

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
في الأمراض العصبية والنفسية

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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 monophosphate

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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