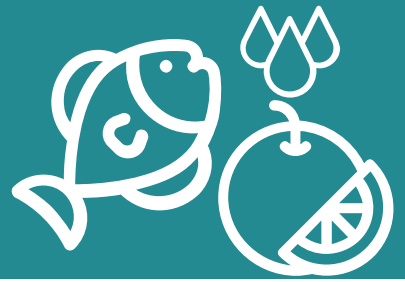
UNIVERSIDADE DE SÃO PAULO
FACULDADE DE SAÚDE PÚBLICA
HNT0228 - Alimentos Funcionais e Substâncias Bioativas (2023)

Alimentos Funcionais e Saúde Mental

Leonardo Negrão

- Nutricionista formado pela Universidade Federal do Piauí (UFPI).
- Doutorando em Ciência pela Faculdade de Saúde Pública (FSP/USP) - Foco em Psiquiatria Nutricional com ênfase em mecanismos da depressão .
- Pesquisador do grupo do Laboratório de Componentes Alimentares e Saúde (LABCAS/FSP/USP)
- Integrante do Projeto "*NuMoOS – COVID-19 – Brazilian Nutrition and Mood Online Survey*".

Leonardo Negrão NUTRICIONISTA @leonardonegraonutri

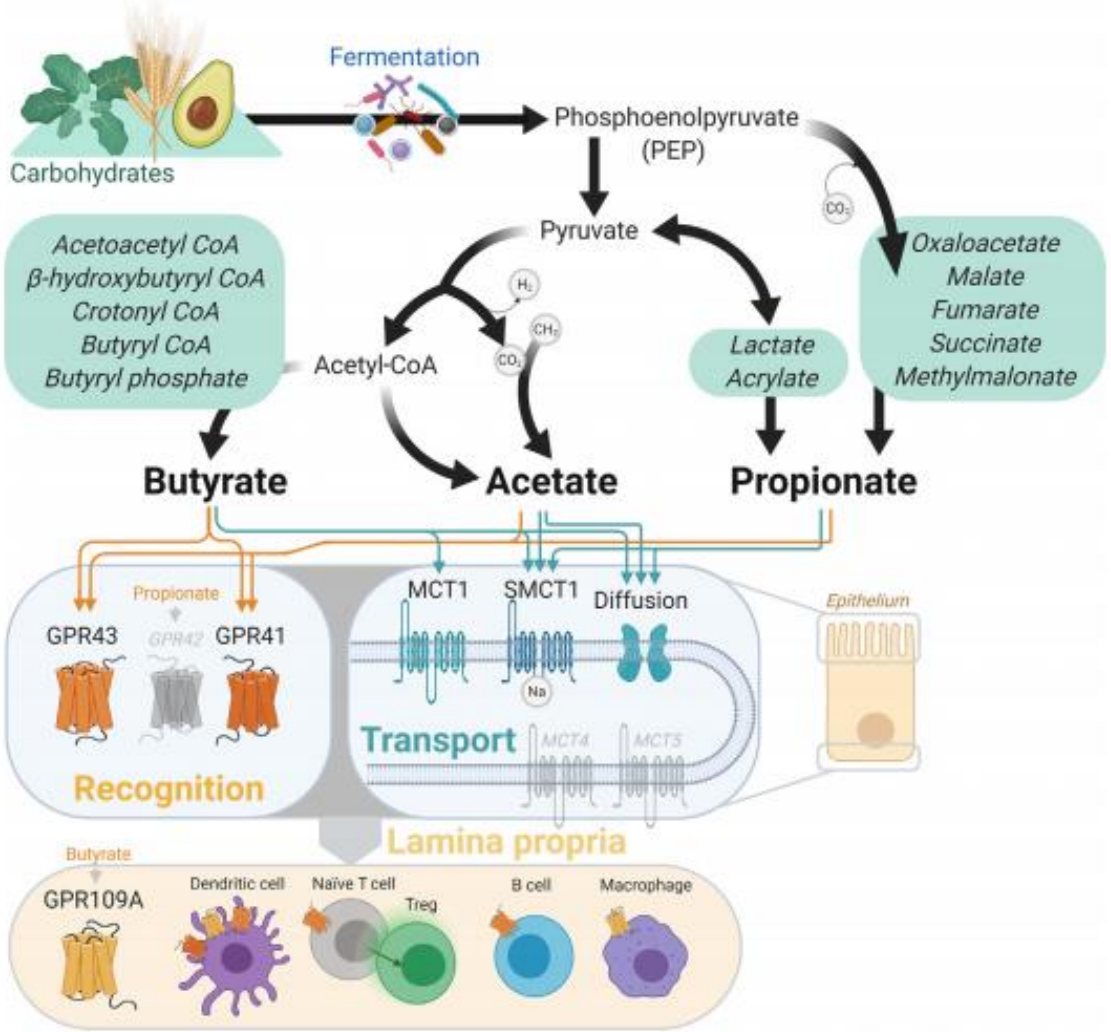


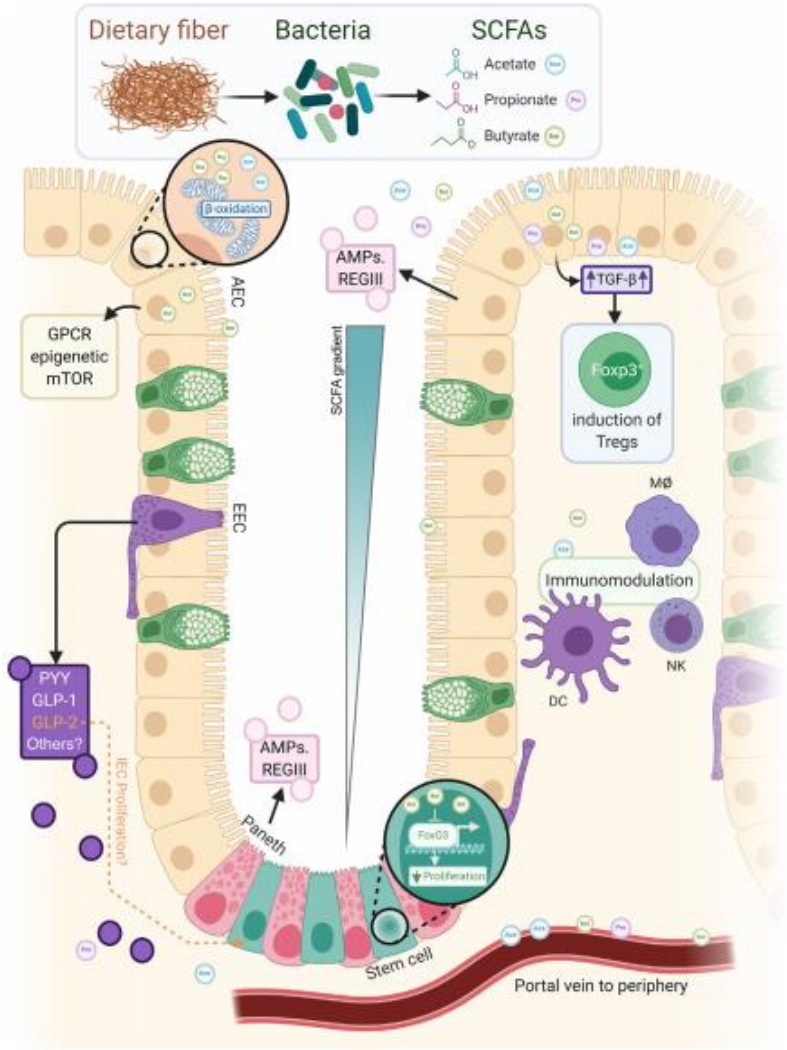
Alimentos Funcionais

- É todo alimento que contêm nutriente e/ou não nutriente que possui ação metabólica ou fisiológica específica no organismo humano além de nutrir (ANVISA,2002).

- Alimentos funcionais estão relacionado à redução de risco a doenças ou outra ação metabólica e/ou fisiológica no organismo humano. Não são permitidas alegações de saúde que façam referência à cura ou prevenção de doenças (ANVISA, 1999).

Microbiota





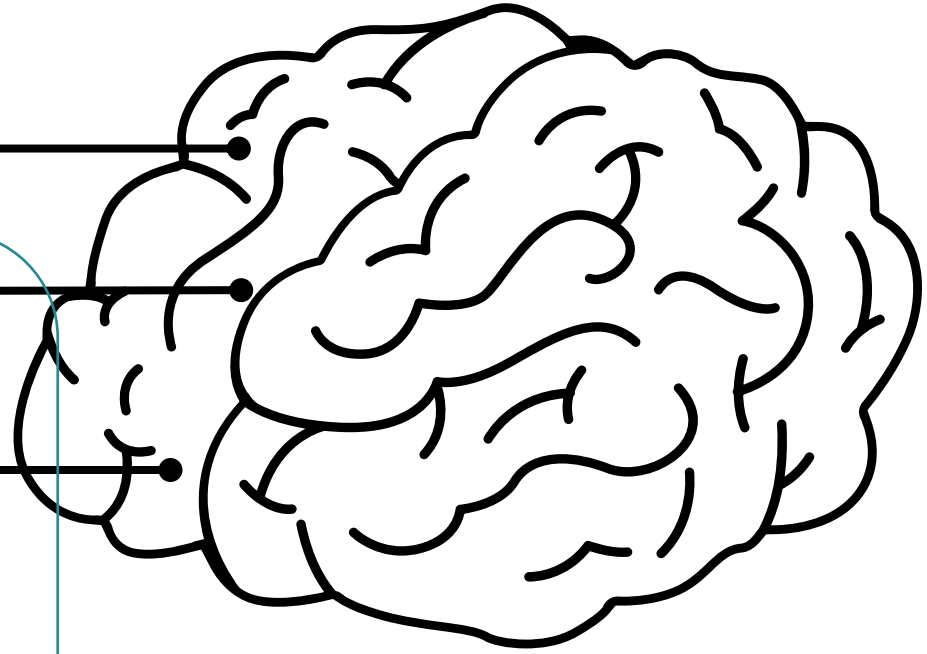
Hee & Wells. *Trends in Microbiology*, 2021

Saúde Mental

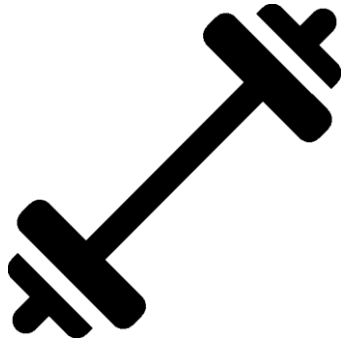
Doenças neurodegenerativas
Alzheimer, Parkinson, ELA, adrenoleucodistrofia...

Transtornos mentais
Depressão, Ansiedade, Bipolaridade, TDAH, Autismo, esquizofrenia, TOC...

Sono e cognição
Qualidade do sono, funcionamento do cérebro (memória, velocidade de processamento, atenção, foco)



Fatores de Riscos



Atividade Física

Sedentarismo

Alimentação

Excesso ou deficiência de nutrientes

Saúde

Obesidade

Tabagismo

Etilismo

Genética

Histórico Familiar

Estresse

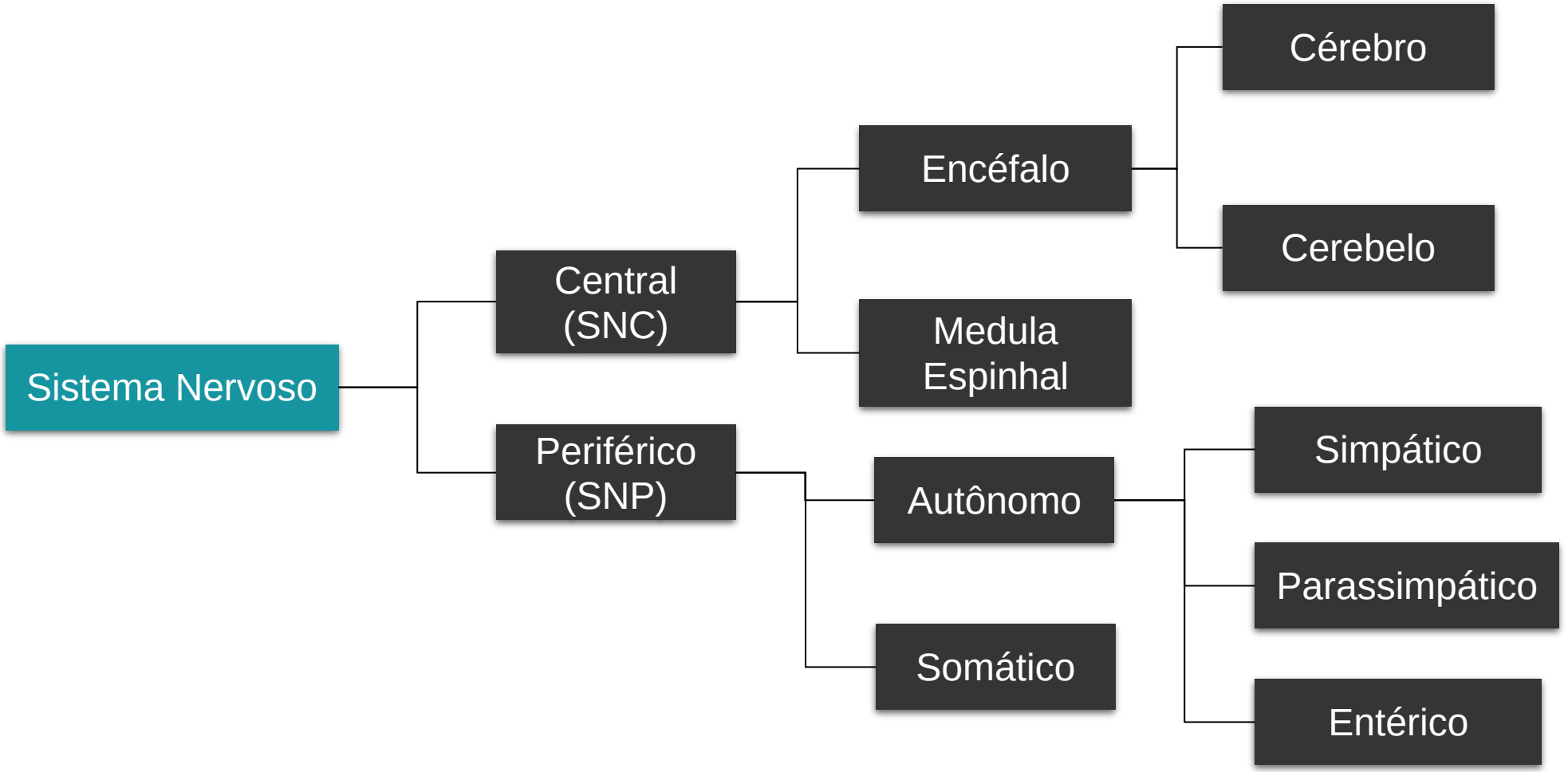
Físico

Emocional

Social

Mahan & Raymond, 2018

Sistema Nervoso



Sistema Nervoso

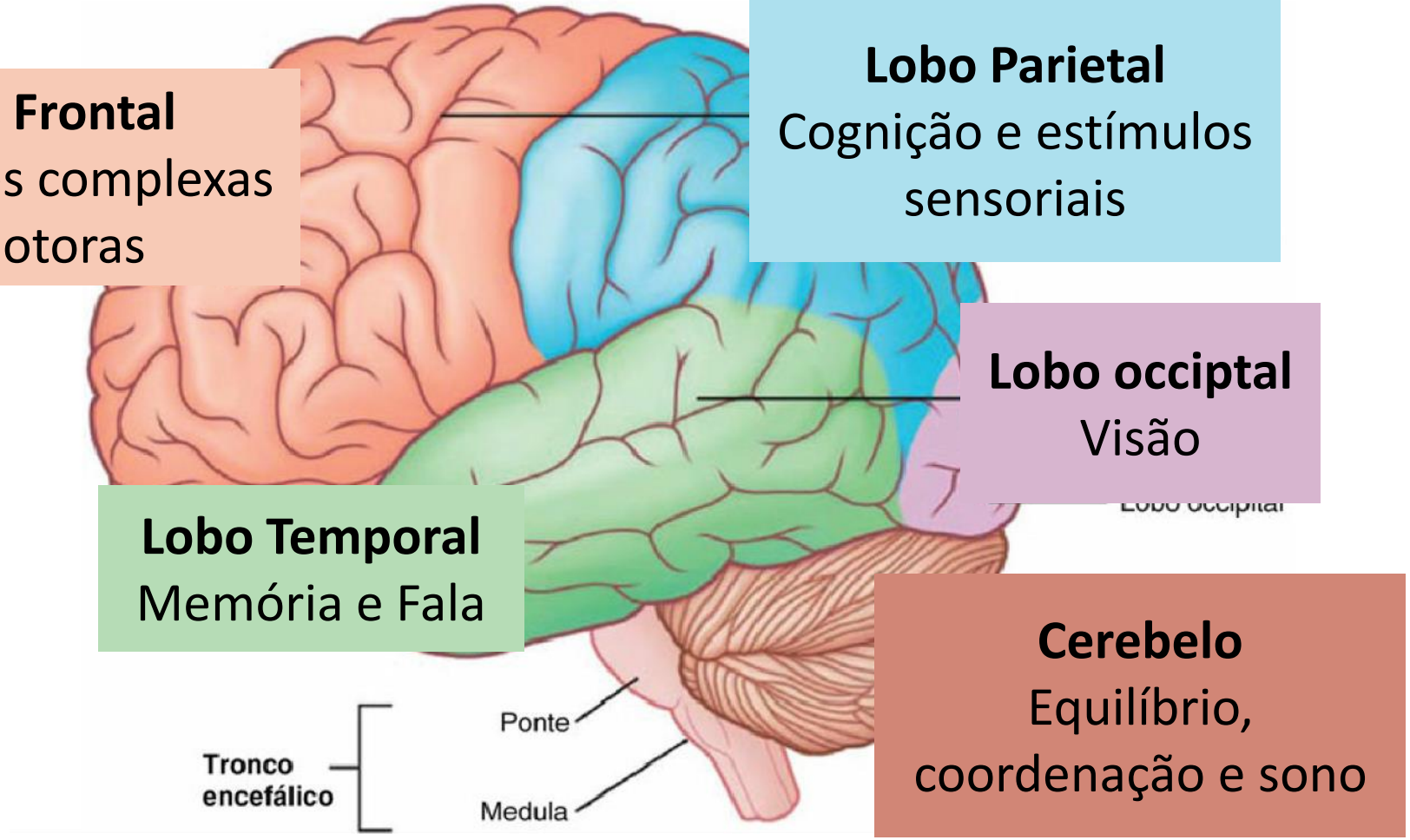
Lobo Frontal
Atividades complexas
E motoras

Lobo Parietal
Cognição e estímulos
sensoriais

Lobo occiptal
Visão

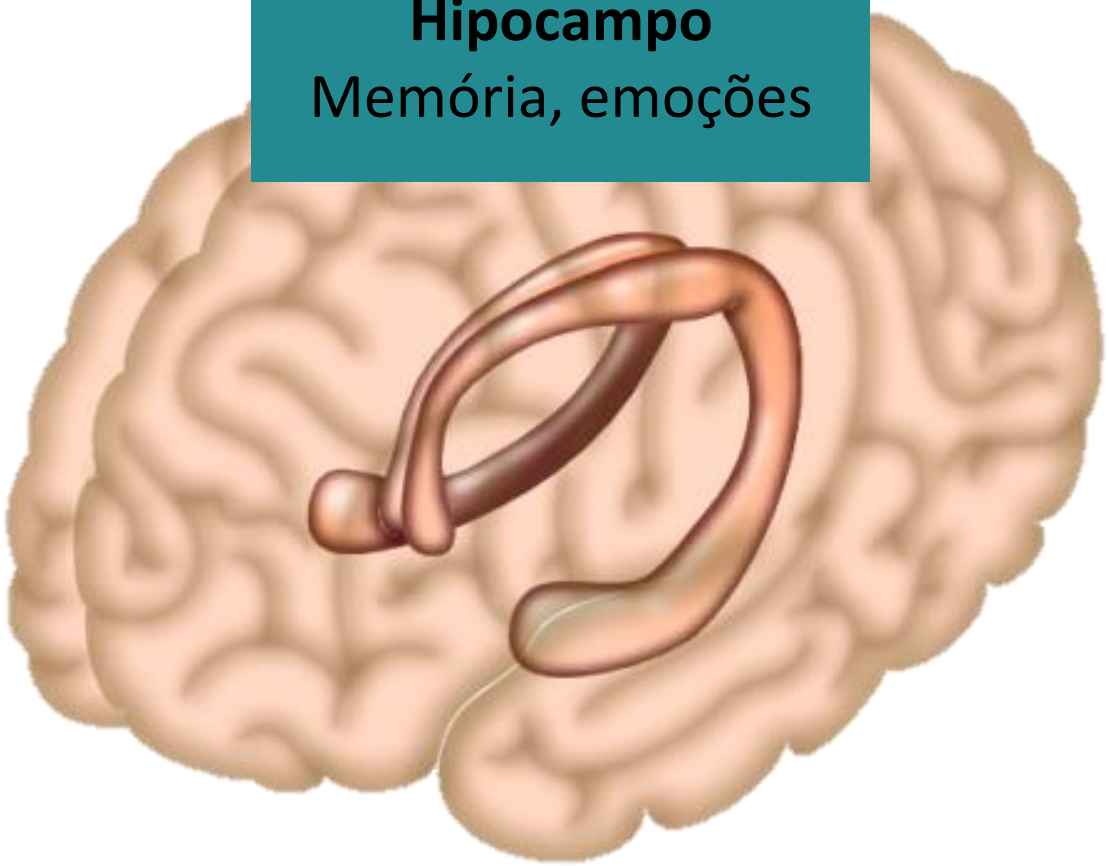
Lobo Temporal
Memória e Fala

Cerebelo
Equilíbrio,
coordenação e sono

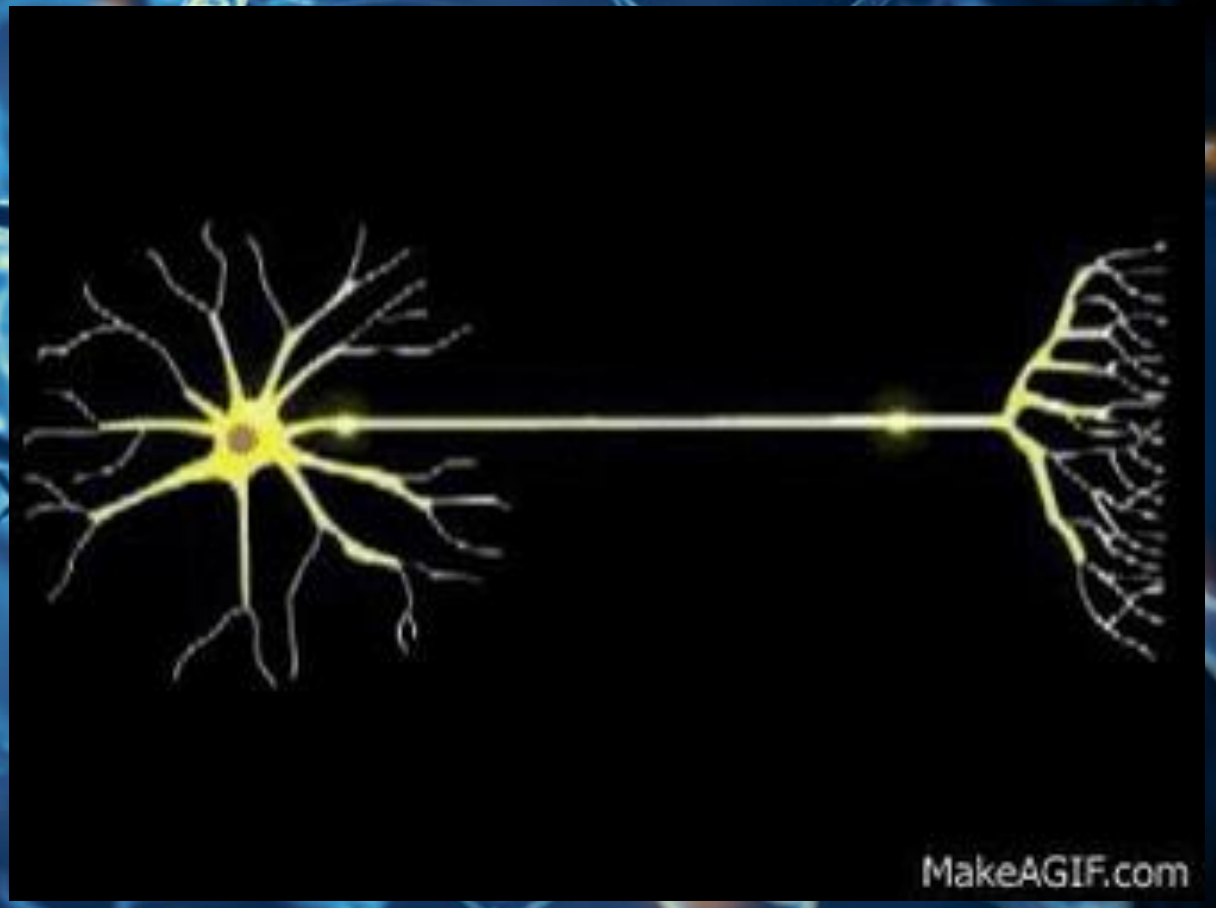


Sistema Nervoso

Hipocampo
Memória, emoções

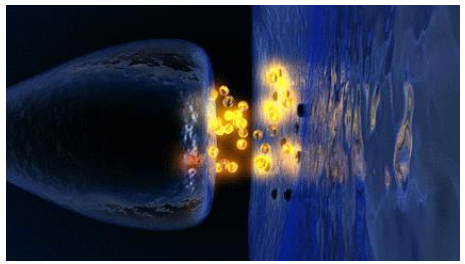


Sistema Nervoso



Neurotransmissores

- Neurotransmissores
- Acetilcolina (colina)
  - Serotonina, dopamina e noraderenalina
  - Triptofano, tirosina e fenilalanina
- Aminoácidos (glutamato e aspatato)
  - Neurotransmissores nem precursores vindo da alimentação



Alimentos

Inulina

10g/d Inulina → ↑*Bifidobacterium* spp.

Cereais Integrais → ↑*Lactobacillus* spp.

Doses de inferiores a 5g/d de fibra alimentar são suficientes para aumentar *Bifidobacterium* spp.

So et al. *Am J Clin Nutr*, 2018
https://doi.org/10.1093/ajcn/nqy041

Cacao

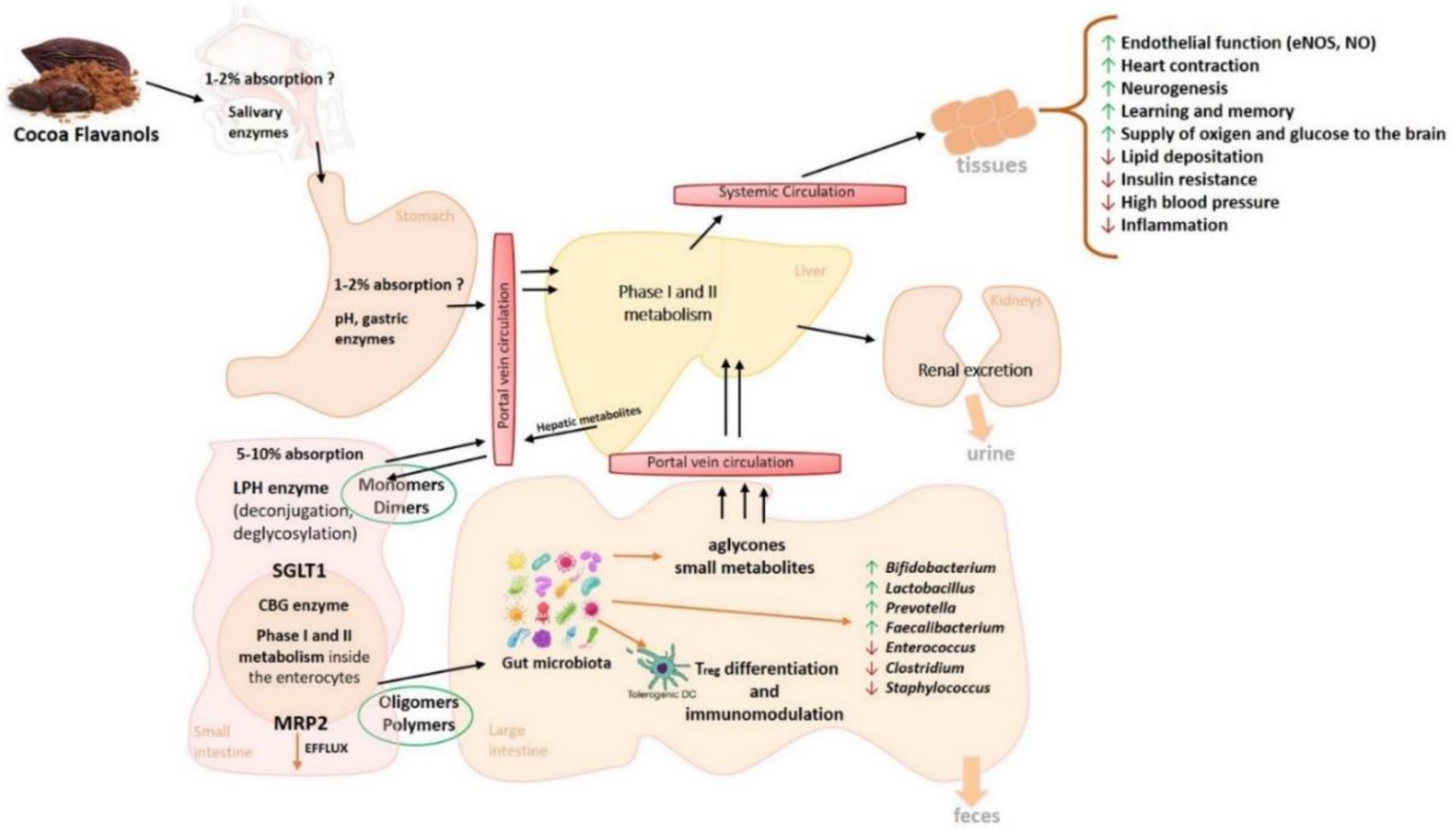
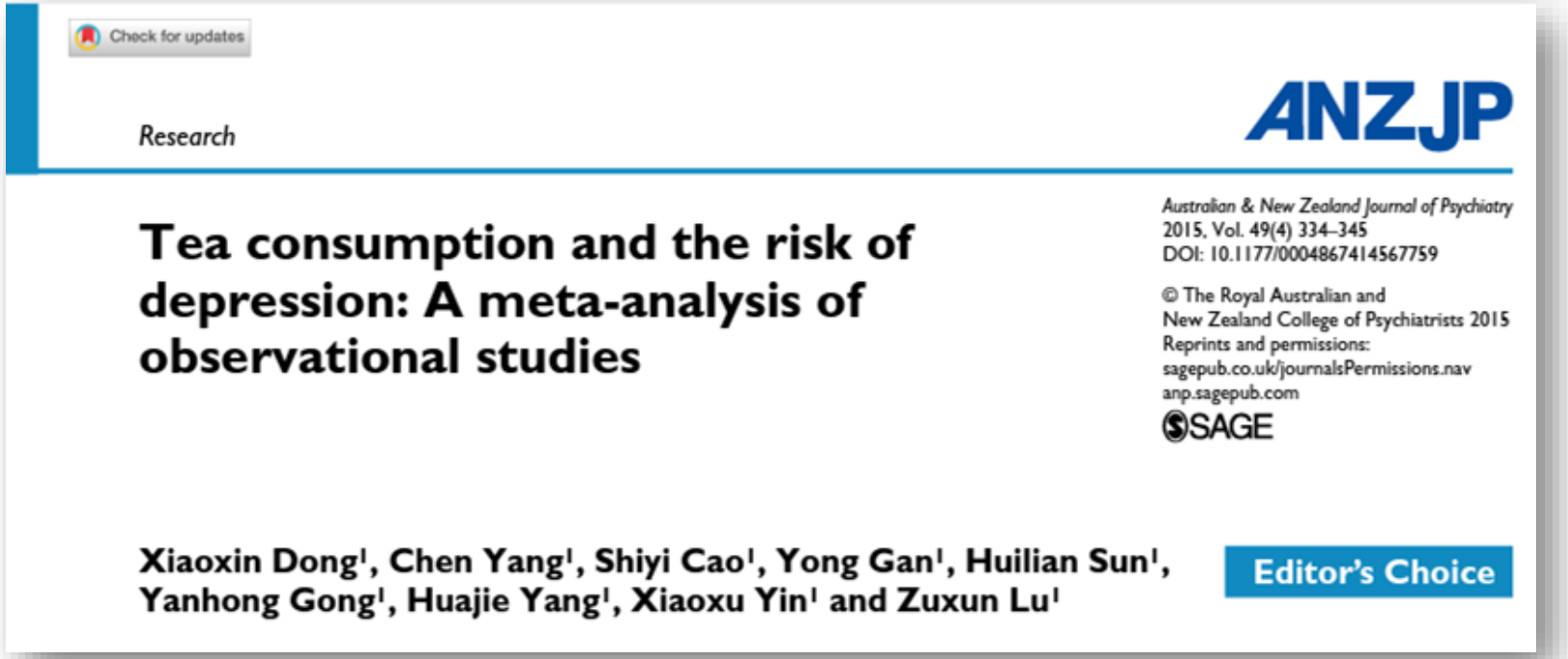


Figure 2. Bioavailability and properties of cocoa polyphenols.

Sorrenti *et* al., **Nutrients**, 2020.

Chás



Check for updates

Research

ANZJP

Tea consumption and the risk of depression: A meta-analysis of observational studies

Australian & New Zealand Journal of Psychiatry
2015, Vol. 49(4) 334–345
DOI: 10.1177/0004867414567759

Xiaoxin Dong[1], Chen Yang[1], Shiyi Cao[1], Yong Gan[1], Huilian Sun[1], Yanhong Gong[1], Huajie Yang[1], Xiaoxu Yin[1] and Zuxun Lu[1]

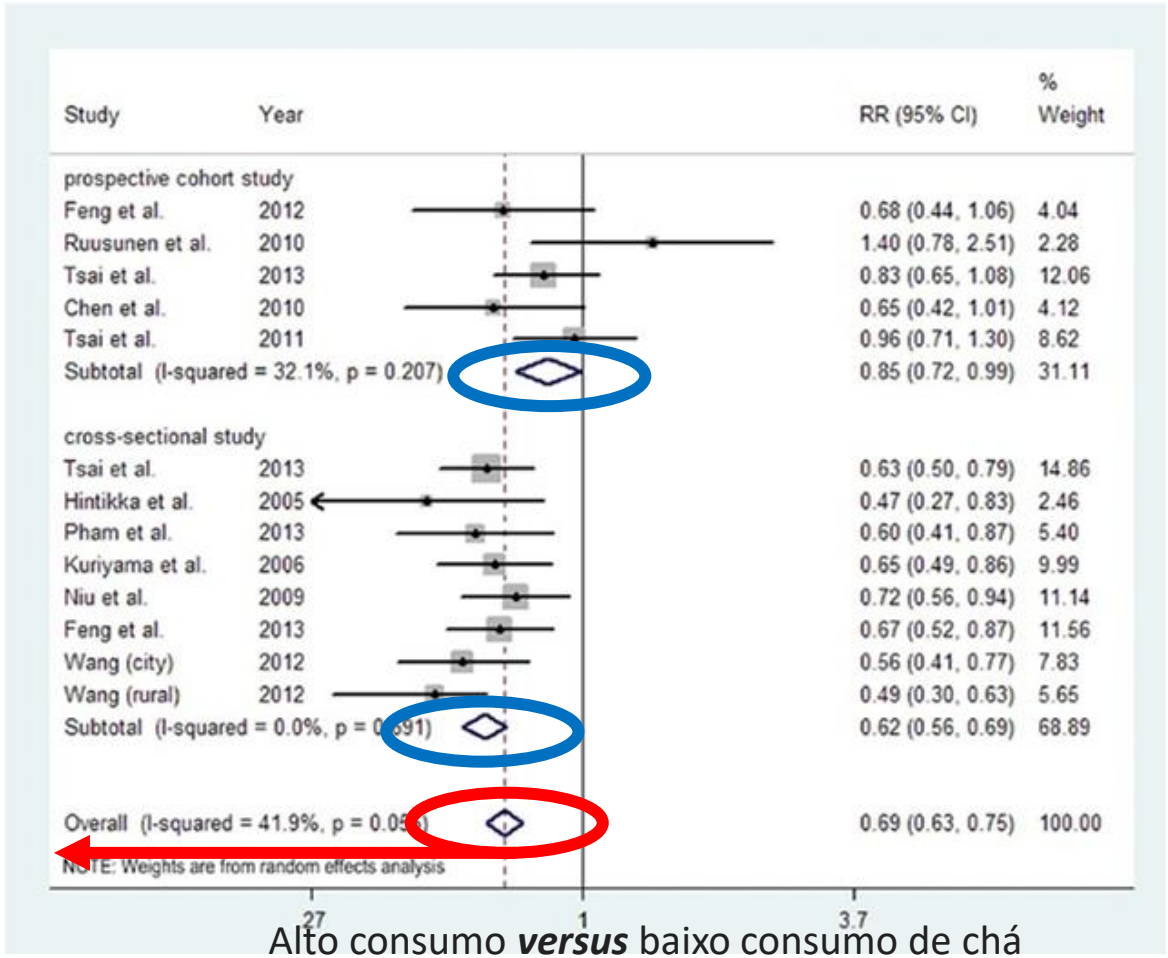
Editor's Choice

Meta-análise com 13 **estudos observacionais** (5 de coorte e 8 transversais)
Chá verde (3) e chás diversos (9)
22.817 participantes no total, sendo 4.743 com depressão.

Dong *et* al., **ANZJP**, 2015.

Chás

Figure 2. Summary relative risks (RRs) of depression for higher versus low level of tea consumption.



Alto consumo ***versus*** baixo consumo de chá

Indivíduos com menor consumo de chá apresentaram um RR de depressão de 0,69

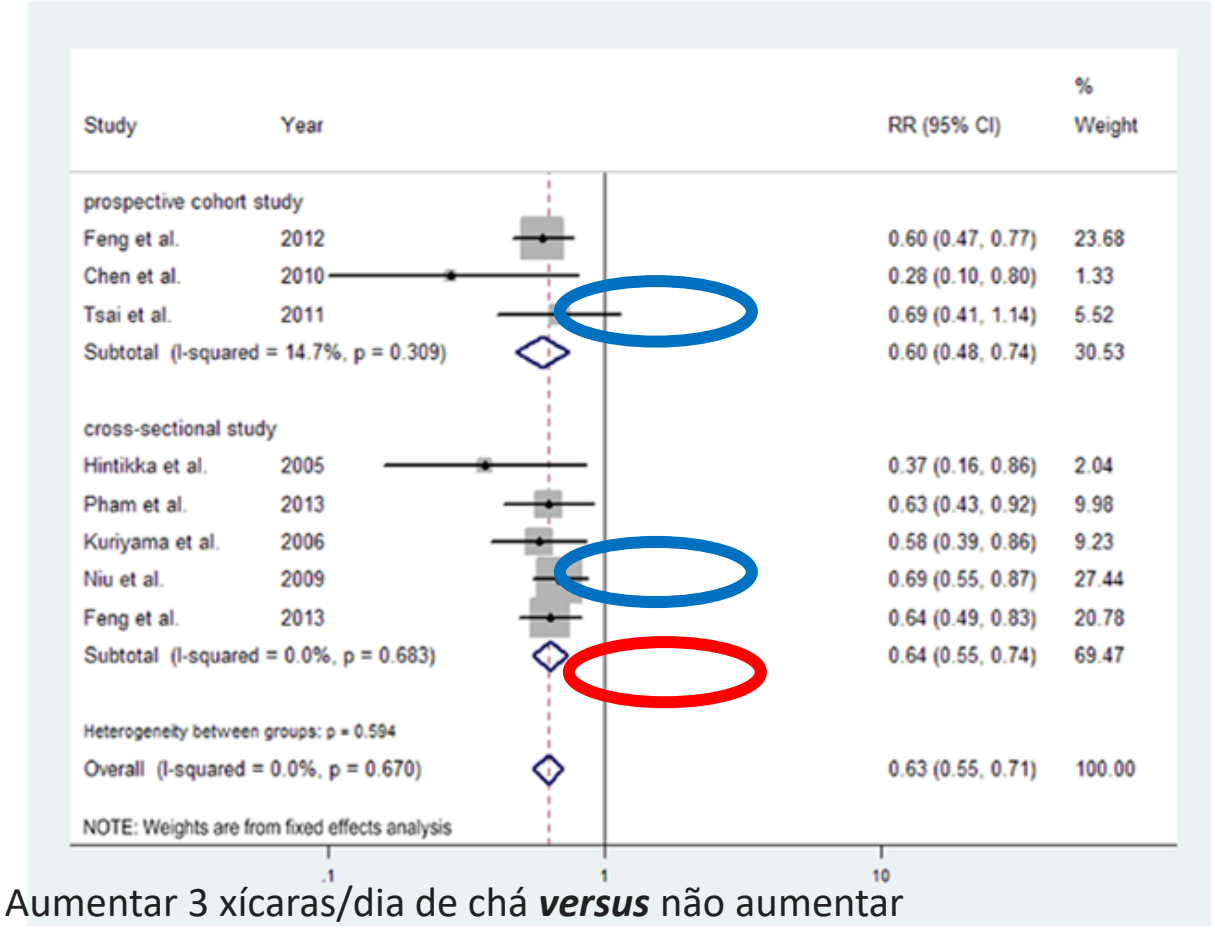
Dong *et* al., **ANZJP**, 2015.

Chás

O aumento de 3 xícaras/dia no consumo de chá foi associado a uma diminuição no risco de depressão de 37%
(RR = 0,63, IC 95%: 0,55-0,71)

Os autores concluíram que o consumo de chá está **associado à diminuição** do risco de depressão.

Figure 4. Summary relative risks (RRs) of depression for an increment of 3 cups/d in tea consumption.



Aumentar 3 xícaras/dia de chá ***versus*** não aumentar

Dong *et* al., **ANZJP**, 2015.

Chá de camomila


JAN

Informing Practice and Policy Worldwide through Research and Scholarship

ORIGINAL RESEARCH: EMPIRICAL RESEARCH – QUANTITATIVE

Effects of an intervention with drinking chamomile tea on sleep quality and depression in sleep disturbed postnatal women: a randomized controlled trial

Shao-Min Chang & Chung-Hey Chen

Avaliar os efeitos do chá de camomila na qualidade do sono, fadiga e depressão pós parto.

Grupo experimentou tomou chá de camomila por 2 semanas

Ensaio Clínico Aleatorizado

80 mulheres pós-natais (Taiwan) com má qualidade do sono

40 grupo experimental e 40 do grupo controle

Chang & Chen, **Journal of Advanced Nursing**, 2015.

Chá de camomila

Comparado com o grupo controle, o grupo experimental demonstrou escores significativamente mais baixos de sintomas de depressão (t = -2·372, P = 0,020)

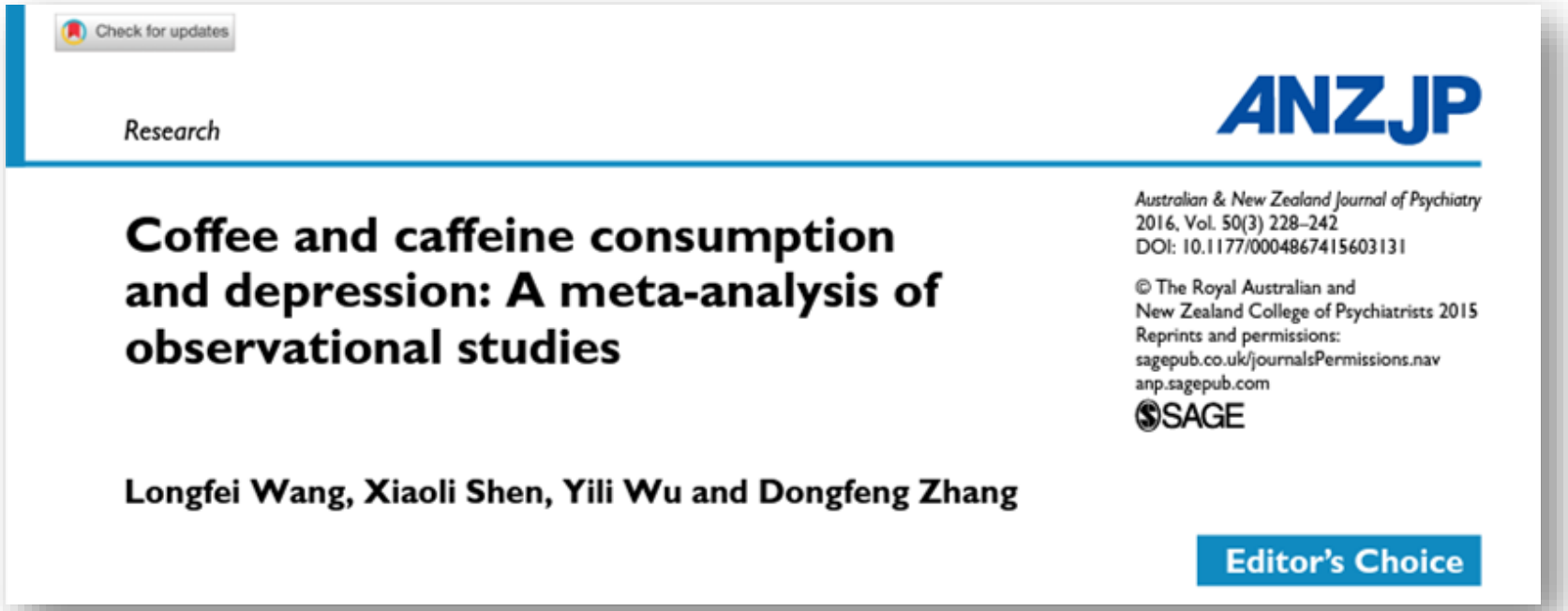
Os autores concluíram que o chá de camomila pode ser recomendado para puérperas como uma abordagem complementar para aliviar a depressão e problemas de qualidade do sono.

Table 2 Two-sample *t*-tests for outcome variables, experimental and control groups.

Scales	Experimental Mean (SD)	Control Mean (SD)	*t*	*P*
PSQS Factor 1				
Pretest	18·20 (3·612)	18·13 (4·425)	0·072	0·943
2-week post-test	15·09 (4·686)	16·47 (5·182)	−1·197	0·235
4-week post-test	13·91 (4·507)	14·27 (5·216)	0·309	0·758
PSQS Factor 2				
Pretest	6·29 (4·004)	7·50 (3·391)	−1·402	0·165
2-week post-test	6·11 (2·867)	8·08 (3·787)	−2·482	0·015
4-week post-test	6·34 (3·038)	6·95 (3·756)	−0·746	0·458
EPDS				
Pretest	7·86 (4·577)	9·71 (4·274)	−1·789	0·078
2-week post-test	7·86 (4·864)	10·47 (4·560)	−2·372	0·020
4-week post-test	7·26 (4·361)	9·51 (4·154)	−2·248	0·028

Chang & Chen, **Journal of Advanced Nursing**, 2015.

Café



Check for updates

Research

ANZJP

Coffee and caffeine consumption and depression: A meta-analysis of observational studies

Longfei Wang, Xiaoli Shen, Yili Wu and Dongfeng Zhang

Australian & New Zealand Journal of Psychiatry
2016, Vol. 50(3) 228–242
DOI: 10.1177/0004867415603131

Editor's Choice

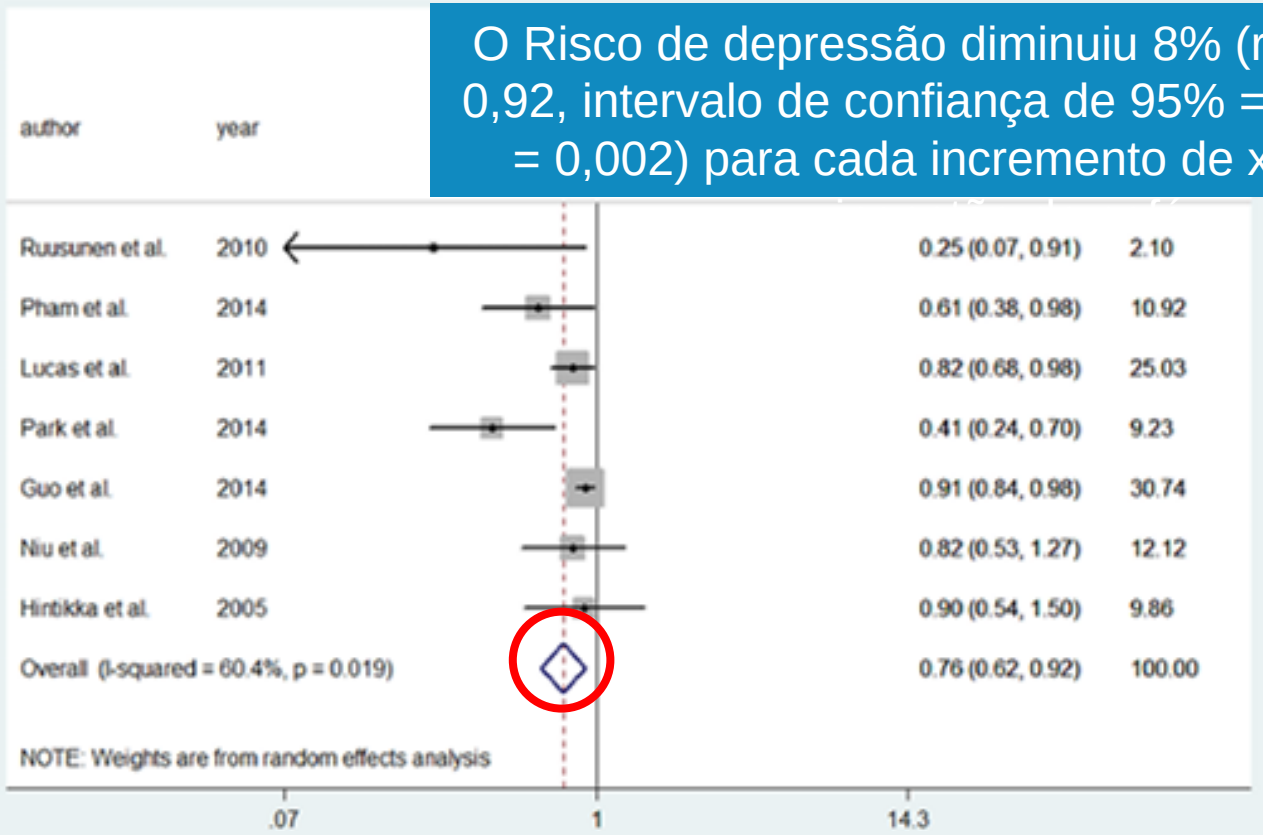
Meta-análise com 11 **estudos observacionais** 7 café e 8 com cafeína
7 com café (1 caso-controle; 4 transversais; 2 coorte)
330.677 participantes

Wang et al.,, **ANZJP**, 2016.

Café

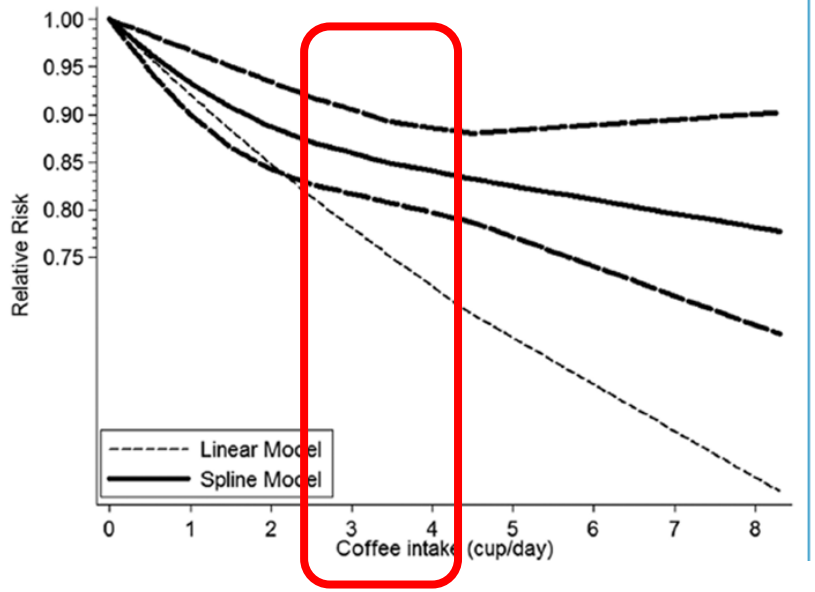
Ingestão de café e risco de depressão

O Risco de depressão diminuiu 8% (risco relativo = 0,92, intervalo de confiança de 95% = [0,87, 0,97], p = 0,002) para cada incremento de xícara/dia na



Risco Relativo 0,757 [0,624, 0,917]

Figure 3. Dose-response relationships between coffee intake and depression risk.



Os autores concluem que o consumo de café está associado à diminuição do risco de depressão

Wang et al.,, **ANZJP**, 2016.

Café e chás

Mol. Nutr. Food Res. 2016, *60*, 223–234 DOI 10.1002/mnfr.201500620 223

RESEARCH ARTICLE

Coffee, tea, caffeine and risk of depression: A systematic review and dose–response meta-analysis of observational studies

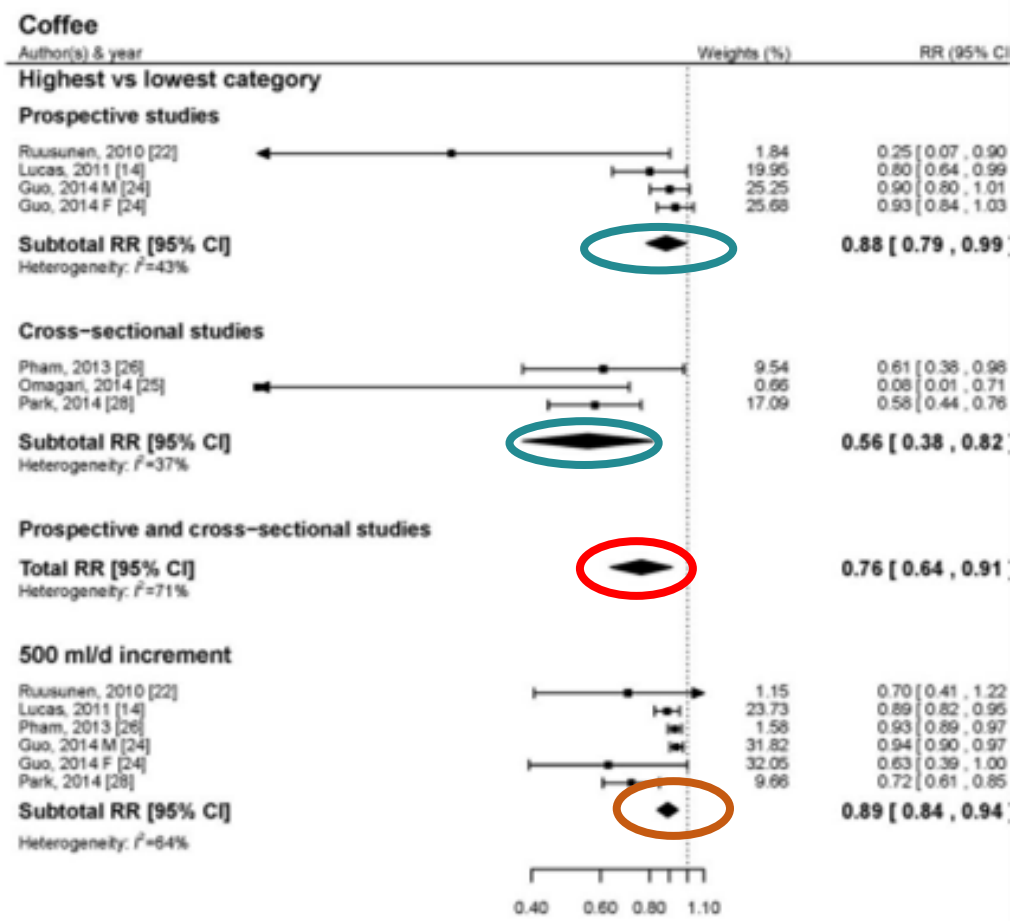
Giuseppe Grosso[1], Agnieszka Micek[2], Sabrina Castellano[3], Andzrej Pajak[2] and Fabio Galvano[3]

[1] Integrated Cancer Registry of Catania-Messina-Siracusa-Enna, Catania, Italy
[2] Department of Epidemiology and Population Studies, Jagiellonian University Medical College, Krakow, Poland
[3] Department of Biomedical and Biotechnological Sciences, Section of Pharmacology and Biochemistry, University of Catania, Catania, Italy

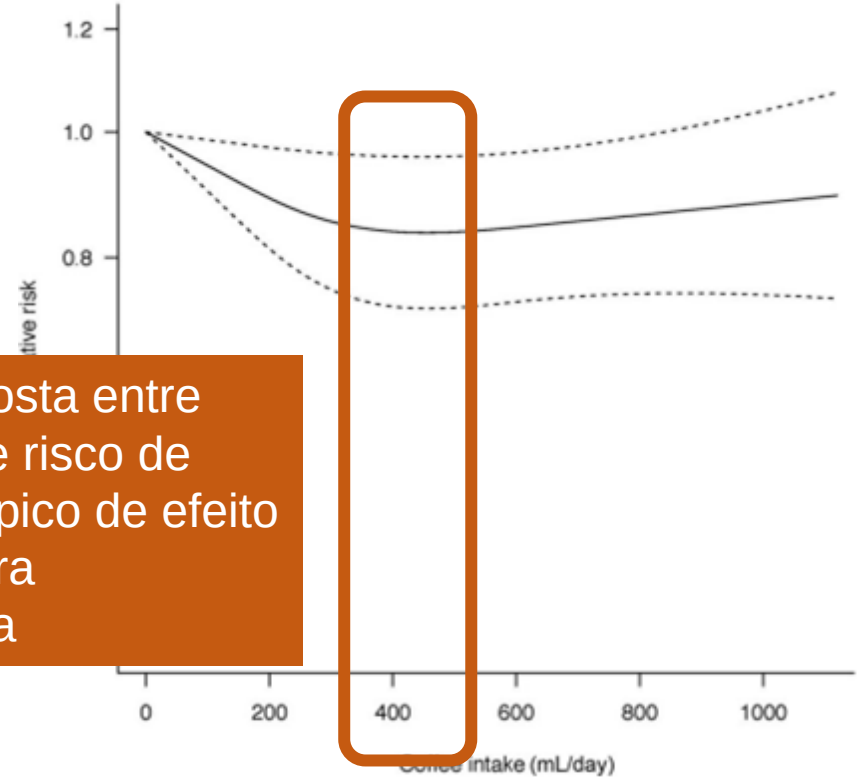
Meta-análise de 12 estudos (7 transversais; 5 prospectivos)
346.913 indivíduos e 8.146 casos de depressão

Grosso et al.,, **Mol. Nutri. Food Res.**, 2016.

Café



A maior ingestão apresentou um RR de depressão de 0,76 (IC 95%: 0,64, 0,91).



O efeito dose-resposta entre consumo de café e risco de depressão sugere um pico de efeito protetor para 400 mL/dia

Grosso et al.,, **Mol. Nutri. Food Res.**, 2016.

Chás

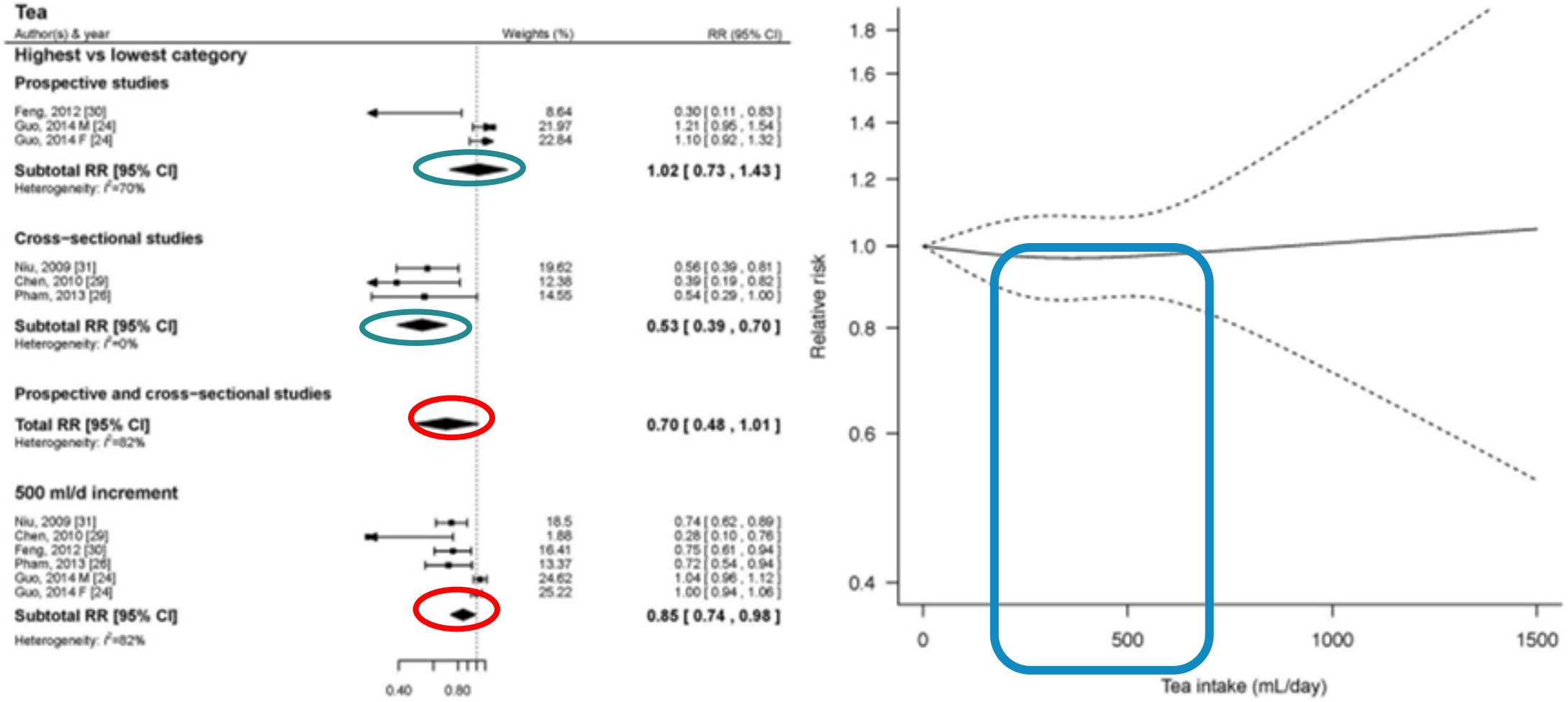


Figure 3. Forest plot of summary relative risks (RRs) of depression for higher versus low level of tea consumption and dose–response analysis.

Grosso et al.,, **Mol. Nutri. Food Res.**, 2016.

Café e chás

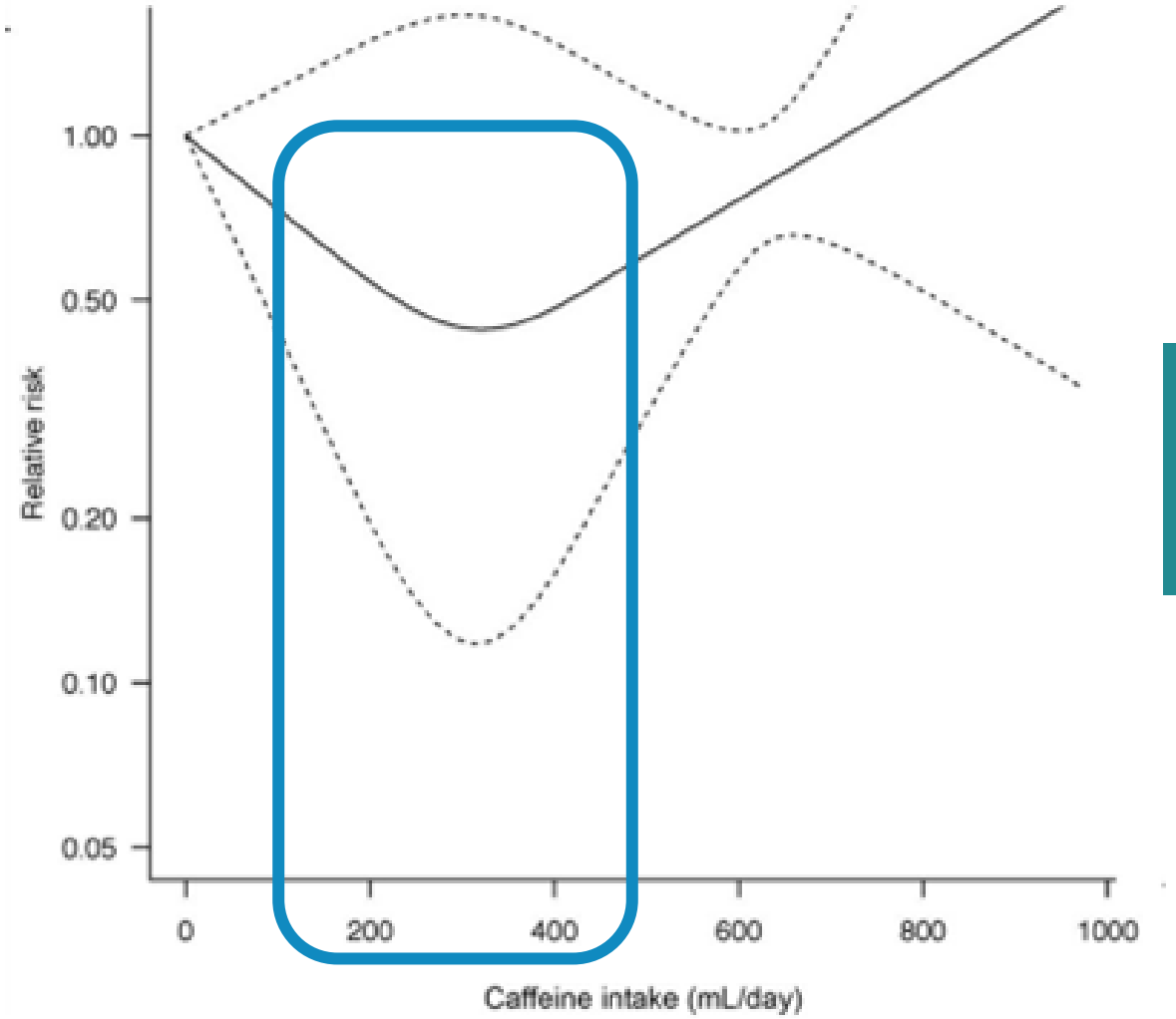
Table 2. Dose–response analyses for various category of exposure and risk of depression

	Dose					
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
	0 mL/day	200 mL/day	400 mL/day	600 mL/day	800 mL/day	1000 mL/day
Coffee	1.00	0.89 (0.81, 0.97)	0.84 (0.73, 0.96)	0.84 (0.74, 0.96)	0.86 (0.75, 0.99)	0.88 (0.75, 1.04)
Tea	1.00	0.98 (0.89, 1.07)	0.97 (0.87, 1.08)	0.98 (0.86, 1.11)	0.99 (0.79, 1.25)	1.01 (0.71, 1.43)
Model 1[a)]	1.00	0.91 (0.78, 1.05)	0.84 (0.67, 1.06)	0.79 (0.62, 1.02)	0.76 (0.58, 1.00)	0.72 (0.53, 0.99)
Model 2[b)]	1.00	0.83 (0.74, 0.93)	0.72 (0.57, 0.91)	0.66 (0.46, 0.94)	0.61 (0.37, 1.01)	0.56 (0.29, 1.09)
	0 mg/day	150 mg/day	300 mg/day	450 mg/day	600 mg/day	750 mg/day
Caffeine	1.00	0.63 (0.29, 1.35)	0.45 (0.12, 1.66)	0.54 (0.22, 1.33)	0.76 (0.57, 1.02)	1.08 (0.58, 2.01)

a) Model 1 included RRs for "caffeinated hot tea" and "decaffeinated hot tea" from the study of Guo et al. [24].
b) Model 2 included RR for only "caffeinated hot tea" from the study of Guo et al. [24].

Grosso et al.,, **Mol. Nutri. Food Res.**, 2016.

Cafeína



Os autores concluem um efeito protetor do café e, parcialmente, do chá e da cafeína no risco de depressão.

Grosso et al., **Mol. Nutri. Food Res.**, 2016.

Suco de Laranja

nutrients

MDPI

Article

Flavonoid-Rich Orange Juice Intake and Altered Gut Microbiome in Young Adults with Depressive Symptom: A Randomized Controlled Study

Miey Park [1,†], Jihee Choi [1,†] and Hae-Jeung Lee [1,2,*]

Ensaio Clínico Aleatorizado

N= 40 Indivíduos com idade média 21 anos, ambos os sexos

Grupo intervenção

380 mL de Suco de laranja rico em flavonoides

8 semanas

Grupo não experimental

380 mL de Suco de laranja com baixo teor de flavonoides

8 semanas

Park et al.,,***Nutrients***, 2020

Suco de Laranja

Table 1. Anthropometric data and blood test results at baseline and 8 weeks after intervention.

Variables	Flavonoid-Rich Orange Juice (FR, $n = 20$)		p-Value †	Flavonoid-Low Orange Cordial (FL, $n = 20$)		p-Value †	Δ Group Comparison ¥
	Baseline	After Intervention		Baseline	After Intervention		
	Mean ± SE			Mean ± SE			
Age		22.20 ± 2.608			21.45 ± 2.259		0.337 †
Male		$n = 8$ (40%)			$n = 8$ (40%)		1.000
Weight, kg	66.28 ± 3.41	66.57 ± 3.40	0.382 †	60.22 ± 2.32	59.98 ± 2.31	0.510 †	0.672
BMI, kg/m^2	23.45 ± 0.87	23.62 ± 0.88	0.178 †	21.74 ± 0.66	21.62 ± 0.63	0.387 †	0.122
Percent body fat, %	27.72 ± 1.76	27.90 ± 1.85	0.609 †	25.84 ± 2.08	24.73 ± 2.18	0.052 †	0.050
SBP, mmHg	121.25 ± 2.98	123.05 ± 2.78	0.520 †	121.20 ± 2.39	118.40 ± 3.55	0.307 †	0.117
DBP, mmHg	74.80 ± 2.01	76.20 ± 1.63	0.522 †	70.55 ± 2.24	72.60 ± 1.47	0.397 †	0.063
BDNF	255.30 ± 40.78	322.08 ± 42.80	0.038 ‡	267.23 ± 45.00	287.45 ± 53.24	0.673‡	0.132
Serotonin, ng/mL	151.73 ± 22.76	187.66 ± 27.12	0.219 †	122.62 ± 13.37	154.23 ± 20.69	0.102 †	0.058
Folate, ng/mL	6.31 ± 0.69	7.47 ± 1.00	0.013 †	6.39 ± 1.45	6.72 ± 3.41	0.536 †	0.057
hs-CRP, mg/L	1.76 ± 0.56	0.81 ± 0.29	0.180 ‡	2.03 ± 0.89	0.41 ± 0.10	0.061‡	0.031
Vitamin B_{12}, pg/mL	517.70 ± 30.57	507.75 ± 25.80	0.694 †	550.45 ± 45.51	542.00 ± 38.89	0.768 †	0.143
CES-D score	30.4 ± 7.97	15.15 ± 8.95	<0.0001 †	28.35 ± 6.49	17.85 ± 7.36	0.001 †	0.889

BMI, body mass index; † paired t-test; ‡ Wilcoxon signed rank test; ¥ multiple regression analysis was applied for Δ values (income, sex, and age were adjusted).

Park et al.,,***Nutrients***, 2020

Chá de Lavanda

Complementary Therapies in Medicine 50 (2020) 102393

Contents lists available at ScienceDirect

Complementary Therapies in Medicine

journal homepage: www.elsevier.com/locate/ctim

The effect of lavender herbal tea on the anxiety and depression of the elderly: A randomized clinical trial

Mohammad-Rafi Bazrafshan[a], Mozhgan Jokar[b], Nasrin Shokrpour[c], Hamed Delam[d,*]

[a] Department of Nursing, School of Nursing, Larestan University of Medical Sciences, Larestan, Iran
[b] Department of Nursing, Khomein University of Medical Sciences, Khomein, Iran
[c] English Department, Shiraz University of Medical Sciences, Shiraz, Iran
[d] Student Research Committee, Larestan University of Medical Sciences, Larestan, Iran

Ensaio Clínico Aleatorizado

N= 60 indivíduos idosos

Intervenção de 2 semanas

Grupo intervenção

2g de chá de lavanda

2 vezes (manhã e noite)

Grupo controle

Sem chá

Bazrafshan et al.,,***Complement Ther Med***, 2020

Chá de Lavanda

Table 2
Comparison of the mean scores of depression and anxiety (state and trait) in the intervention and control groups.

		Before intervention (Mean ± SD*)	After intervention (Mean ± SD*)	P-value***
Depression	Intervention (n = 30)	17.80 ± 1.49	16.33 ± 1.49	< 0.001
	Control (n = 30)	18.40 ± 1.81	18.33 ± 1.84	0.748
	P-value**	0.181	< 0.001	
	Mean difference (95 %CI)	−0.60 (−1.45, 0.25)	−2.00 (−2.86, −1.13)	
Anxiety (state)	Intervention (n = 30)	45.47 ± 7.28	40.07 ± 4.80	< 0.001
	Control (n = 30)	45.50 ± 6.95	46.47 ± 6.77	0.401
	P-value**	0.656	< 0.001	
	Mean difference (95 %CI)	−0.03 (−3.71, 3.64)	−6.40 (−9.43, −3.36)	
Anxiety (trait)	Intervention (n = 30)	47.47 ± 6.96	42.63 ± 6.67	< 0.001
	Control (n = 30)	46.90 ± 6.49	46.77 ± 6.98	0.751
	P-value**	0.750	0.031	
	Mean difference (95 %CI)	0.56 (−2.91, 4.04)	−4.13 (−7.66, −0.60)	

* Standard deviation.
** Independent *t*-test.
***

O consumo do chá de lavanda pode reduzir os escores de depressão e ansiedade, sugere-se que seja utilizado como tratamento complementar na redução da ansiedade e depressão.

Bazrafshan et al.,,***Complement Ther Med***, 2020

Guaraná

Received: 9 June 2021 | Revised: 22 September 2021 | Accepted: 23 September 2021

DOI: 10.1111/1541-4337.12862

COMPREHENSIVE REVIEWS IN FOOD SCIENCE AND FOOD SAFETY

Effects of the consumption of guarana on human health: A narrative review

Elizabeth A. F. S. Torres[1] | Ana Clara da C. Pinaffi-Langley[1] | Marcela de Souza Figueira[1] | Karina Silva Cordeiro[1] | Leonardo Dias Negrão[1] | Maiara Jurema Soares[1] | Cintia Pereira da Silva[1] | Maria Carolina Zsigovics Alfino[1] | Geni Rodrigues Sampaio[1] | Adriano Costa de Camargo[2]

TABLE 1 Main bioactive compounds found in guarana seed

Compound name	Mean mg/100 g of guarana seed	Standard error mg/100 g of guarana seed	N	Minimum mg/100 g of guarana seed	Maximum mg/100 g of guarana seed	Reference
Methylxanthines						
Caffeine	2797	623	7	850	5130	Machado et al. (2018); Santana et al. (2019); Santana and Macedo (2019); Sousa et al. (2010); Yonekura et al. (2016)
Theobromine	20	4	7	6	39	Machado et al. (2018); Santana et al. (2019); Santana and Macedo (2019); Sousa et al. (2010); Yonekura et al. (2016)
Theophylline	50	18	6	10	130	Machado et al. (2018); Santana et al. (2019); Santana and Macedo (2019); Sousa et al. (2010)
Monomeric flavan-3-ols						
Catechin	2056	573	12	460	7600	da Silva et al. (2017); Machado et al. (2018); Mendes et al. (2019); Santana et al. (2019); Yonekura et al. (2016)
Epicatechin gallate	13	5	4	4	26	Santana et al. (2019); Santana and Macedo (2019)
Epicatechin	1340	334	12	370	4400	da Silva et al. (2017); Machado et al. (2018); Mendes et al. (2019); Santana et al. (2019); Yonekura et al. (2016)
Proanthocyanidins						
Procyanidin B1	374	3	3	370	380	Machado et al. (2018); Mendes et al. (2019)
Procyanidin B2	314	80	4	100	490	Machado et al. (2018); Mendes et al. (2019); Sousa et al. (2010)
Procyanidin A2	60	–	1	–	–	Sousa et al. (2010)

Torres et al., **Nutrients**, 2021.

Alimentos Funcionais

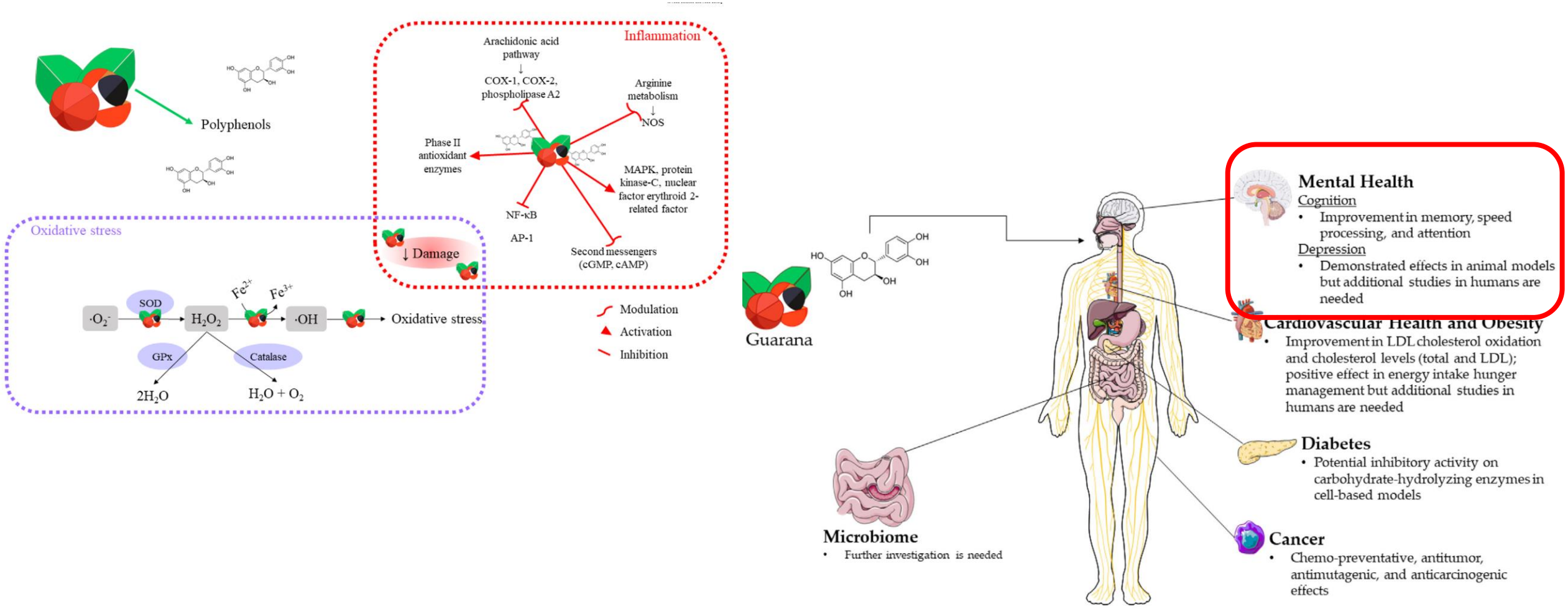
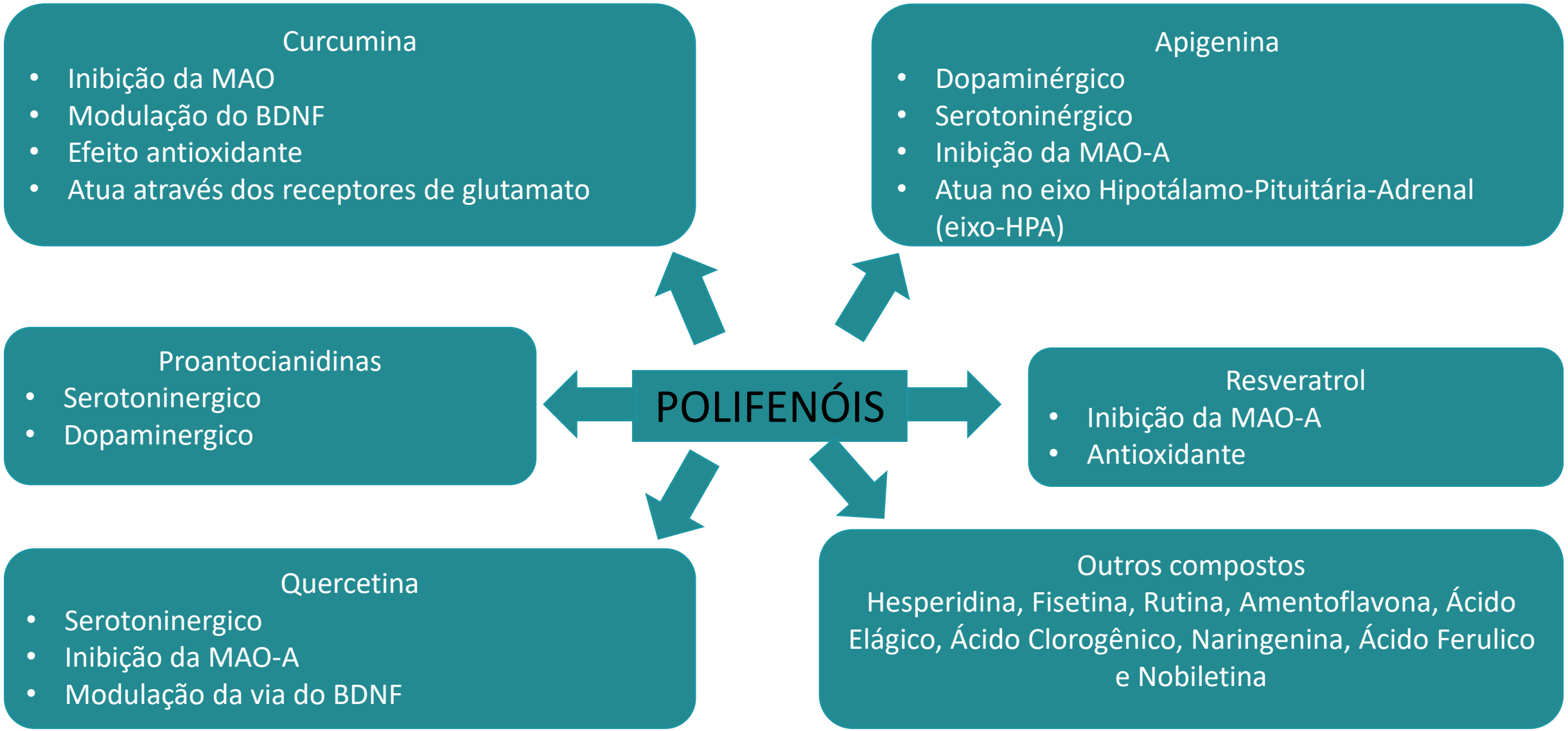


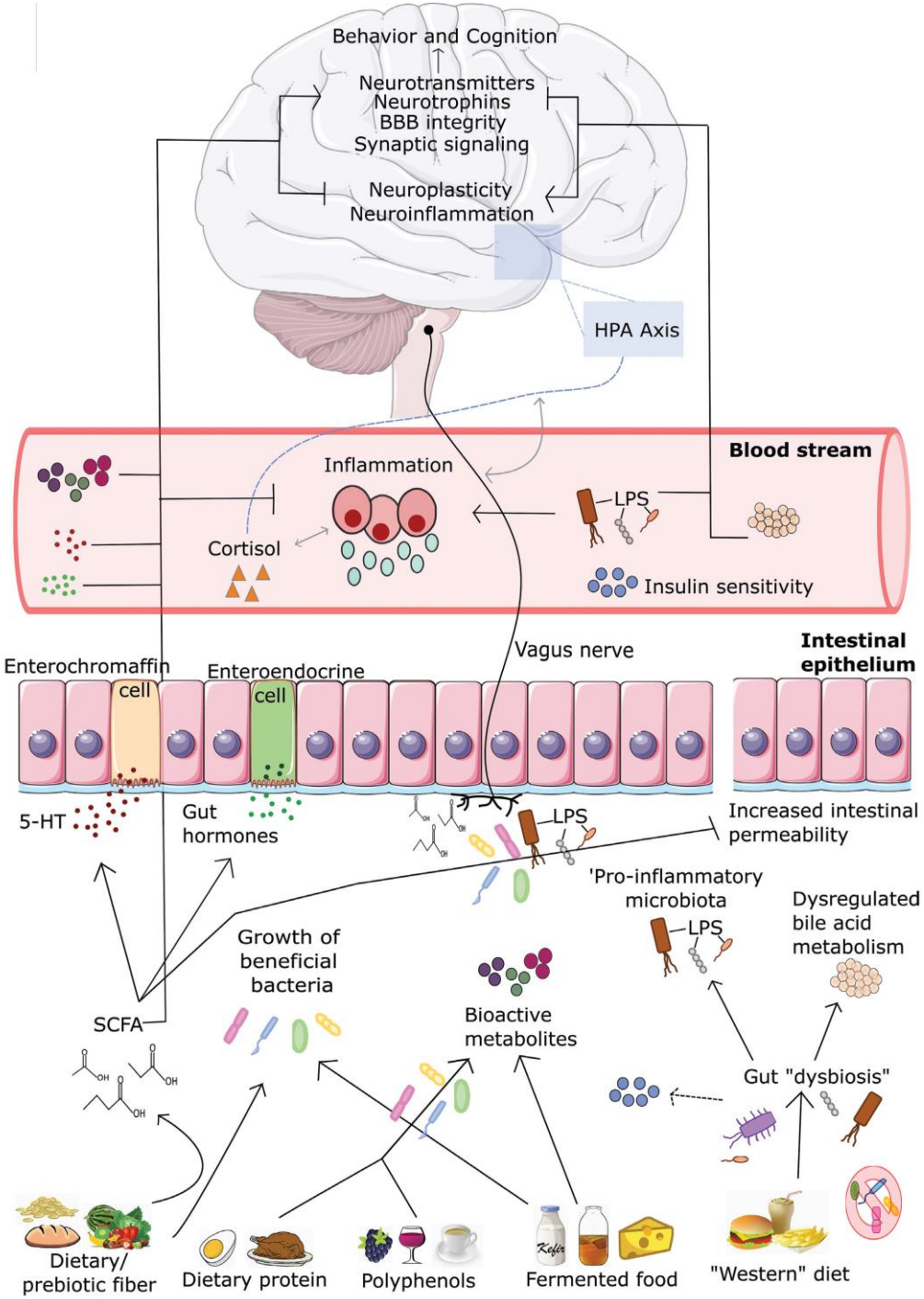
FIGURE 4 Illustration summarizing the diverse applications of guarana on human health

Torres et al., **Nutrients**, 2021

Polifenóis



Pathak, Agrawal & Dhir, **Expert Opinion on Investigational Drugs**, 2013



Berding et al., Adv Nutr 2021.

Peixes

nutrients

MDPI

Article

Fatty Fish Intake and the Effect on Mental Health and Sleep in Preschool Children in FINS-KIDS, a Randomized Controlled Trial

Mari Hysing [1,2,*], Ingrid Kvestad [1], Marian Kjellevold [3], Lisa Kolden Midtbø [3], Ingvild Eide Graff [3,4], Øyvind Lie [3,5], Hallvard Hurum [1], Kjell Morten Stormark [1,6] and Jannike Øyen [3]

Ensaio Clínico Aleatorizado

N= 232 Crianças de 4 a 6 anos

Grupo Intervenção

Almoço com peixe gordo (arenque/cavala)

3 vezes/semana

16 semanas

Grupo Controle

Almoço com carnes (frango/cordeiro/carne)

3 vezes/semana

16 semanas

Hysing et al., **Nutrients**, 2018.

Peixes

Table 2. Predicted changes in parent-reported mental health measured by the Strengths and Difficulties Questionnaire (SDQ) total and subscales scores after fish (n = 81) or meat (n = 89) intervention.

	Crude			Models Adjusted For			
				Pre-Score		Pre-Score, Dietary Compliance	
SDQ	Pre Mean (SD)	Post Mean (SD)	p-Value [1]	Change Mean (95% CI)	p-Value [2]	Change Mean (95% CI)	p-Value [3]
Emotional problems							
Fish	1.4 (1.4)	1.3 (1.5)	0.652	−0.02 (−0.29, 0.24)	0.765	0.02 (−0.03, 0.28)	0.505
Meat	1.2 (1.3)	1.1 (1.5)	0.749	−0.08 (−0.33, 0.17)		−0.11 (−0.37, 0.14)	
Conduct problems							
Fish	1.3 (1.2)	1.3 (1.3)	0.641	0.04 (−0.22, 0.30)	0.501	0.05 (−0.22, 0.31)	0.480
Meat	1.4 (1.2)	1.3 (1.2)	0.404	−0.07 (−0.32, 0.18)		−0.08 (−0.33, 0.18)	
Hyperactivity/inattention							
Fish	2.3 (2.1)	2.6 (2.3)	0.610	0.10 (−0.23, 0.42)	0.536	0.09 (−0.25, 0.42)	0.640
Meat	2.4 (2.0)	2.3 (2.0)	0.880	−0.03 (−0.35, 0.28)		−0.02 (−0.35, 0.31)	
Peer problems							
Fish	0.8 (1.2)	0.9 (1.2)	0.401	0.07 (−0.15, 0.29)	0.135	0.11 (−0.12, 0.34)	0.064
Meat	0.9 (1.2)	0.7 (1.1)	0.135	−0.16 (−0.37, 0.05)		−0.19 (−0.41, 9.02)	
Total problems							
Fish	5.9 (4.0)	6.1 (4.6)	0.573	0.22 (−0.47, 0.91)	0.191	0.29 (−0.41, 0.99)	0.127
Meat	5.8 (3.8)	5.4 (3.8)	0.256	−0.37 (−1.03, 0.30)		−0.44 (−1.11, 0.24)	

[1] Paired-samples t-test for comparison of individual pre- and post-intervention values within each intervention group. [2] Linear mixed effect model adjusted for pre-intervention score. [3] Linear mixed effect model adjusted for pre-intervention score and dietary compliance (amount of fish/meat consumed).

Hysing et al., **Nutrients**, 2018.

Peixes

Received: 26 January 2018 | Accepted: 13 August 2018
DOI: 10.1111/appy.12335

Check for updates

ORIGINAL ARTICLE

WILEY ASIA-PACIFIC PSYCHIATRY

Fish consumption and risk of depression: Epidemiological evidence from prospective studies

Yeonji Yang MS | Youngyo Kim PhD | Youjin Je ScD

Meta-análise de 10 estudos de coorte
109.764 indivíduos, sendo 6.672 casos de depressão

Yang et al., ***Asia Pac Psychiatry***, 2018.

Peixes

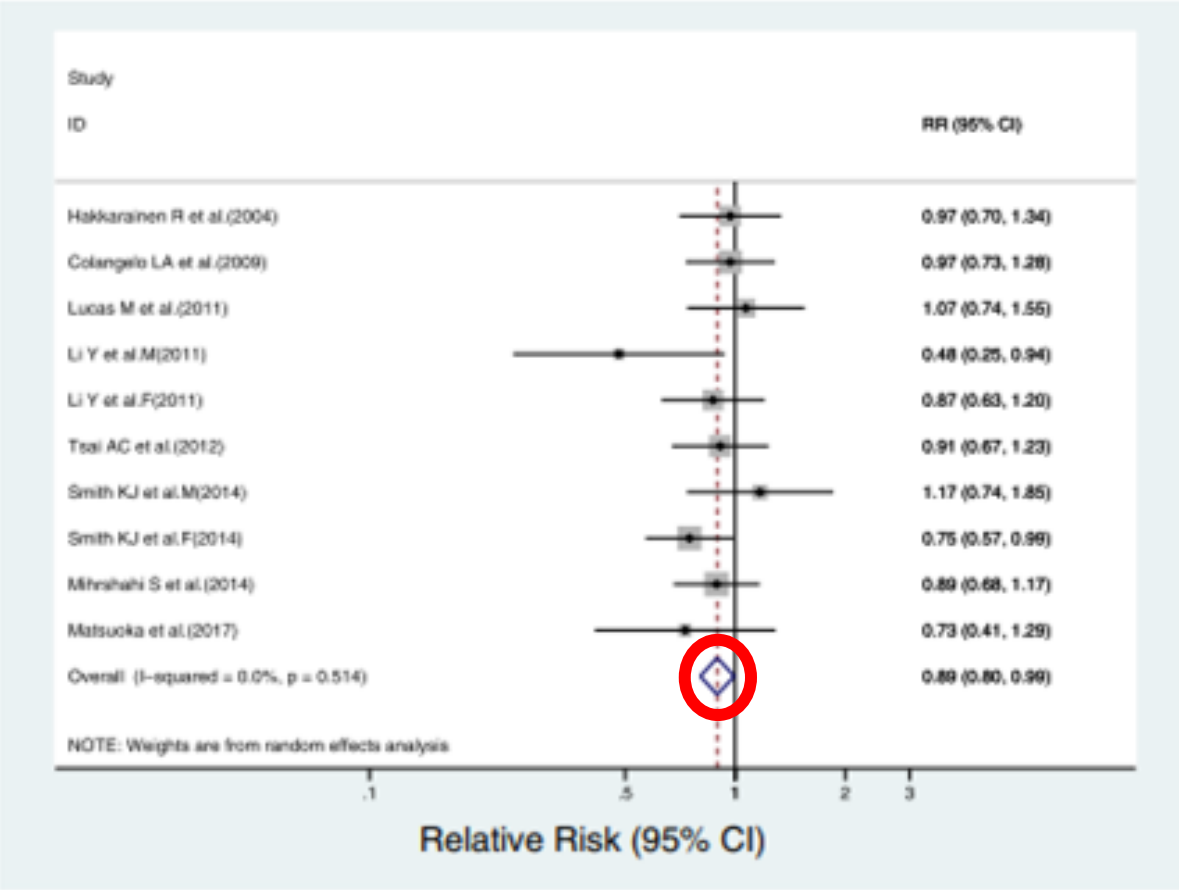


FIGURE 2 Forest plot of depression for the highest vs lowest categories of fish consumption

O RR ajustado combinado de depressão para o maior consumo de peixe foi de 0,89 (IC 95%: 0,80-0,99)

Aumentar 1 porção/semana de consumo de peixe está associado com 89% de risco a menos do que quem não consome peixe

Foi observado uma associação inversa entre a ingestão de peixes ou ácidos graxos ômega-3 e o risco de depressão, especialmente em mulheres

Yang et al., ***Asia Pac Psychiatry***, 2018.

Frutos do mar

nutrients

MDPI

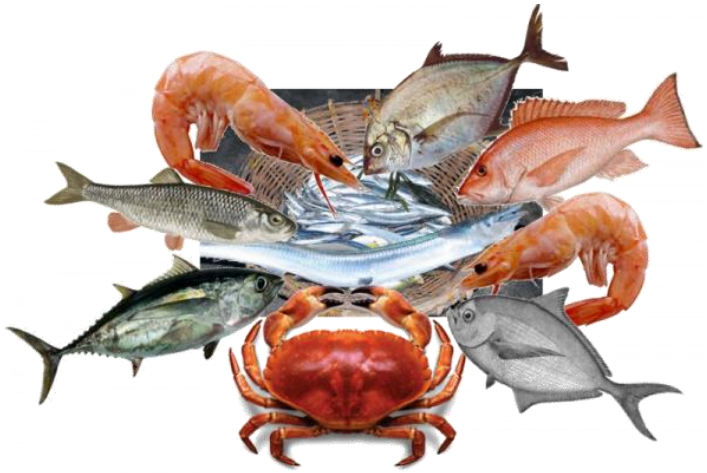
Article

Seafood Consumption, Omega-3 Fatty Acids Intake, and Life-Time Prevalence of Depression in the PREDIMED-Plus Trial

Almudena Sánchez-Villegas [1,2,*], Jacqueline Álvarez-Pérez [1,2], Estefanía Toledo [2,3], Jordi Salas-Salvadó [2,4,5,6], Carolina Ortega-Azorín [2,7], Maria Dolores Zomeño [8,9], Jesús Vioque [10,11], Jose Alfredo Martínez [2,13], Dora Romaguera [2,14], Jessica Pérez-López [15], José López-Miranda [2,16], Ramón Estruch [2,17], Aurora Bueno-Cavanillas [10,18], Fernando Arós [2,19,20], Josep A. Tur [2,21], Francisco J. Tinahones [2,15,22], Oscar Lecea [2,3,23], Vicente Martín [10,24], M. Ortega-Calvo [2,25], Clotilde Vázquez [2,26], Xavier Pintó [2,27], Josep Vidal [28,29], Lidia Daimiel [13], Miguel Delgado-Rodríguez [10,30], Pilar Matía [31], Dolores Corella [2,7], Andrés Díaz-López [2,4,5], Nancy Babio [2,4,5], Miguel Ángel Muñoz [33], Montserrat Fitó [2,32], Manoli García de la Hera [10,11], Itziar Abete [12], Antonio García-Rios [2,16], Emilio Ros [2,33], Miguel Ruíz-Canela [2,3], Miguel Ángel Martínez-González [2,3,34], Marisol Izquierdo [35] and Lluis Serra-Majem [1,2]

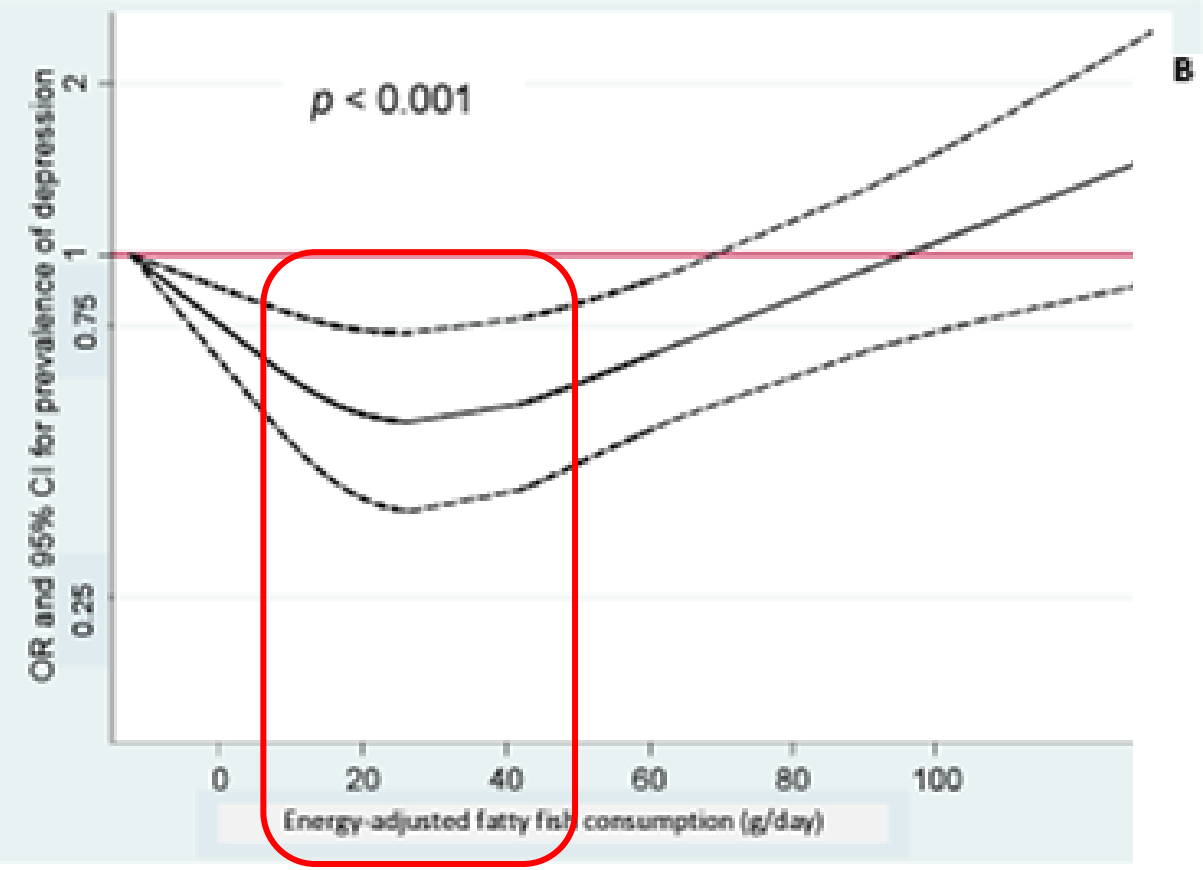
Análise transversal do estudo PREDIMED-Plus

6.587 indivíduos, sendo 1.367 casos de depressão



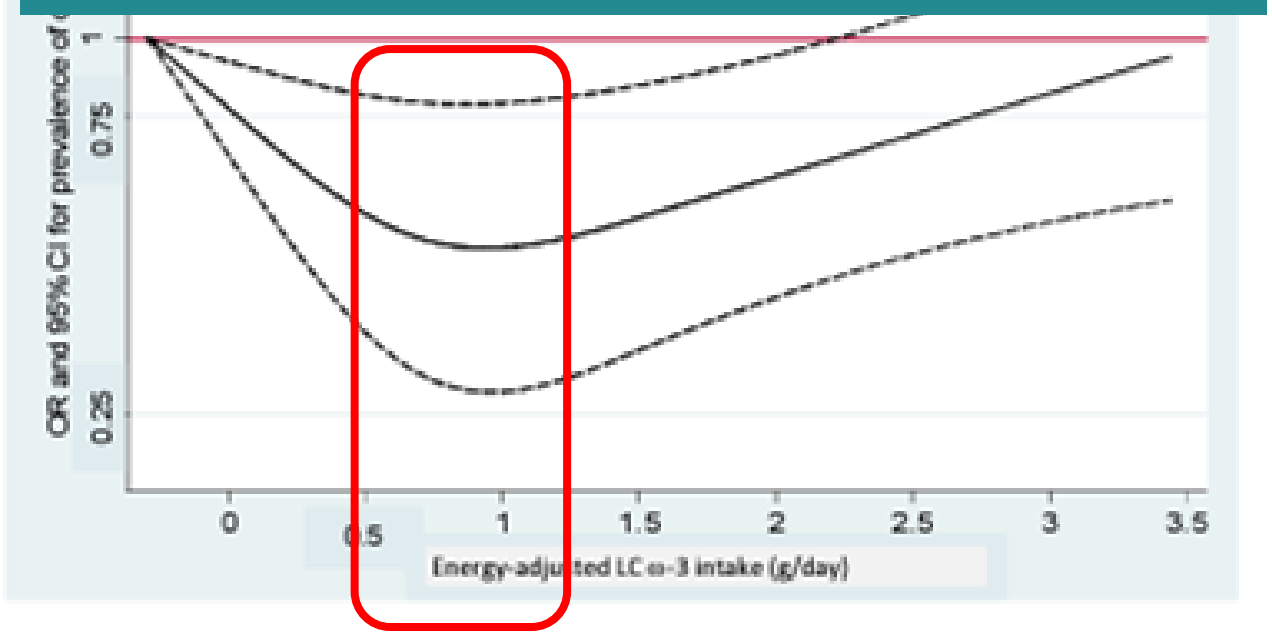
Sánchez-Villegas et al., ***Nutrients***, 2018.

Peixes



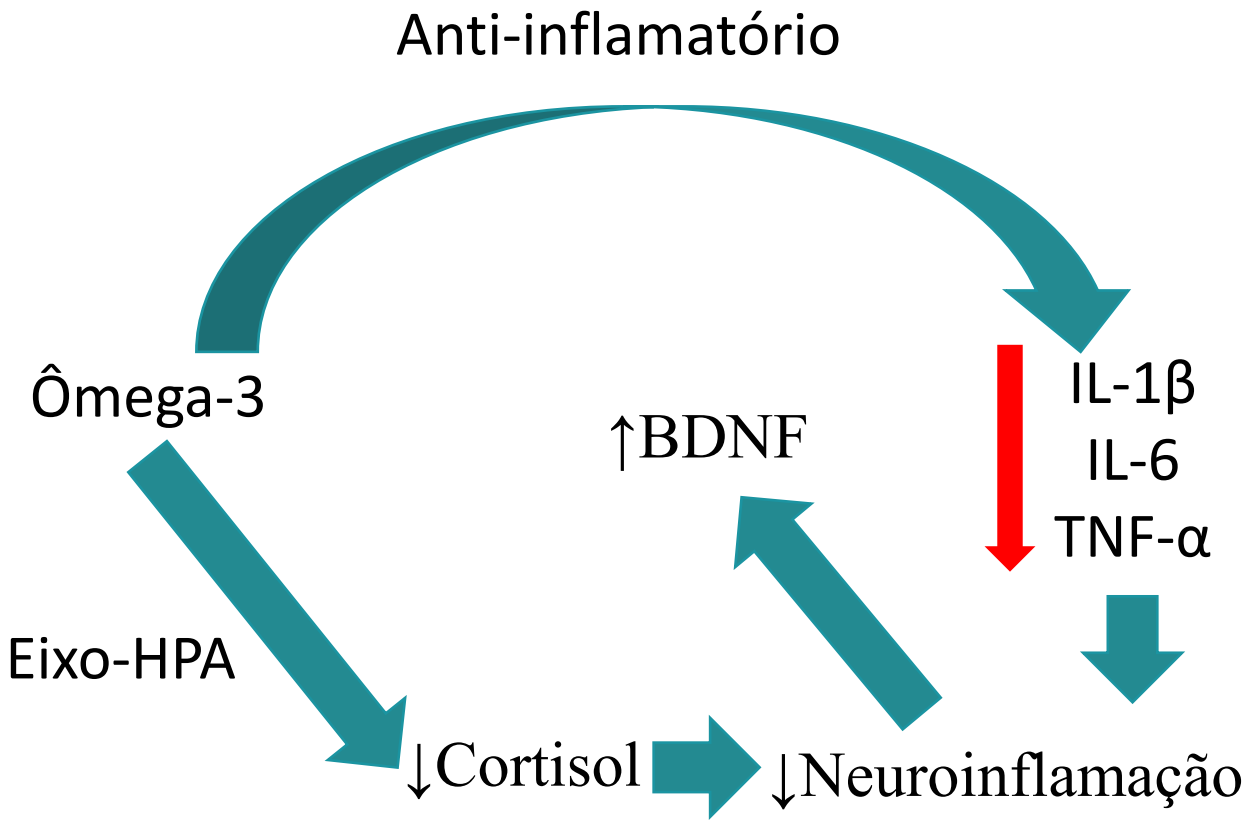
As razões de chance (ORs) para o 2º, 3º e 4º quintis de consumo de peixe gordo foram 0,77 (0,63⁻0,94), 0,71 (0,58⁻0,87) e 0,78 (0,64⁻0,96).

A ingestão moderada de peixe, mas não alta ingestão, foi associada a menores chances de depressão



Yang et al., ***Asia Pac Psychiatry***, 2018.

Ômega-3



Quatro mecanismos identificados:

- Resposta inflamatória
- Fator neurotrófico derivado do cérebro (BDNF)
- Cortisol
- Atividade cardiovascular

Polokowski et al., *Nutr Neurosci*. 2020; DOI: 10.1080/1028415X.2018.1525092

Intervenção dietética

PLOS ONE

RESEARCH ARTICLE

A brief diet intervention can reduce symptoms of depression in young adults – A randomised controlled trial

Heather M. Francis[1]*, Richard J. Stevenson[1], Jaime R. Chambers[2,3], Dolly Gupta[1], Brooklyn Newey[1], Chai K. Lim[4]

1 Psychology Department, Macquarie University, Sydney, NSW, Australia, 2 Sydney Integrative Medicine, Level 1, Sydney, NSW, Australia, 3 Cooper St Clinic, Sydney, NSW, Australia, 4 Biomedical Sciences, Macquarie University, Sydney, NSW, Australia

Grupo intervenção
Intervenção dietética de 3 semanas

Grupo controle
Dieta habitual

Ensaio Clínico Aleatorizado
Adultos jovens com sintomas de depressão elevados

Francis et al., **PLoS One.**, 2019

Intervenção dietética

Os participantes foram instruídos a **aumentar**:

- 5 porções de vegetais por dia;
- 2-3 porções de frutas por dia;
- 3 porções de cereais integrais por dia;
- 3 porções de proteínas (carne magra, aves, ovos, tofu, legumes) por dia;
- 3 porções de laticínios sem açúcar por dia;
- 3 porções de peixe por *semana*;
- 3 colheres de nozes e sementes por dia;
- 2 colheres de sopa de azeite de oliva por dia;
- 1 colher de chá de especiarias (açafrão e canela) na maioria dos dias;

Diminuir carboidratos refinados, açúcar, carnes gordurosas ou processadas e refrigerantes

Francis et al., **PLoS One.**, 2019

Intervenção dietética

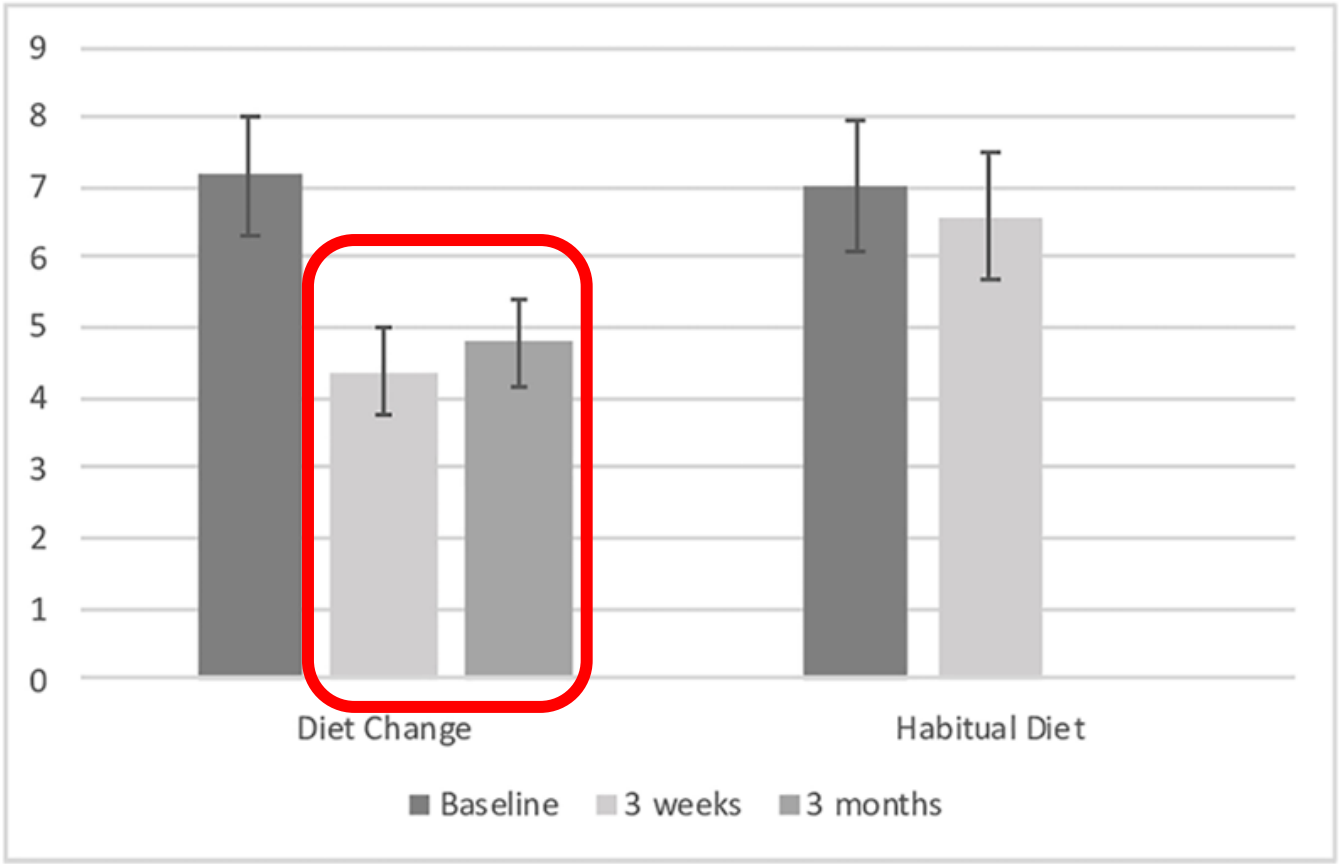


Fig 3. DASS-21 Depression subscale scores for diet change (n = 38) group were significantly lower than the habitual diet (n = 38) group following 3 weeks of diet improvement, controlling for baseline scores (effect size: Cohen's d = 0.65) and remained significantly lower than baseline at 3 month follow up for the diet change group (n = 33).

Francis et al., **PLoS One.**, 2019

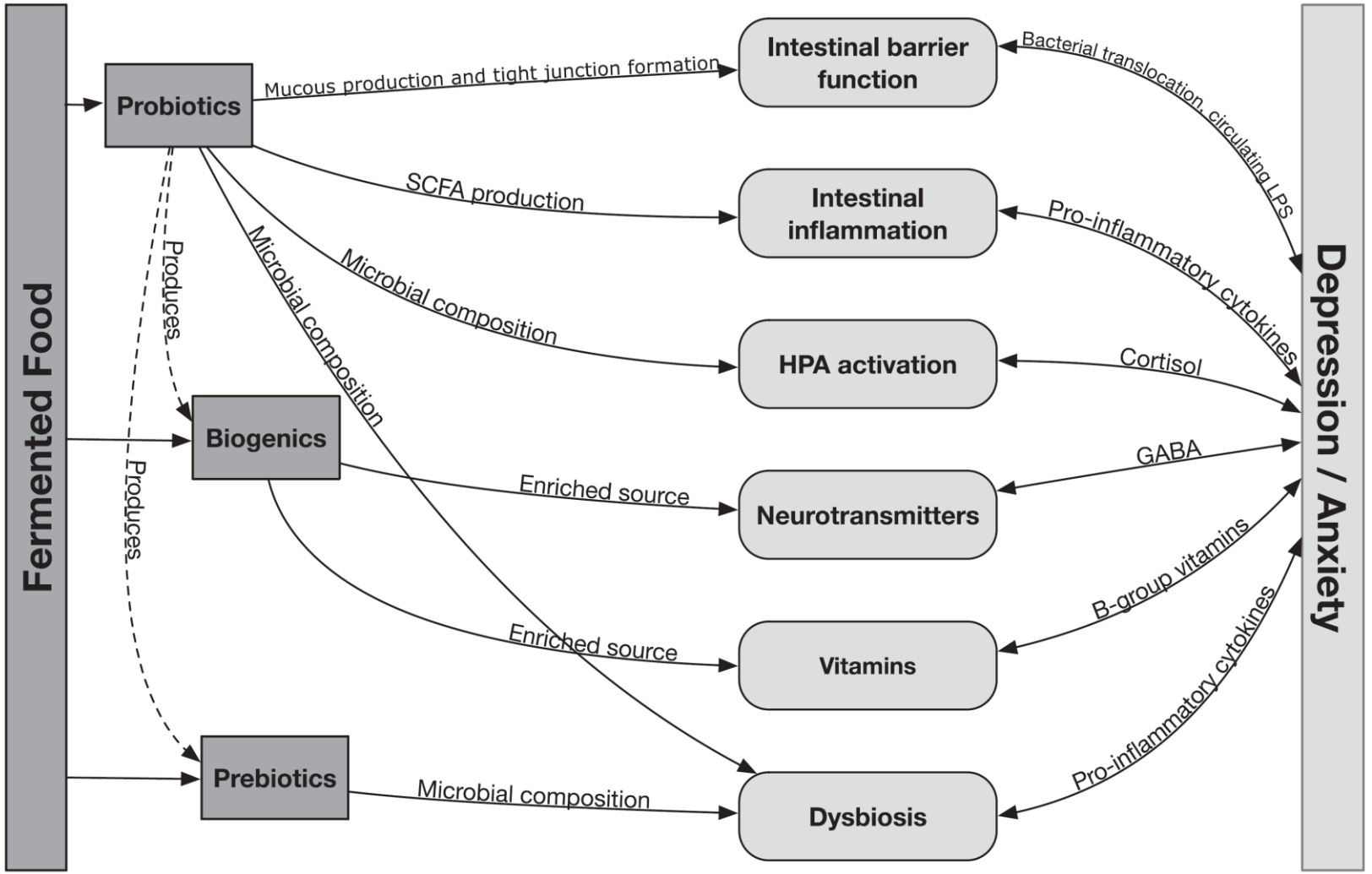
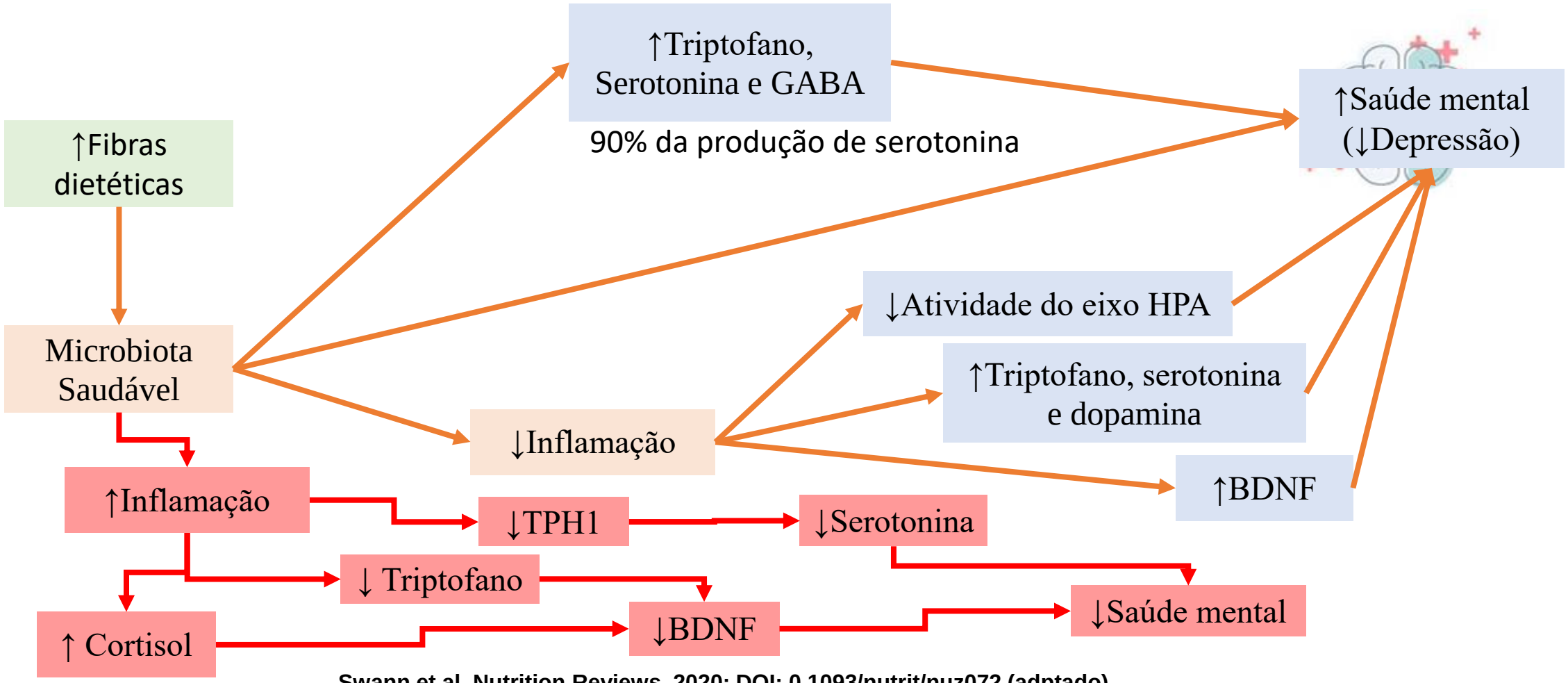


Figure 2 Interaction between the functional components of fermented food and the hypothesized biological mechanisms influencing mental health.The dark grey rectangular boxes are the functional components of fermented foods. The arrows from each functional component to the hypothesized biological mechanisms influencing mental health (rounded rectangular boxes) indicate a benefit or restoration. The double-headed arrows denote bidirectional relationships between the hypothesized biological mechanisms and depression and/ or anxiety.

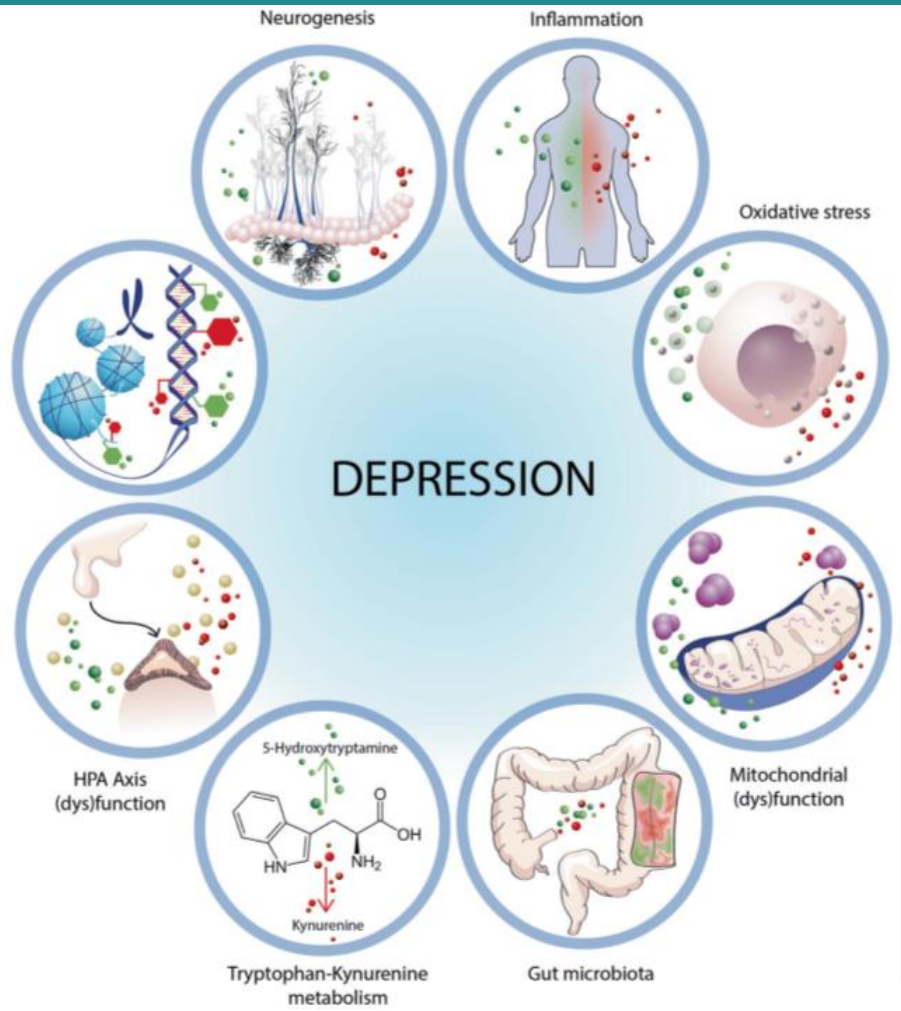
Aslam *et* al., **Nutritional Neuroscience**, 2020.

Saúde intestinal



Swann et al. Nutrition Reviews, 2020; DOI: 0.1093/nutrit/nuz072 (adptado)

Saúde intestinal



Molecular Psychiatry
https://doi.org/10.1038/s41380-020-00925-x

EXPERT REVIEW

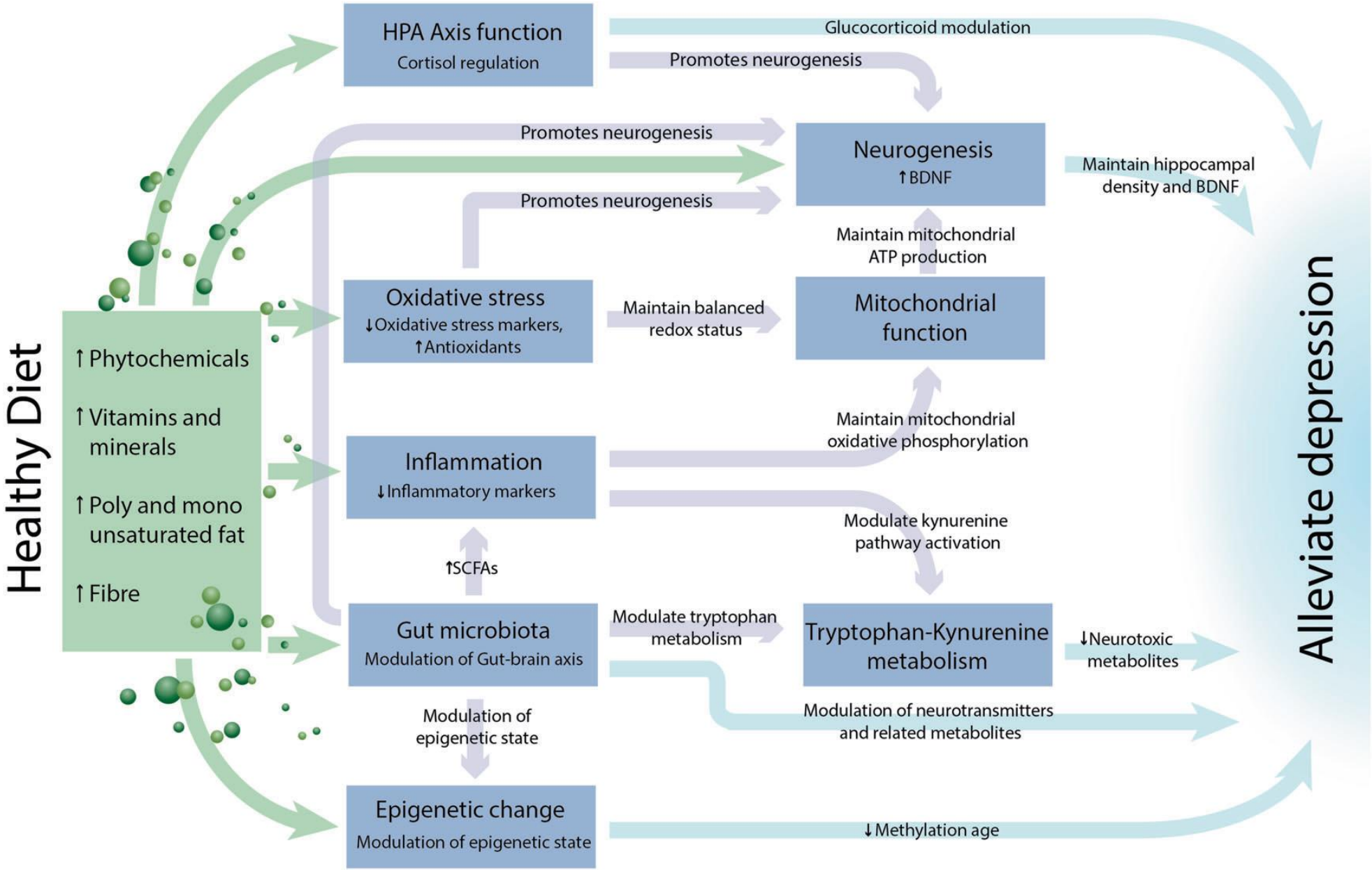
Diet and depression: exploring the biological mechanisms of action

Wolfgang Marx[1] · Melissa Lane[1] · Meghan Hockey[1] · Hajara Aslam[1] · Michael Berk[1,2,3] · Ken Walder[4] · Alessandra Borsini[5] · Joseph Firth[6,7] · Carmine M. Pariante[5] · Kirsten Berding[8] · John F. Cryan[8,9] · Gerard Clarke[8,10,11] · Jeffrey M. Craig[12] · Kuan-Pin Su[13,14,15] · David Mischoulon[16,17] · Fernando Gomez-Pinilla[18] · Jane A. Foster[19] · Patrice D. Cani[20] · Sandrine Thuret[21] · Heidi M. Staudacher[1] · Almudena Sánchez-Villegas[22,23] · Husnain Arshad[24] · Tasnime Akbaraly[24,25] · Adrienne O'Neil[1] · Toby Segasby[21] · Felice N. Jacka[1,26,27,28]

Received: 1 June 2020 / Revised: 1 October 2020 / Accepted: 9 October 2020

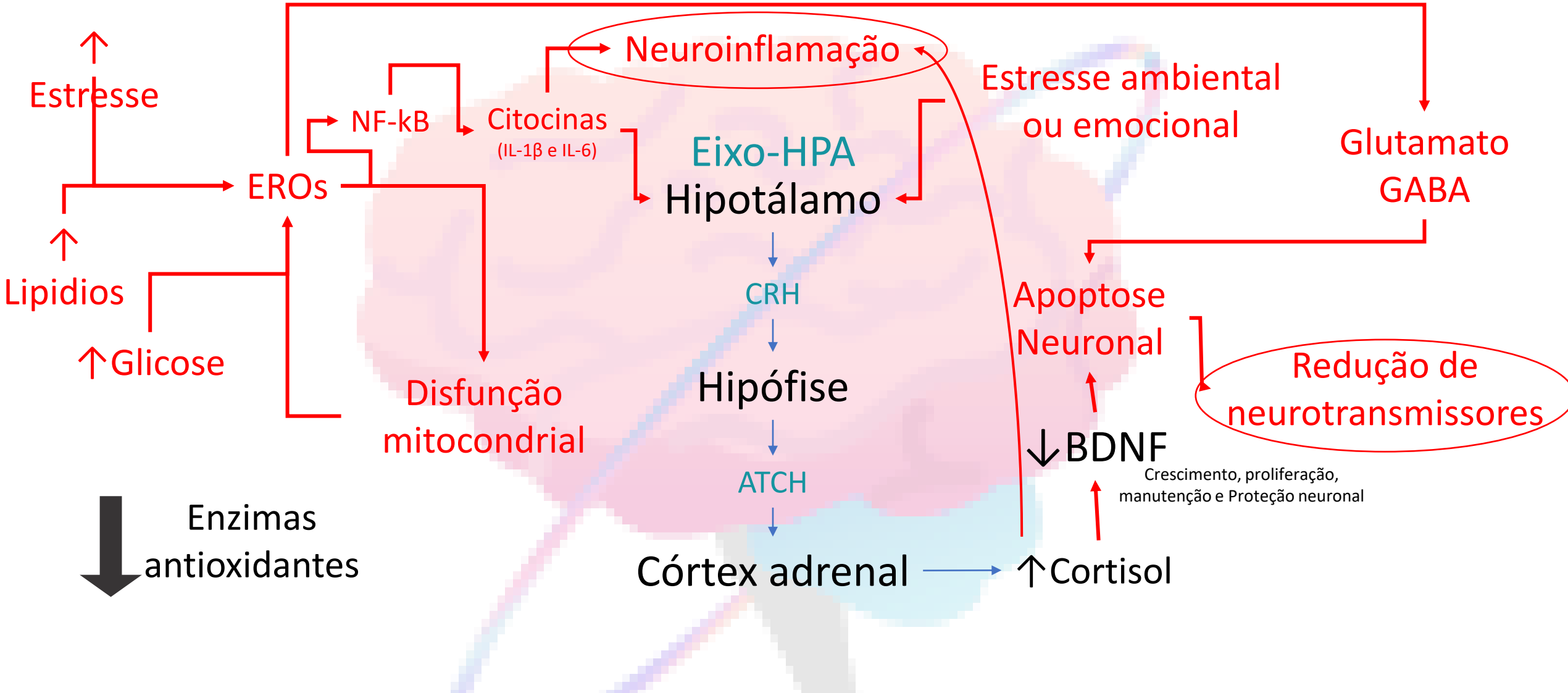
- Neurogênesis
- Inflamação
- Estresse oxidativo
- Mudanças Epigenéticas
- Disfunção do eixo HPA
- Metabolismo Triptofano-Quinurenina
- Microbiota intestinal
- Disfunção mitocondrial

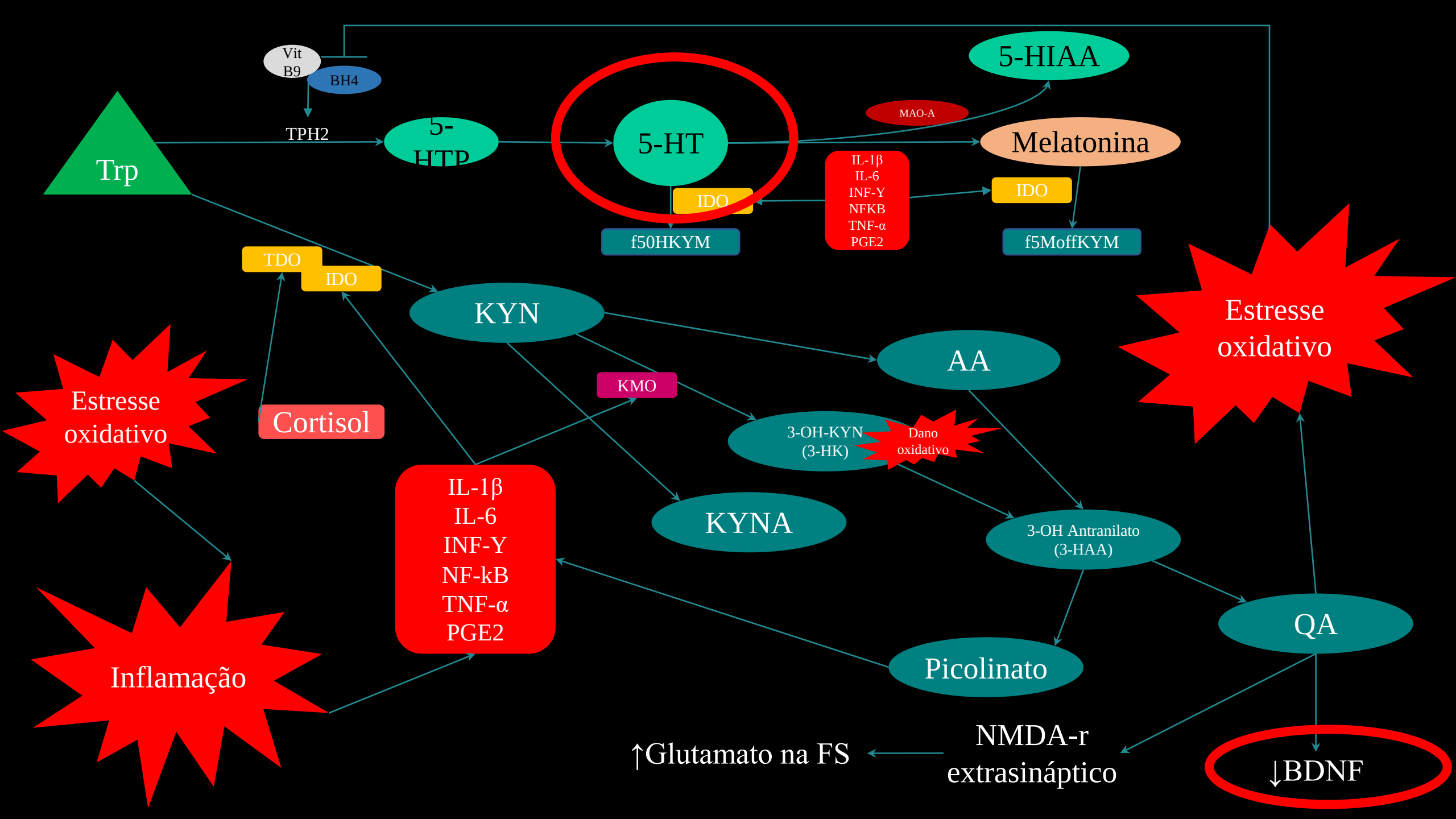
DEPRESSÃO



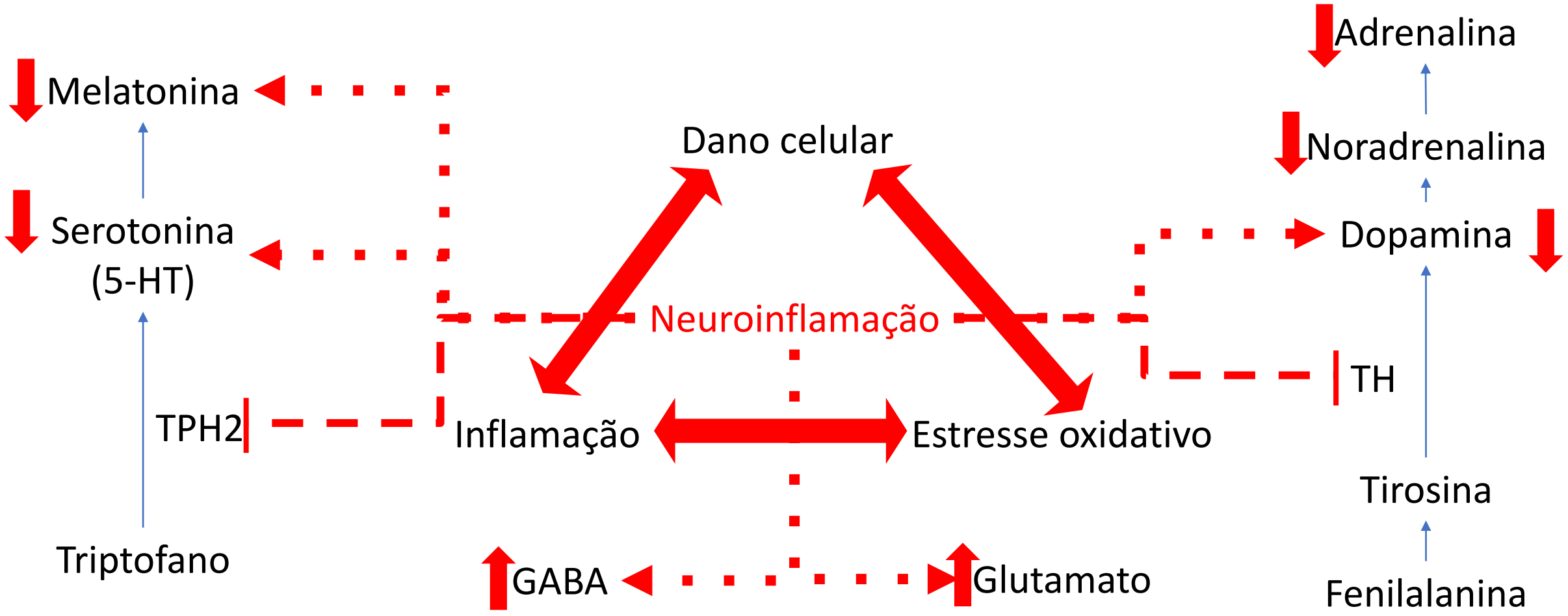
Marx et al. Molecular Psychiatry., 2020; DOI: 10.1038/s41380-020-00925-x

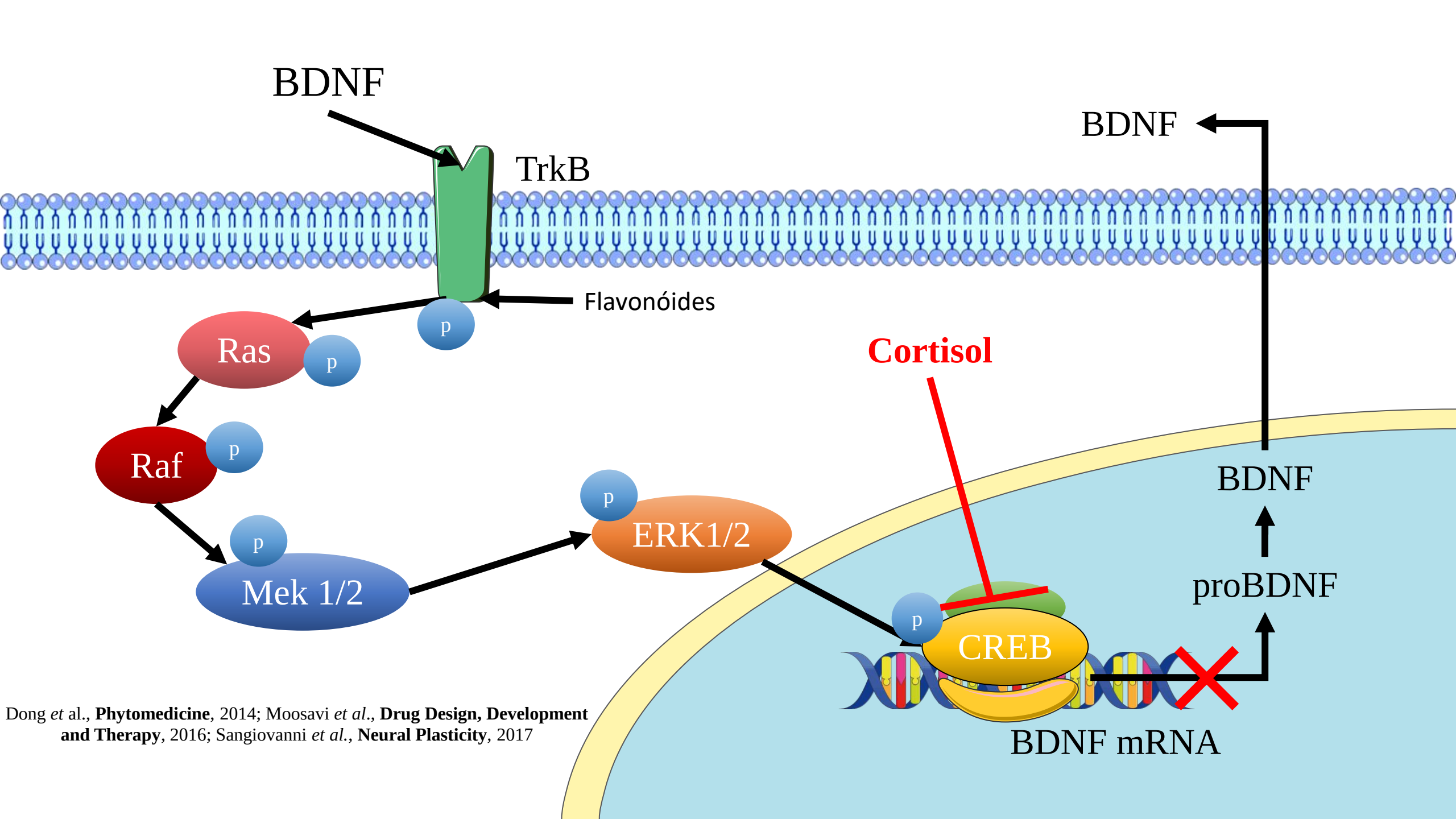
Fisiopatologia




Vit B9
BH4
TPH2
Trp
5-HTP
5-HT
5-HIAA
MAO-A
Melatonina
IL-1β
IL-6
INF-Y
NFKB
TNF-α
PGE2
IDO
IDO
f50HKYM
f5MoffKYM
TDO
IDO
KYN
AA
Estresse oxidativo
Estresse oxidativo
KMO
Cortisol
3-OH-KYN (3-HK)
Dano oxidativo
IL-1β
IL-6
INF-Y
NF-kB
TNF-α
PGE2
KYNA
3-OH Antranilato (3-HAA)
QA
Inflamação
Picolinato
↑Glutamato na FS
NMDA-r extrasináptico
↓BDNF

Neurotransmissores





Dong *et* al., **Phytomedicine**, 2014; Moosavi *et al.*, **Drug Design, Development and Therapy**, 2016; Sangiovanni *et al.*, **Neural Plasticity**, 2017

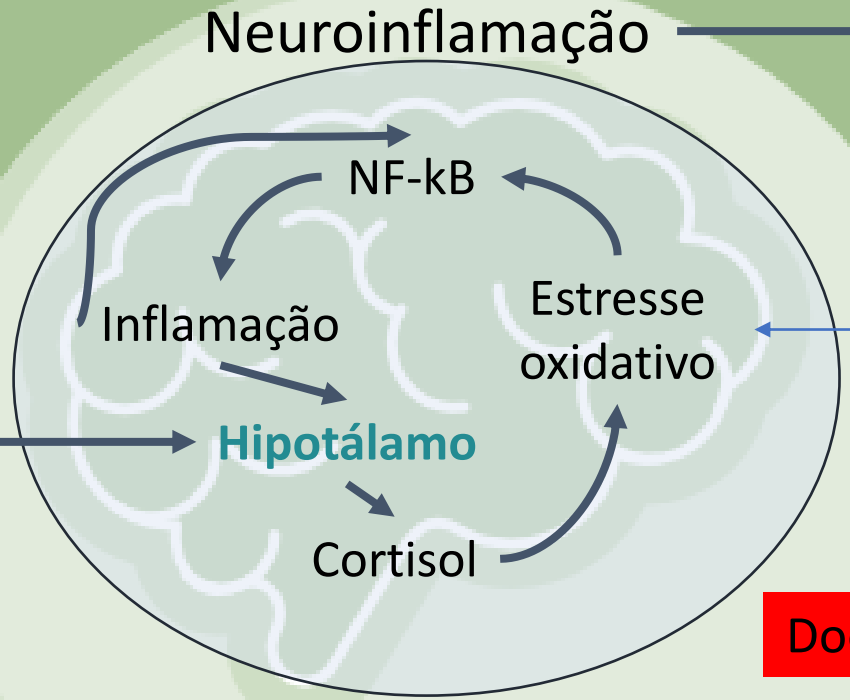
Estresse → Cérebro

Estresse ambiental ou emocional,
dano celular

Inflamação
Citocinas pró-inflamatórias

Fatores de Crescimento
BDNF
Fator de crescimento nervoso (NGF)

Neurotransmissores
GABA, 5-HT

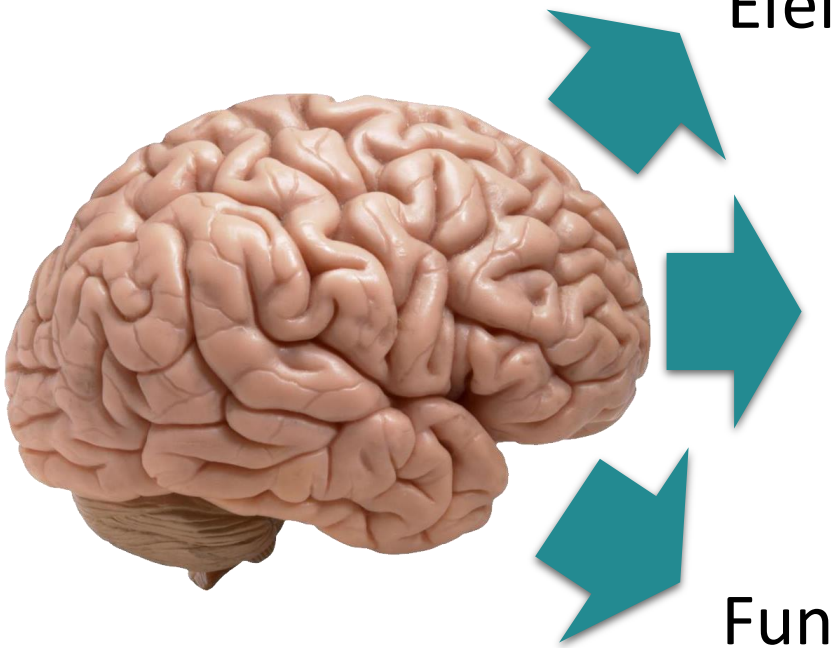


Sintomas ansiosos

Metabolismo dos neurotransmissores e fatores neurotróficos
↓Serotonina, GABA, BDNF, NGF

Bauer & Teixeira, ***Ann. N.Y. Acad. Sci.*** 2019 ; **Strawn & Levine, *Biomarkers in Neuropsychiatry*, 2020**

Efeitos dos nutrientes na saúde mental



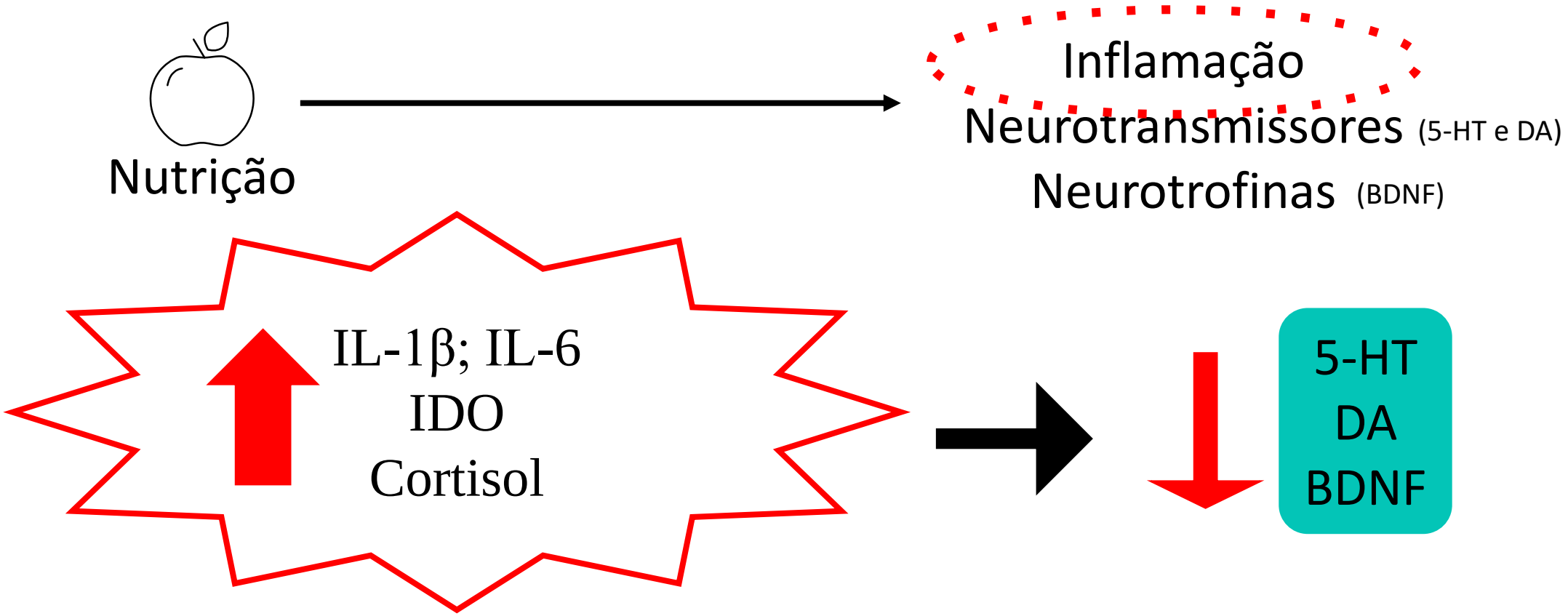
Efeito antioxidante → Polifenóis

Efeito anti-inflamatório → Ômega-3, ácidos graxos poli-insaturados

Função moduladora → Vitaminas do complexo B, glicina, L-ornitina, aminoácidos com o triptofano

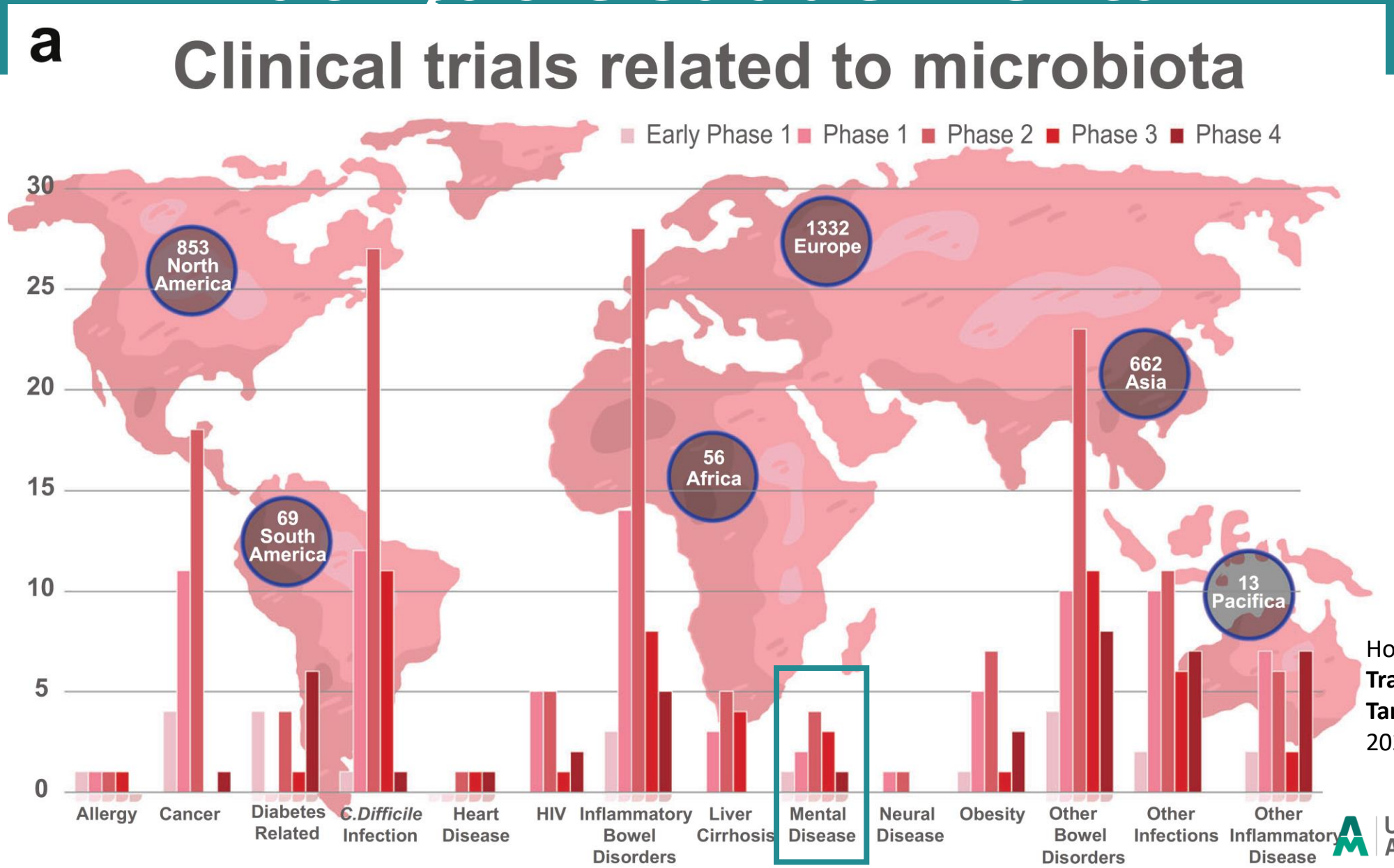
Grosso. ***Nutrients,*** 2021

Nutrição e Saúde Mental



Karakula-juchnowicz et al., Nutritional Journal, 2019; Wiener et al., Psychiatry Research, 2019; Melo; Santos & Ferreira, Frontiers in Neuroscience, 2019

Nutrição e Saúde Mental



Hou et al., Signal **Transduction and Targeted Therapy**, 2022.

Universidade Anhembi Morumbi

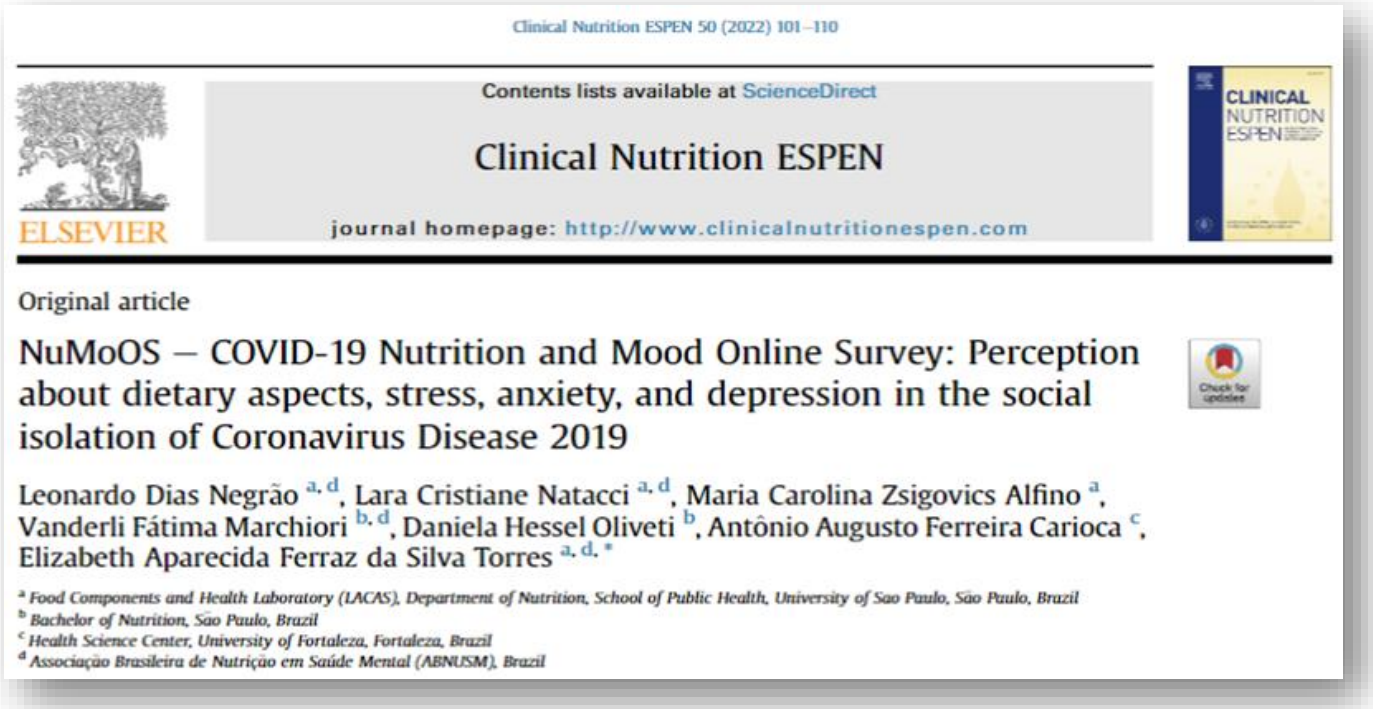
NuMoOS

COVID-19

Brazilian Nutrition and Mood Online Survey

during COVID-19 pandemic

Mudanças no consumo de alimentos



Clinical Nutrition ESPEN 50 (2022) 101–110

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journal homepage: http://www.clinicalnutritionespen.com

Original article

NuMoOS – COVID-19 Nutrition and Mood Online Survey: Perception about dietary aspects, stress, anxiety, and depression in the social isolation of Coronavirus Disease 2019

Leonardo Dias Negrão [a, d], Lara Cristiane Natacci [a, d], Maria Carolina Zsigovics Alfino [a], Vanderli Fátima Marchiori [b, d], Daniela Hessel Oliveti [b], Antônio Augusto Ferreira Carioca [c], Elizabeth Aparecida Ferraz da Silva Torres [a, d, *]

[a] Food Components and Health Laboratory (LACAS), Department of Nutrition, School of Public Health, University of Sao Paulo, São Paulo, Brazil
[b] Bachelor of Nutrition, São Paulo, Brazil
[c] Health Science Center, University of Fortaleza, Fortaleza, Brazil
[d] Associação Brasileira de Nutrição em Saúde Mental (ABNUSM), Brazil

Observou-se um aumento notável de fast foods e bebidas alcoólicas. Carboidrato-alimentos ricos foi associado a sintomas de estresse e ansiedade. O mesmo foi observado no aumento do teor calórico alimentos como gorduras, bebidas açucaradas e fast foods. Além da diminuição de proteínas, vitaminas, e alimentos fontes de fibras tiveram forte associação com sintomas de estresse, ansiedade e depressão.

Negrão et al., ***Clinical Nutrition ESPEN***, 2022.

Mudanças no consumo de alimentos

Table 4
Linear regression analysis to predict stress, anxiety and depression symptoms through modification in food consumption reported.

Consumption changes	Stress β coefficient (95%IC)	Anxiety β coefficient (95%IC)	Depression β coefficient (95%IC)
Bread, pasta, potatoes, cassava			
Unchanged	reference	reference	reference
Decreased	**1.75 (0.09–3.41)***	**1.70 (0.24–3.17)***	1.18 (−0.39–2.76)
Increased	**4.66 (3.15–6.17)***	**3.32 (1.99–4.66)***	3.35 (1.92–4.79)
Red meat, fish, and chicken			
Unchanged	reference	reference	reference
Decreased	**3.53 (2.00–5.06)***	**3.46 (2.12–4.81)***	**3.31 (1.87–4.76)***
Increased	3.49 (1.42–5.55)	1.39 (−0.43–3.20)	1.76 (−0.19–3.71)
Eggs			
Unchanged	reference	reference	reference
Decreased	**2.97 (1.09–4.85)***	**3.57 (1.92–5.21)***	**2.74 (0.96–4.51)***
Increased	**1.58 (0.09–3.07)***	1.12 (−0.19–2.43)	**1.73 (0.32–3.13)***
Dairy			
Unchanged	reference	reference	reference
Decreased	**2.09 (0.42–3.76)***	**2.42 (0.95–3.89)***	**1.59 (0.01–3.17)***
Increased	**3.55 (1.90–5.21)***	**2.25 (0.79–3.71)***	**2.30 (0.74–3.87)***
Vegetables			
Unchanged	reference	reference	reference
Decreased	**2.44 (0.71–4.16)***	**2.36 (0.84–3.87)***	**2.53 (0.90–4.15)***
Increased	0.42 (−1.11–1.95)	0.20 (−1.14–1.54)	−0.04 (−1.48–1.40)

Model was adjusted by sex, age, education and sleep hours. 95%CI = 95% confidence interval. *statistically significant difference (p-value<0.05).

Redução no consumo de:
Pães, massas, batatas, mandioca...
Carne vermelha, pescados e carne de aves
Ovos
Leite e derivados
Legumes e hortaliças

↓

Sintomas de estresse, ansiedade e depressão

Negrão et al., ***Clinical Nutrition ESPEN***, 2022.

Mudanças no consumo de alimentos

Table 4
Linear regression analysis to predict stress, anxiety and depression symptoms through modification in food consumption reported.

Consumption changes	Stress β coefficient (95%IC)	Anxiety β coefficient (95%IC)	Depression β coefficient (95%IC)
Unchanged	reference	reference	reference
Decreased	**2.65 (0.91–4.39)***	**2.11 (0.58–3.64)***	**2.19 (0.55–3.83)***
Increased	**1.66 (0.04–3.28)***	0.91 (−0,52–2,34)	0.55 (−0.98–2.08)
Rice and beans			
Unchanged	reference	reference	reference
Decreased	0.69 (−0.81–2.18)	0.55 (−0.77–1.87)	0.19 (−1.23–1.61)
Increased	**3.52 (1.38–5.65)***	1.15 (−0.73–3.04)	1.30 (−0.72–3.32)
Fats			
Unchanged	reference	reference	reference
Decreased	0.56 (-095–2.07)	**1.65 (0.32–2.99)***	0.98 (−0.45–2.40)
Increased	**5.53 (3.62–7.44)***	**3.99 (2.30–5.67)***	**4.61 (2.81–6.42)***
Fruits			
Unchanged	reference	reference	reference
Decreased	**3.68 (2.02–5.34)***	**2.94 (1.48–4.41)***	**2.12 (0.54–3.70)***
Increased	**2.13 (0.60–3.66)***	1.16 (−0.18–2.51)	0.67 (−0.78–2.12)
Chestnuts/oilseeds			
Unchanged	reference	reference	reference
Decreased	1.01 (−0.51–2.53)	1.17 (−0.16–2.51)	0.24 (−1.19–1.68)
Increased	0.65 (−1.23–2.54)	0.69 (−0.97–2.34)	0.25 (−1.52–2.03)
Alcoholic beverages			
Unchanged	reference	reference	reference
Decreased	**1.58 (0.06–3.10)***	0.84 (−0.51–2.18)	1.41 (−0.03–2.85)
Increased	**3.07 (1.40–4.74)***	1.22 (−0.26–2.70)	1.50 (−0.08–3.08)
Sugar sweetened beverages			
Unchanged	reference	reference	reference
Decreased	**1.65 (0.21–3.09)***	**2.20 (0.93–3.47)***	**1.38 (0.01–2.74)***
Increased	**7.24 (5.24–9.24)***	**5.67 (3.91–7.44)***	**5.57 (3.67–7.47)***
Fast Foods			
Unchanged	reference	reference	reference
Decreased	0.11 (−1.36–1.59)	0.53 (−0.77–1.83)	−0.21 (−1.60–1.19)
Increased	**4.34 (2.49–6.18)***	**3.24 (1.61–4.87)***	**2.85 (1.10–4.60)***

Model was adjusted by sex, age, education and sleep hours. 95%CI = 95% confidence interval. *statistically significant difference (p-value<0.05).

Redução no consumo de:
Leguminosas
Frutas

Aumento no consumo de:
Gorduras
Fast foods

Sintomas de estresse, ansiedade e depressão

Negrão et al., ***Clinical Nutrition ESPEN***, 2022.

Estratégia para lidar com a carga global de doenças mentais

Ácidos graxos ômega-3

Doença de Alzheimer, Demência (Estágios iniciais), Depressão, Esquizofrenia

Colesterol e Fosfolipídios

Doença de Alzheimer, depressão e comprometimento cognitivo leve.

Vitamina B: B6, B12, folato e niacina

Deterioração comportamental, demência, depressão e deficiência cognitiva leve.

Antioxidantes: Vitamina A, C, E

Ansiedade, Déficit de atenção, Autismo, Declínio cognitivo, Transtorno bipolar, Transtorno de hiperatividade e Esquizofrenia.

Ensaios clínicos randomizados sugerem que 1,5 a 2g de EPA/dia (ácido eicosapentaenóico) e 0,8mg de folato/dia melhoram o humor de pacientes deprimidos (Lakhan & Vieira. *Nutr J*. 2008)

Fatmee. *J Pak Med Assoc.*, 2020; DOI: 10.47391/JPMA.163

Saúde Mental

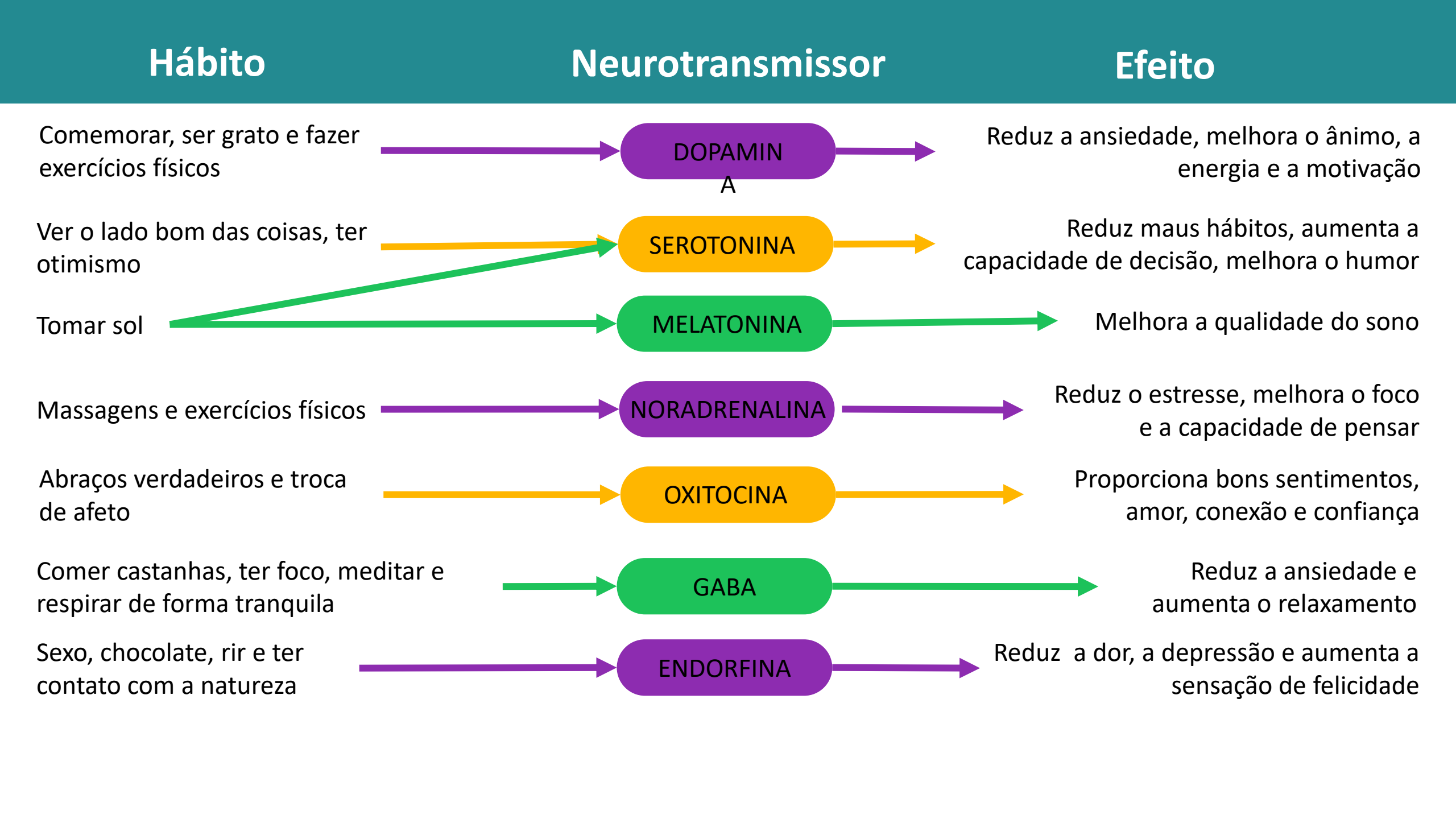
Resumo

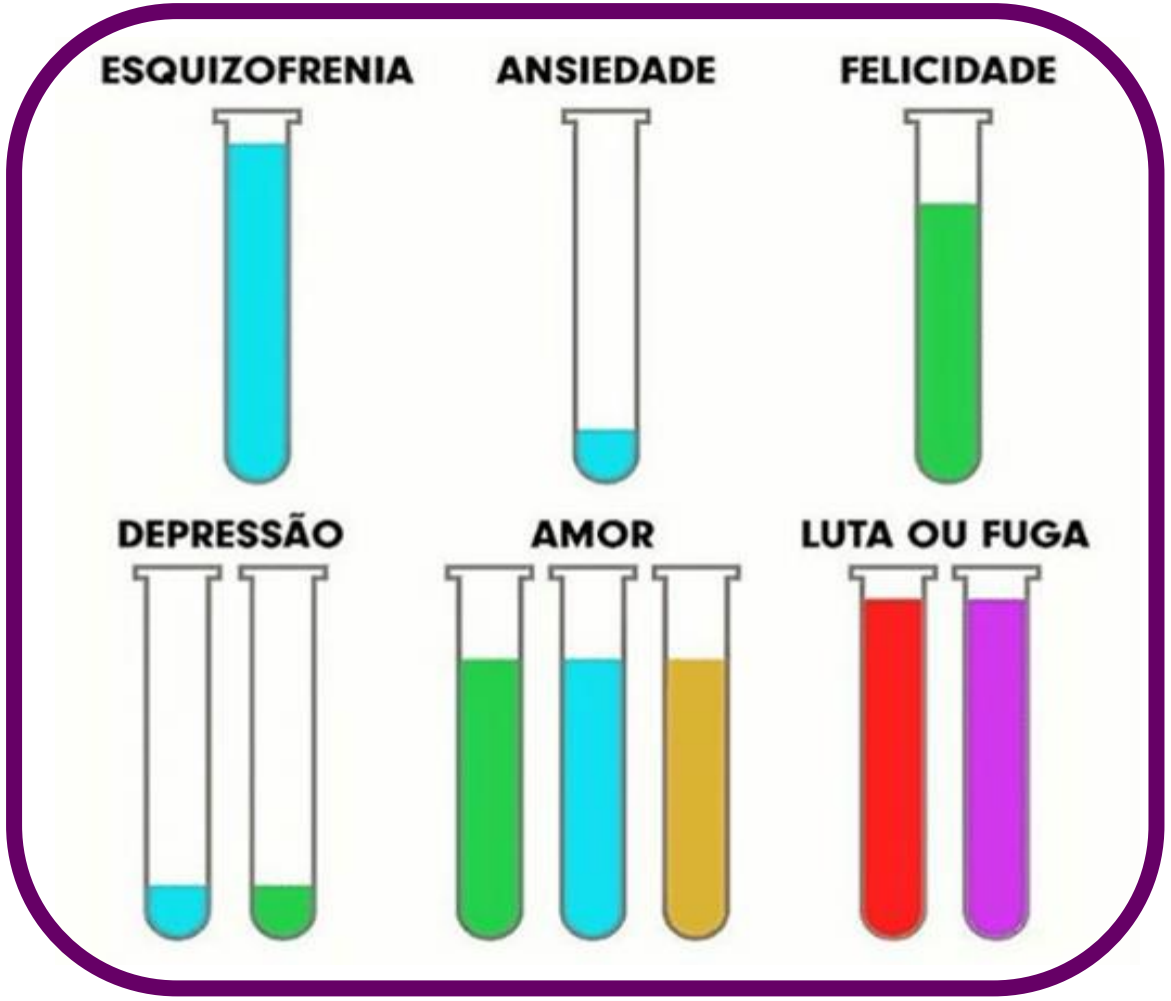
Alimentação, nutrientes e compostos neuroprotetoras e neuromoduladoras, pode auxiliar e/ou ajustar pontos da fisiopatologia, reduzir risco de transtornos mentais, mas **não dispensam** o tratamento médico e/ou psicológico

Resumo

“Um BOM plano executado rigorosamente AGORA É MELHOR que um plano PERFEITO executado na PRÓXIMA SEMANA”

George Patton – General americano da 2ª Guerra Mundial


Hábito
Neurotransmissor
Efeito
Comemorar, ser grato e fazer exercícios físicos
DOPAMINA
Reduz a ansiedade, melhora o ânimo, a energia e a motivação
Ver o lado bom das coisas, ter otimismo
SEROTONINA
Reduz maus hábitos, aumenta a capacidade de decisão, melhora o humor
Tomar sol
MELATONINA
Melhora a qualidade do sono
Massagens e exercícios físicos
NORADRENALINA
Reduz o estresse, melhora o foco e a capacidade de pensar
Abraços verdadeiros e troca de afeto
OXITOCINA
Proporciona bons sentimentos, amor, conexão e confiança
Comer castanhas, ter foco, meditar e respirar de forma tranquila
GABA
Reduz a ansiedade e aumenta o relaxamento
Sexo, chocolate, rir e ter contato com a natureza
ENDORFINA
Reduz a dor, a depressão e aumenta a sensação de felicidade



INFLAMAÇÃO

SEROTONINA

DOPAMINA

OXITOCINA

ADRENALINA

NORADRENALINA

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Obrigado!