ROLE OF DIETARY CONSTITUENTS IN COGNITIVE DYSFUNCTION

Essay

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علاقة خلل العناصر الغذائية باضطراب الوظائف المعرفية

رسالة

توطئة للحصول على درجة الماجستير
فى الأمراض العصبية والنفسية

مقدمة من

الطبيب/ خالد جمال عبد الناصر يوسف

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Summary

Alzheimer's disease is a multifactorial disorder that has many physiological, biochemical and neurochemical facets. Aging is the major risk factor for AD that coexists with other causes of cognitive decline, particularly vascular dementia.

The processes underlying the pathology of AD involve several factors including mitochondrial dysfunction, abnormal protein aggregation, metal accumulation, inflammation and excitotoxicity. Although the relationship between these factors and the development of AD is multidirectional, oxidative damage is considered a common thread linking some of these factors is evident before cytopathologic hallmarks of the disorder.

A growing body of research indicates that nutritional deficiencies contribute to age-related cognitive decline including that which accompanies AD. But, it is important to mention that intervention trials have not been adequately designed to test whether these associations are causal.

Controlled studies in mice and patients with MCI and dementia have demonstrated that cognitive performance is subject to dietary compromise and that key dietary supplementation can alleviate and in some cases reverse the impact of dietary deficiencies on cognitive performance.

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List of abbreviations

(MeOPhSe)2 : p,p-methoxyldiphenyl diselenide

(PhSe)2 : Diphenyl diselenide

1,25-OH)2D : 1,25-dihydroxy-vitamin D

25OHD : 25-hydroxyvitamin D

5HTP : 5-hydroxytryptamine

8-OHdG : 8-hydroxy-2-deoxyguanosine

AA : Arachidonic acid

ACAT : Acyl-coenzyme A cholesteryl acyltransferase

AChE : Acetylcholinesterase

AD : Alzheimer's disease

ADAM10 : A Disintegrin And Metallopeptidase 10

ADAScog :Alzheimer's disease Assessment Scale cognitive subscale

AFR : Ascorbate free radical

ALCAR : Acetyl-L-carnitine

Am80 : Tamibarotene

AMP : Adenosine monophaosphate

APO : Apolipoprotein

APP : Amyloid precursor protein

ATP : Adenosine triphosphate

ATRA : All-trans retinoic acid

Aβ : Amyloid β

BDNF : Brain-derived neurotrophic factor

BMAA : Beta-N-methylamino-L-alanine

XC- : Cystine/glutamate antiporter

CADPR : Cyclic ADP-ribose

CH : Cognitive health

ChAT : Choline acetyltransferase

CLN : Colostrinin

ALCAR : Acetyl-Lcarnitine

COX : Cyclooxygenase

CRABP : Cellular retinoic acid-binding protein

CRBP : Cellular Retinoid Binding Proteins

CSF : Cerebrospinal fluid

DHA : Docosahexaenoic acid

DHLA : Dihydrolipoic acid

DTI : Diffusion tensor imaging

DTMP : Deoxythymidine monophosphate

DUMP : Deoxyuridine monophosphate

EAE : Experimental autoimmune encephalomyelitis

EPA : Eicosapentaenoic acid

FA : Friedreich's ataxia

FAD : Flavine adenine dinucleotide

fAβ : fibrils β-amyloid

FDN : Flavin dinucleotide

FGAR : Formylglycinamide ribonucleotide

FMN : Flavin mononucleotide

GABA : γ-amino butyric acid

GAD : Glutamic acid decarboxylase

GAR : Glycinamide ribonucleotide

GDNF : Glial cell line–derived neurotrophic factor

GLUT : Glucose transporter isoforms

GPXs : Glutathione peroxidases

GSH : Glutathione

HAT : Histone acetyltransferase

HDAC : Histone deacetylase

HDL : High-density lipoproteins

HHcy : Hyperhomocysteinemia

HIF-1 : Hypoxia-inducible factor 1

HNE : 4-hydroxy-2-transnonenal

HVD : Hydroxy vitamin D

ICAM-1 : Intracellular adhesion molecule-1

IDIs : Iodothyronine deiodinases

IDL : Intermediate-density lipoprotein

IFN : Interferon

Ig : Immunoglobulin

IL : Interleukin (e.g. IL-1)

INOS : Inducible nitric oxide synthetase

IPF : Isoprostane F

JAK : Janus kinase

LDL : Low-density lipoproteins

LF : Lactotransferrin

LOAD : Late onset Alzheimer disease

LPL : Lipoprotein lipase

LPS : Lipopolysaccharide

LTDM : Long-term declarative memory

MCI : Mild cognitive impairment

MCO : Metal-catalyzed oxidation

MDA : Malondehyde

MHC : Major histocompatibility complex

MS : Multiple sclerosis

MTA : Medial temporal lobe atrophy

NAD : Nicotinamide adenine dinucleotide

NADH : Nicotinamide adenine dinucleotide hydrogenase

NADP : Nicotinamide adenine dinucleotide phosphate

NADPH : Nicotinamide adenine dinucleotide phosphate

NBIA : Neurodegeneration with brain iron accumulation

NMDA : N-Methyl D-aspartate

NO : Nitric oxide

NPD1 : NeuroprotectionD1

PC : Phosphatidylcholine

PD : Parkinson disease

PE : phosphatidylethanolamine

PG : Prostaglandin

PL : Total phospholipids

PLP : Pyridoxal phosphate

PRP : Proline-rich polypeptide

PS : Phosphatidyl serine

PUFA : Polyunsaturated fatty acids

RA : Retinoic acid

RALDH : Retinaldehyde dehydrogenase

RAR : Retinoic acid receptor

RARE : Retinoic acid response element

RBP : Retinol-binding protein

ROS : Reactive oxygen species

RXR : Retinoid X receptor

SAM : *S*-adenosylmethionine

SCD : Subacute combined degeneration

SOCS : Suppressors of cytokine signaling

SOD : Superoxide dismutase

STAT : Signal transducers and activators of transcription

STWM : Short-term/working memory

SVCT1 : Sodium-dependent vitamin C transporter types 1 and 2

T2DM : Type 2 diabetes mellitus

TBA-RS : Thiobarbituric acid-reactive substances

TH : T helper

TMP : Thiamin monophosphate

TNF : Tumour necrosis factor

Trx : Thioredoxin

TT : Tetanus toxoid

TTP : Thiamin triphosphate

TTR : Transthyretin

VDR : Vitamin D receptor

VLDL : Very-low-density lipoproteins

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