2,4] and Raphael Mechoulam[3]

[1] Department of Experimental Pharmacology, University of Naples Federico II, Naples, Italy
[2] Institute of Biomolecular Chemistry, National Research Council, Pozzuoli (NA), Italy
[3] Department of Medicinal Chemistry and Natural Products, Hebrew University Medical Faculty, Jerusalem, Israel
[4] Endocannabinoid Research Group, Italy



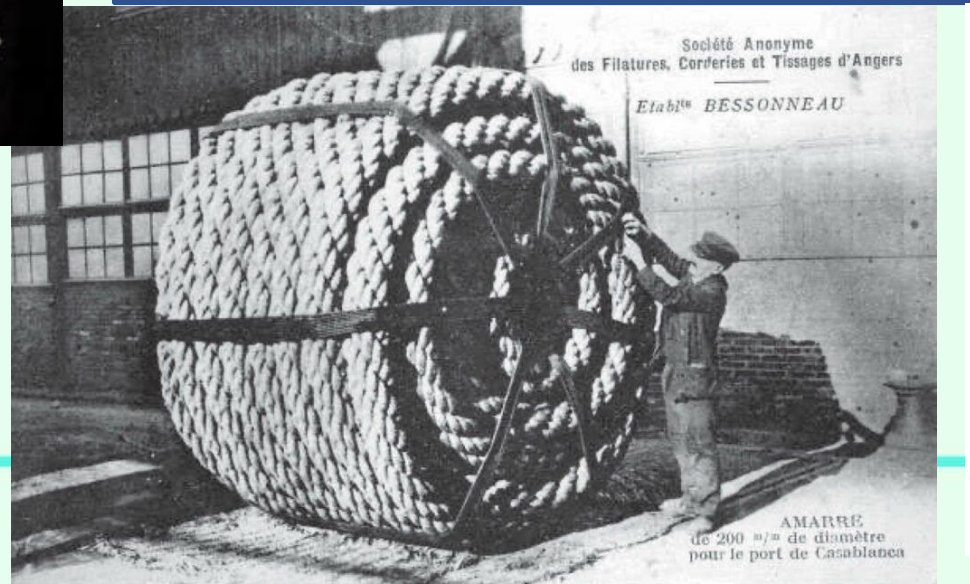
Non-psychotropic plant cannabinoids: new therapeutic opportunities from an ancient herb Angelo A. Izzo1,4 , Francesca Borrelli1, 4 , Raffaele Capasso1,4 , Vincenzo Di Marzo2,4 and Raphael Mechoulam3 1 Department of Experimental Pharmacology, University of Naples Federico II, Naples, Italy 2 Institute of Biomolecular Chemistry, National Research Council, Pozzuoli (NA), Italy 3 Department of Medicinal Chemistry and Natural Products, Hebrew University Medical Faculty, Jerusalem, Israel 4 Endocannabinoid Research Group, Italy

Convenção Internacional do Ópio (23/1/1912)

O uso de cânhamo indiano e a preparação de produtos derivados só pode ser autorizados para fins médicos e científicos. A resina crua (charas), no entanto, que é extraída dos exemplares femininos da Cannabis sativa, juntamente com as suas diversas preparações obtidas a partir dela (haxixe, chira, esrar, diamba, etc), as quais não são utilizadas para fins médicos e só é usada para fins prejudiciais, da mesma maneira como outros narcóticos, não podem ser produzidas, vendidas, comercializadas, etc, em qualquer hipótese.

Porque a Cannabis foi proibida?

- Falso argumento de ser "porta de entrada" para outras drogas.
- Marginalização.
- Pressão dos Oligopólios.
- Lei Seca (EUA).
- Imposto da maconha.
- DEA
- Brasil (escravidão, "ópio dos pobres".



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MACONHA

A PLANTA DO DIABO

Texto de LUIZ ALIPIO DE BARROS
Fotos de JOSE' MEDEIROS

A história que vamos contar aqui é uma história de espantar. Uma história triste, cruel, verídica e trágica. Uma história que contaremos cruamente, sem ligar para estilo literário ou frazes bonitas e certas. Ela deve ser contada sem artifícios, mas com veemência, e deve ser repetida por tôdas as bôcas, passada adiante, levada a todos os cantos do Brasil, de norte a sul, de leste a oeste. Uma catástrofe se anuncia para êste Brasil tão sofredor e cheio de defeitos. Esta catástrofe precisa ser evitada. Não é uma história nova, não é um caso ou problema nascido ontem. O problema é velho, tem muitos anos de existência e já foi atacado, às vêzes mais, às vêzes menos violentamente. Mas o problema agora está tomando fórma assustadora; impulsionado por fôrças poderosas o problema, até agora sem maior amplitude, pretende tornar-se de âmbito nacional se não se reagir duramente, se não se reagir violentamente, atacando-o por todos os meios possíveis. E' imperioso resolvê-lo o mais rápido possível; para o bem desta terra êle deve ser extinto. Vamos contar aqui uma história trágica. Vamos contar o drama da maconha.

UM FARRAPO HUMANO êste nordestino que outrora foi forte. Agora, olhos injetados, expressão trágica, êste homem se arrasta tristemente pelas ruas da sua cidadezinha. Quase não fala, não trabalha, não tem coragem para nada. Apenas o vício o movimenta, e êle deplorávelmente se enterra nos cigarros de maconha.

"[...] o ato de fumar maconha é uma espécie de vingança de negros selvagens contra brancos civilizados, que os haviam escravizado" – Dr. Rodrigues Dória em carta ao Congresso Científico Pan-Americano em 1915.

"A maconha é mais perigosa que o ópio." – Dr. Pernambuco Filho na II Conferência Internacional do Ópio em 1924.


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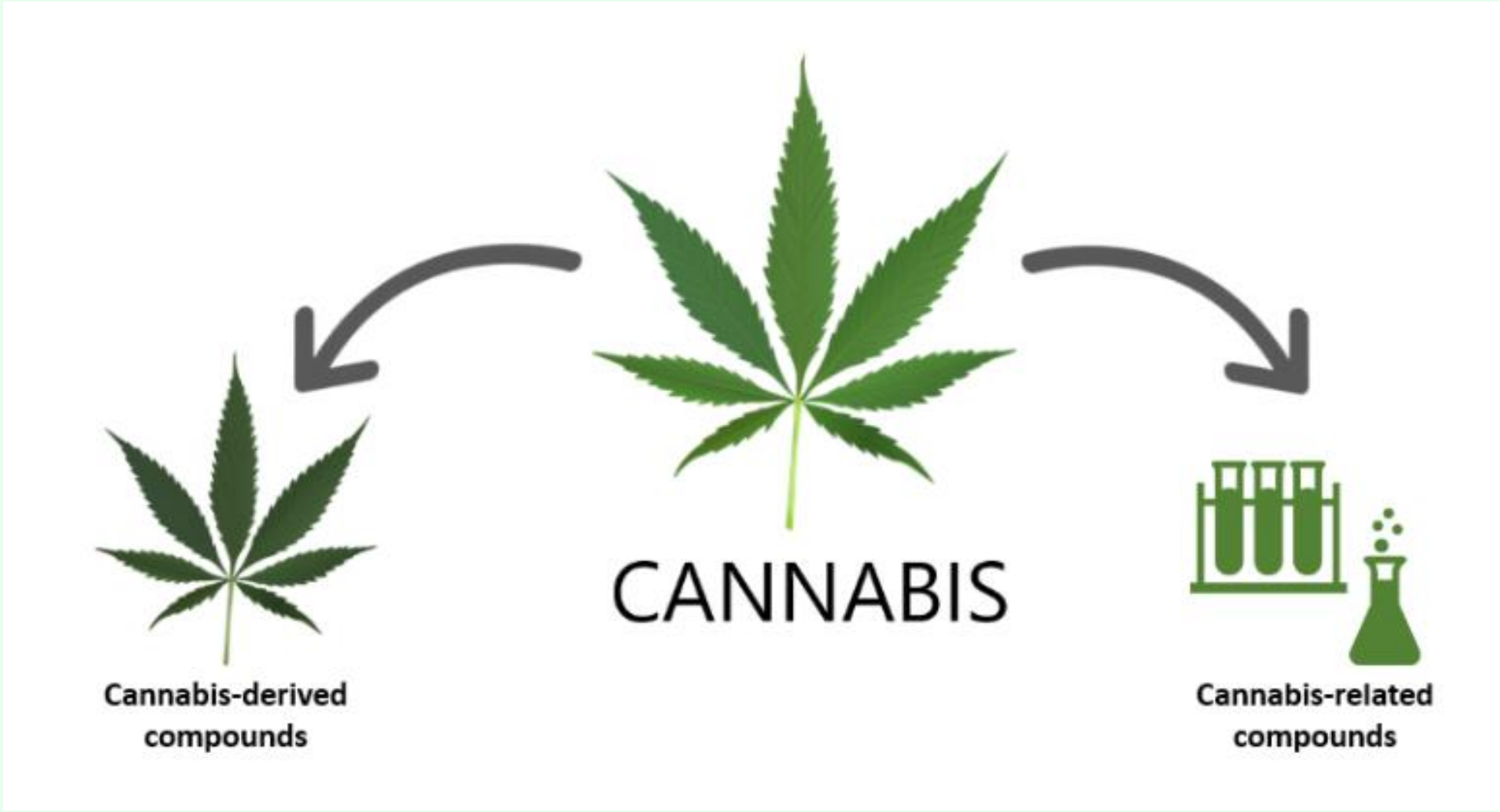
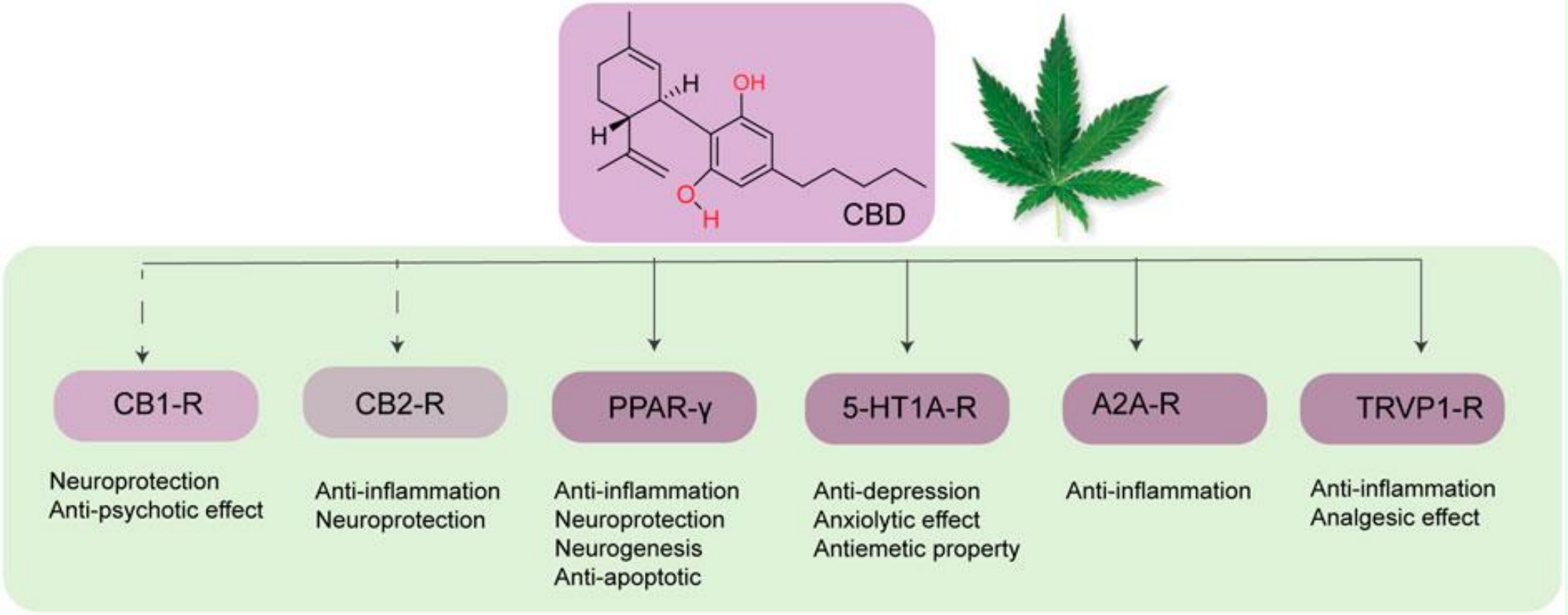


Fonte: https://www.fda.gov/news-events/public-health-focus/fda-and-cannabis-research-and-drug-approval-process

Evidências científicas em Alzheimer

Cannabidiol for neurodegenerative disorders: A comprehensive review.



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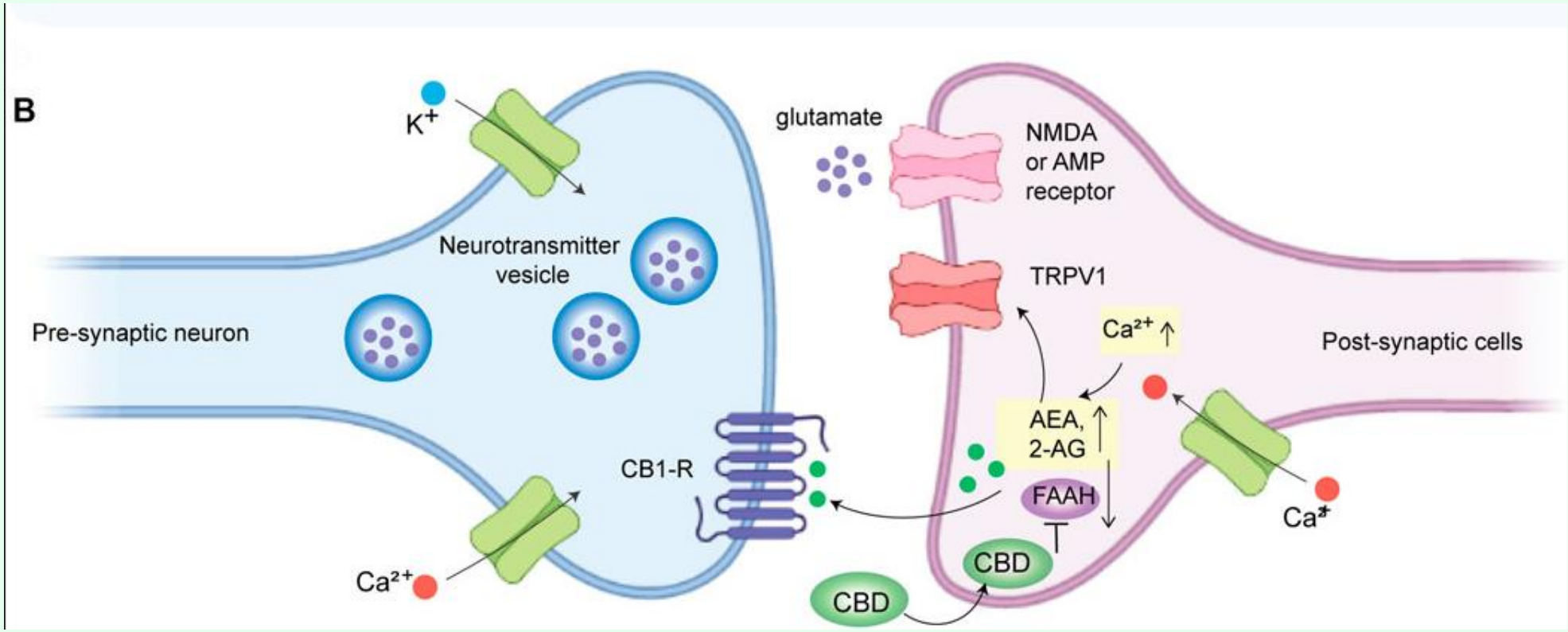
Cannabidiol for neurodegenerative disorders: A comprehensive review.



Front. Pharmacol., 25 October 2022
Sec. Neuropharmacology
Volume 13 - 2022 |
https://doi.org/10.3389/fphar.2022.989717

frontiers in Pharmacology

ORIGINAL RESEARCH

A Systematic Review on the Pharmacokinetics of Cannabidiol in Humans

Sophie A. Millar*, Nicole L. Stone, Andrew S. Yates and Saoirse E. O'Sullivan*

Background: Cannabidiol is being pursued as a therapeutic treatment for multiple conditions, usually by oral delivery. Animal studies suggest oral bioavailability is low, but literature in humans is not sufficient. The aim of this review was to collate published data in this area.

Methods: A systematic search of PubMed and EMBASE (including MEDLINE) was conducted to retrieve all articles reporting pharmacokinetic data of CBD in humans.

Results: Of 792 articles retrieved, 24 included pharmacokinetic parameters in humans. The half-life of cannabidiol was reported between 1.4 and 10.9 h after oromucosal spray, 2–5 days after chronic oral administration, 24 h after i.v., and 31 h after smoking. Bioavailability following smoking was 31% however no other studies attempted to report the absolute bioavailability of CBD following other routes in humans, despite i.v formulations being available. The area under the curve and C_{max} increase in dose-dependent manners and are reached quicker following smoking/inhalation compared to oral/oromucosal routes. C_{max} is increased during fed states and in lipid formulations. T_{max} is reached between 0 and 4 h.

Conclusions: This review highlights the paucity in data and some discrepancy in the pharmacokinetics of cannabidiol, despite its widespread use in humans. Analysis and understanding of properties such as bioavailability and half-life is critical to future

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Meia-vida entre 1,4 - 10,9h após spray oromucosa,
2 - 5 dias após adm. oral crônica,
24h após adm. i.v.,
31h após vaporizar.

Biodisponibilidade 31% ao fumar e 6% via oral devido ao significativo metabolismo da primeira passagem.

AUC e Cmáx aumentam de forma dose-dependente e são alcançados mais rapidamente após a inalação/vaporização em comparação com as rotas orais/oromucosa.

Cmax é aumentado durante estados alimentados e em formulações lipídicas e **Tmax** é alcançado entre 0 e 4h.

Dos 792 artigos, apenas 24 incluíram parâmetros farmacocinéticos em humanos.

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Efeito "Entourage"

CBA

CBN

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CBD

THC

Flavonoides

Terpenos

CURRENT NEUROPHARMACOLOGY

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Curr Neuropharmacol. 2023 Mar 8; 21(3): 715–726.

Published online 2023 Mar 8. doi: 10.2174/1570159X20666220201091006

PMCID: PMC10207907

PMID: 35105293

Impact of the Cannabinoid System in Alzheimer's Disease

Shuangtao Li,[1,#] Yuanbing Huang,[2,#] Lijun Yu,[1] Xiaoyu Ji,[2] and Jie Wu[✉1,*]

The expression trend of CB1Rs in various neurological diseases.

Brain Regions	Tendency	Species	Neurological Disorders
Prefrontal cortex, hippocampus, and caudate putamen	Decrease	Humans	AD
Dorsal hippocampus (DH), basolateral amygdala complex (BLA)	Decrease	Mice(model)	12-month-old AD
Cerebellum, dentate nucleus	Decrease	Mice(model)	Cerebellar ataxia
Striatum	Decrease	Mice(model)	Huntington's disease
Prefrontal and midcingulate cortex	Decrease	Humans, rat (model)	Parkinson's disease

The expression trend of CB2Rs in various neurological diseases.

Brain Regions	Tendency	Species	Neurological Disorders
Hippocampus and entorhinal and parahippocampal cortices	Increase	Humans and mice (model)	AD
Granular layer, Purkinje cells	Increase	Humans	Spinocerebellar ataxia
Striatal microglia	Increase	Humans and mice (model)	Huntington's disease
Substantia nigra microglial cells, striatal	Increase	Humans, rat (model) and mice (model)	Parkinson's disease
Spinal cord microglia	Increase	Mice (model)	Amyotrophic lateral sclerosis

THC e placas senis

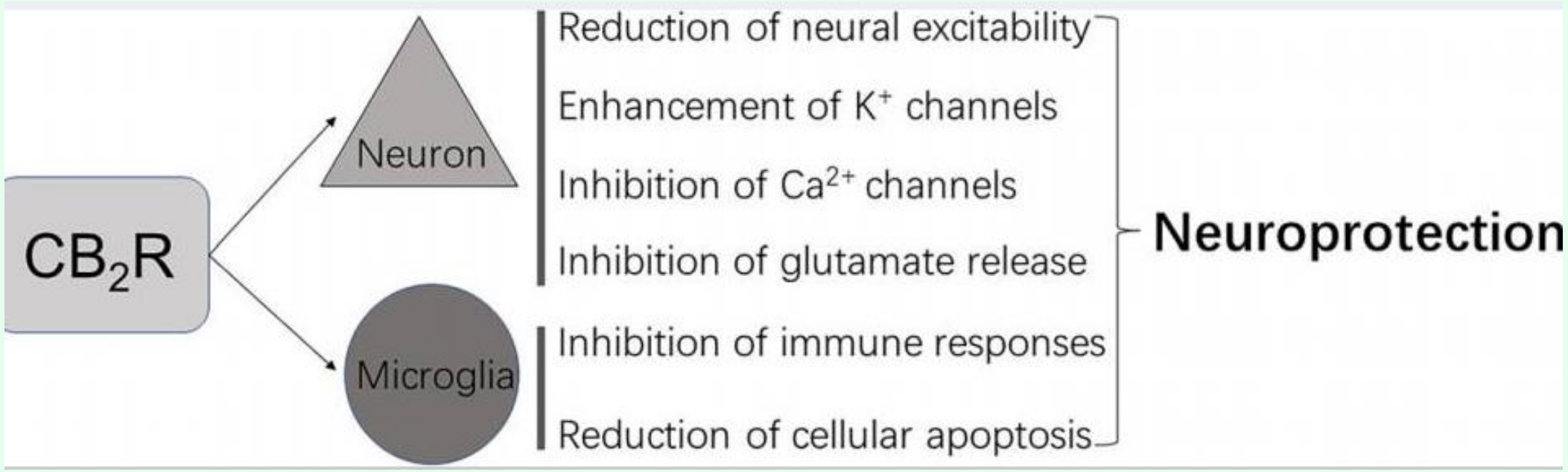
Int J Mol Sci. 2023 Apr; 24(7): 6598.
Published online 2023 Apr 2. doi: 10.3390/ijms24076598

PMCID: PMC10095455
PMID: 37047608

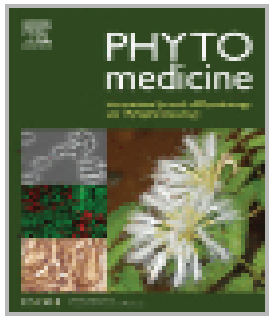
Δ^8-THC Protects against Amyloid Beta Toxicity Modulating ER Stress In Vitro: A Transcriptomic Analysis

Agnese Gugliandolo, Methodology, Investigation, Writing – original draft,[1] Santino Blando, Investigation,[1] Stefano Salamone, Resources,[2,3] Diego Caprioglio, Resources,[2,3] Federica Pollastro, Resources,[2,3] Emanuela Mazzon, Conceptualization, Writing – review & editing, Supervision,[1,*] and Luigi Chiricosta, Software, Formal analysis, Data curation[1]

EFEITOS DO THC E DO CBD NA PATOGÊNESE E TERAPÊUTICA DA DOENÇA DE ALZHEIMER



Phytomedicine
Volume 107, December 2022, 154485



Evaluating *Cannabis sativa* L.'s neuroprotection potential: From bench to bedside

John Staton Laws III, Scott D. Smid

Table 1. Representative table presenting *C. sativa's* compounds and their neuroprotective mechanisms of action.

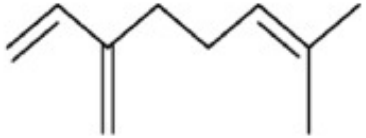
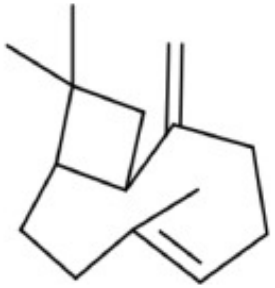
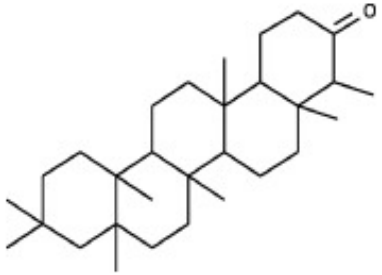
Plant Part	Compound	Mechanism of Action	Experimental Protocol	Ref.
Seed	ω−3	Preventing $A\beta_{40}$ and $A\beta_{42}$ fibrillogenesis	ThT	ElShatshat et al., 2019
Seed	γ-tocopherol	Ameliorate the toxicity of Aβ	*in vitro* model using SH-SY5Y cells	PahrudinArrozi et al., 2022
Seed	Lignanamides	Anti-oxidant, AChE inhibitory activities	DPPH, ABTS, and ORAC free radical-scavenging assays, *in vitro* and *in silico*	Yan et al., 2015

Sprout/Leaves	Cannflavin A	Aβ-mediated neurotoxicity by inhibiting Aβ fibrillisation and increasing cell viability	*in vitro* model using PC12 cells	Egger setal. , 2019
Stem Bark	β-sitosterol	Increase cell viability against corticosterone-induced toxicity via activation of AKT/PI3K pathway	*in vitro* model using SH-SY5Y cells	Jame eletal ., 2021
Root	Friedelin	Anti-oxidant by upregulating enzymatic activity Anti-neuroinflammatory by abolishing nuclear factor- κB inhibiting c-Jun N-terminal kinase	scopolamine-induced oxidative stress swiss albino mice model	Marv aetal. , 2022
Flower	$^{\Delta 9}$-THC	Reduce tau hyperphosphorylation, apoptosis, and oxidative stress	*in vitro* model using SH-SY5Y and N2A/ABPPswe cells	Carro lletal. , 2012

Flower	CBD	Anti-neuroinflammatory by reducing reactive gliosis and Aβ-induced inflammation	pharmacological rodent models of AD	Watt and Karl, 2017
Flower	$^{\Delta 8}$-THC	Inhibit oxytosis and prevents intracellular Aβ-induced toxicity	*In vitro* model using HT22 and MC65 cells	Schuberte tal., 2019
Flower	CBC	Reduce cellular nitrite production from Aβ and increase cell viability associated with Aβ neurotoxicity	*In vitro* model using C6 and SH-SY5Y cells	Teresaetal., 2013
Flower	Myrcene	Increase cell viability from $A\beta_{1-42}$-induced neurotoxicity	*In vitro* model using differentiated NSC-34 cells	Lawsetal., 2022
Flower	β-caryophyllene	Increase cell viability from $A\beta_{1-42}$-induced neurotoxicity	*In vitro* model using differentiated NSC-34 cells	Lawsetal., 2022

Flower	Limonene	Protect against $A\beta_{42}$-induced toxicity by reducing oxidative stress and neuroinflammation	*Drosophila* AD model	Shine tal., 2020
Flower	Terpinolene	inhibitory activity against AChE and BuChE with IC50 values 156.4μg/ml and 147.1μg/ml, respectively	Cholinesterase inhibition assay	Bone sietal ., 2010
Flower	Humulene	Anti-oxidant activities by attenuating hydrogen peroxide induced cell death	*In vitro* model using rat astrocytes	Elma nnet al., 2009
Flower	α-pinene	Anti-oxidant activities by inhibiting intracellular ROS production and initiation of the nuclear Nrf2	*In vivo* model *of* scopolamine induced impairment in C57BL/6 mice	Khos hnaz areta l., 2019
Flower	Linalool	Reduced Aβ-aggregation and reversed Aβ-induced memory loss	AD mouse model	Sabo gal-Guaq uetae

Terpenes

Class	Name	2D Structure
Monoterpene	Myrcene	
Sesquiterpene	β-caryophyllene	
Triterpenoid	Friedelin	

→ Terpenes introduced

→ *C. sativa* flowers possess over 200 terpenes, including monoterpenes, sesquiterpenes and triterpenes


Próximos eventos!

Convidado	Função	Duração	Tema
LEANDRO LUCATO	Palestrante	20	Como os exames de Imagem podem me ajudar no diagnóstico etiológico?
GUSTAVO BRUNIERA	Palestrante	20	Biomarcadroees no líquor: quando serão necessários?
GUSTAVO ALVES ANDRADE DOS SANTOS	**Palestrante**	**20**	**Biomarcadores plasmáticos já podem ser usados de rotina?**
ARTUR MARTINS NOVAES COUTINHO	Palestrante	20	Quando devo solicitar um Exame de Neuroimagem Funcional?

Assessment of inflammatory biomarkers in Alzheimer's disease

International Initiative for Harmonization of Plasma Neurofilament light chain NfL clinical reporting in neurodegenerative diseases

- **Method**: This international project involves 58 clinical laboratories in 16 countries, specializing in the biochemical diagnosis of neurological disorders. By means of a questionnaire, we obtained a description of the COU, pre-analytical and analytical (biological fluid and method used to quantify NfL) protocols of all the centers involved.

Para: Você

Ter, 16/04/2024 10:44

Dear Gustavo Alves,

Thank you for submitting your abstract entitled **"Biomarkers in Alzheimer´s disease – New Perspectives"** to INBC-2024. The scientific team and a group of expert reviewers have assessed your submission.

We are delighted to inform you that, the submitted abstract is accepted for the conference under **Oral Presentation** category. Kindly let us know if you are interested to join In Person in Baltimore or Virtually.

Obrigado!

@gusfarma

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