

## **Curcumin Nanoemulsion as an Inhibitor of Histone Deacetylase 2 (HDAC2) Gene Expression in Alzheimer's Disease**

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Histone acetylation is regulated by the activity of histone deacetylase (HDAC) enzyme. The balance between acetylation and deacetylation of histone proteins determines whether a gene is active or inactive. Examination of post-mortem samples of Alzheimer's disease patients shows that the abundance of histone deacetylase 2 (HDAC2) increases even in the early stages of Alzheimer's disease. Overexpression of HDAC-specific neurons interferes with learning ability and memory performance in adult mice, while removal of HDAC2 embryos in the brain increases learning ability, suggesting that inhibition of HDAC2 is an appropriate strategy in dealing with brain disorder characterized by cognitive impairment. This study aims to look at the action of curcumin as a brain disorder treatment agent on the target of HDAC2 enzymes.

Curcumin compounds are formulated in the form of Self-Nanoemulsifying Drug Delivery System (SNEDDS) to improve solubility and bioavailability in biological fluids. SNEDDS offers special advantages where SNEDDS can increase drug absorption through several supporting mechanisms namely; (i) drug solubility, (ii) inhibition of drug efflux mediated by P-glycoprotein and preabsorptive metabolism via cytochrome enzyme bonds in the intestinal membrane, (iii) promotion of lymphatic transport that delivers drugs directly to the systemic circulation and avoids first-pass liver metabolism and (iv) increasing gastrointestinal membrane permeability.

The curcumin nanoemulsions are compounded in two doses which are a dose of 20 milligrams per kilogram body weight and a dose of 40 milligrams per kilogram body weight to determine its effect on the expression of HDAC2 genes. To induce brain disorder, mice were given ethanol 10% v / v in CMC-Na 0.5% solvent orally for 7 days and were given curcumin nanoemulsion in both doses for 21 days orally. The expression of the HDAC2 gene was analyzed at the DNA level using the PCR Reverse Transcriptase method and gel electrophoresis visualization. The results of this study are nanoemulsion curcumin at a dose of 20 milligrams per kilogram body weight and 40 milligrams per kilogram body weight can inhibit HDAC2 gene expression.