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## Evaluate the impact of Cocoa either alone or in combination with other Nutraceuticals against Alzheimer's disease induced by aluminum in rats

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**Background:** Alzheimer's disease (AD) is a progressive neurodegenerative disorder, oxidative stress plays pivotal role in damaging membrane integrity and reducing nerve cells. Cocoa beans can protect the body from the impact of free radicals and promote better memory. Epigallocatechin-3-gallate (EGCG) can reduce iron-accumulation in instance of neurodegenerative diseases while Vinpocetine (Vinp) increases cerebral blood flow. Coenzyme Q10 (CoQ10) also causes improvement of cognitive functions. Wheat grass possesses essential vitamins, minerals and trace elements, vitamins play important roles against brain damage especially when used together or with selenium (Se).

**Objective:** To evaluate the potential protective effects of Cocoa alone or together with either EGCG, Vinp, CoQ10, Wheat grass, Vitamin B complex or combination of Vitamin E, C and Selenium (Se) against aluminum-induced AD in rats. Methods: Nine groups of rats were used and injected daily for four weeks; either with saline for control or with AlCl<sub>3</sub> (70mg/kg I.P) for AD model groups. One of AD groups served as model control while the others received together with AlCl<sub>3</sub> either Cocoa (24mg/kg, P.O) alone or in combination with EGCG (10mg/kg, I.P), Vinpocetine (20mg/kg, P.O), CoQ10 (200mg/kg, P.O), Wheat grass (100 mg/kg, P.O), Vitamin B complex (0.2 mg/kg, P.O) as well as combination of VE (100mg/kg, P.O), VC (400mg/kg P.O) and Se (1mg/kg, P.O). Behavioral performance in Y-maze and conditional avoidance test as well as changes in brain A $\beta$ , tau,  $\beta$ -secretase, brain derived neurotrophic factor (BDNF), ACHE, monoamines, inflammatory mediators (TNF- $\alpha$ , IL-1 $\beta$ ), oxidative parameters (SOD, TAC, MDA) were measured for all groups. In addition, DNA fragmentation and histopathological changes in different brain regions were also detected.

**Results:** Brain neurological damage characterizing AD model were detected. All treated groups showed protection against hazards of AlCl<sub>3</sub> but combined therapy showed better results than Cocoa alone especially with Vinp or EGCG as indicated by the significant decrease in A $\beta$ ,  $\beta$ -secretase, tau, ACHE, MDA, TNF- $\alpha$ , IL-1 $\beta$  together with increase in SOD, TAC, brain monoamines, BDNF and confirmed by histopathological examinations as well as the decrease in DNA fragmentation.

**Conclusion:** Combination of Cocoa with Vinp or EGCG showed higher protection against AD induced by AlCl<sub>3</sub> in rats than either cocoa alone or together with all other used treatments.

**Key words:** Alzheimer's disease; Cocoa; Vinpocetine; Epigallocatechin-3-gallate; Coenzyme Q10; Wheat grass; Vitamin B complex; Vitamin E, C & Selenium; Rats.

### Speaker Biography

Prof. Azza A Ali has completed her PhD specialized in Pharmacology and Toxicology from Faculty of Pharmacy, Cairo University. Her postdoctoral studies included different scientific aspects related to her specialization field with giving especial interest to researches of neuropharmacology and psychopharmacology; she also developed research line of behavioral pharmacology in Egypt. She is member of many scientific societies in Egypt as well as of (AAPS) American Association of Pharmaceutical Scientists (2002) and (ISTAART) The Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (2016). She published more than 40 papers in reputed journals, supervised and discussed more than 60 PhD and MSc thesis and actively participated by oral and posters presentations at many international conferences especially on Alzheimer's disease & Dementia as Dementia 2015, 2016 and Alzheimer's Association International Conference (AAIC 2016). Now she is a Head of Pharmacology and Toxicology Department at Al-Azhar University and she sacrifices great effort hoping to find real treatment that can prevent or delay the progression of Alzheimer's disease especially in the high-risk individuals focusing on depression, stress and malnutrition.

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