

**Abstract**

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Nootropics are defined as substances that can improve mental and cognitive functioning. (Noor, et. al., 2016). Cornelius E. Giurgea was the first to use this term in the early 1970's (Malik & Tlustoš, 2022). Nootropics improve the brain's cognition by increasing oxygenation and glucose (Malik & Tlustoš, 2022). They also "have antihypoxic effects, and protect brain tissue from neurotoxicity" (Malik & Tlustoš, 2022, para 5, line 2) Nootropics are thought to be able to reverse the aging process of the brain, while improving its cognitive functioning (Malik R, 2007). Piracetim was the first nootropic drug to be used to improve memory function by acting as a tonic for the CNS (Malik et al., 2007). It has no known side effects and is used to treat disorders such as "alcoholism, dementia, stroke, epilepsy, parkinsonism, schizophrenia, AD and dyslexia" (Malik, et al., 2007, p.6)

**Introduction**

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There are natural nootropics such as the herb Ginkgo Bilboa or they can be made in a lab such as the drug Piracetam (Noor, et. al., 2016). Natural nootropics appear to have an upper hand on pharmaceutical versions as they contain the whole chemical makeup found in plants which can potentially have more benefits (Malik & Tlustoš, 2022). The benefits of pharmaceutical nootropics are that one can be assured of its purity, how it will affect the body, and "a possible increase in their effect by modification of the chemical structure" (Malik & Tlustoš, 2022, para 10 line 7-8). Nootropics are also used to help treat progressive conditions such as Alzheimer's disease (Md et. al, 2019). Plants such as Centella asiatica (Sahab, 2019) and Glycyrrhiza glabra (Kulkarni, Girish, & Kumar, 2012).have shown to benefit those with this type of degenerative condition, from acting as a neuroprotectant (Md et. al, 2019) to enhancing memory function (Kulkarni, Girish, & Kumar, 2012).

**Methods**

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A double-blind placebo study was done testing improvements in cognitions with twenty- eight healthy elderly participants (Md, et. al, 2019). These participants were given dosages ranging from 250-750mg of the plant Centella asiatica twice a day for a period of two months (Md, et. al, 2019). "By using the event-related potential and the computerized test battery, cognitive performance was evaluated" (Md, et al, 2019, p. 4). Another study was also done using sixty elderly participants ages sixty- five and older (Md, et. al, 2019). In this study, the participants were given Centella asiatica twice a day for a period of six months at a dosage of 500mg (Md, et al, 2019).

**Results and/or Conclusion**

**Results**

In the first study, improvements were noted in the participants with their working memory, overall mood, "and enhanced N100 component amplitude of event-related potential were increased" (Md, et al, 2019, p. 4). The increase in N100 is thought to have occurred due to the higher dosages of the Centella (Md, et al, 2019). In the second study, it was noted that there was mild enhancement in brain cognition as well as improvements in "constipation, loss of appetite, insomnia, and hypertension" (Md, et, al, 2019, p.5).

**Future Work**

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A study was conducted utilizing participants fifty five years and older using saffron at a level of 30mg in divided dosages twice a day. This extract had the same effectiveness as donepezil in treating "mild-to-moderate Alzheimer's" (Md, et, al, 2019, p.9). In a recent double blind indiscriminate study saffron extract was in given in capsule form for a period of one year and was found to be just as effective as memantine "(i.e., a standard drug that block NMDA receptors)in decreasing cognitive deficits in patients with moderate to the severe AD" (Md, et, al, 2019, p.9) Nootropics are thought to be able to reverse the aging process of the brain, while improving its cognitive functioning (Malik R, 2007). Nootropics have been found to be useful for those struggling with any type of cognitive decline, but its benefits for those who suffer from extreme impairments are still in question (Malik & Tlustoš, 2022).

**References**

Kulkarni, R., Girish, K., & Kumar, A. (2012). Nootropic herbs (Medhya Rasayana) in Ayurveda: An update. *Pharmacognosy Reviews*, 6(12), 147-153. <https://doi.org/10.4103/0973-7847.99949>

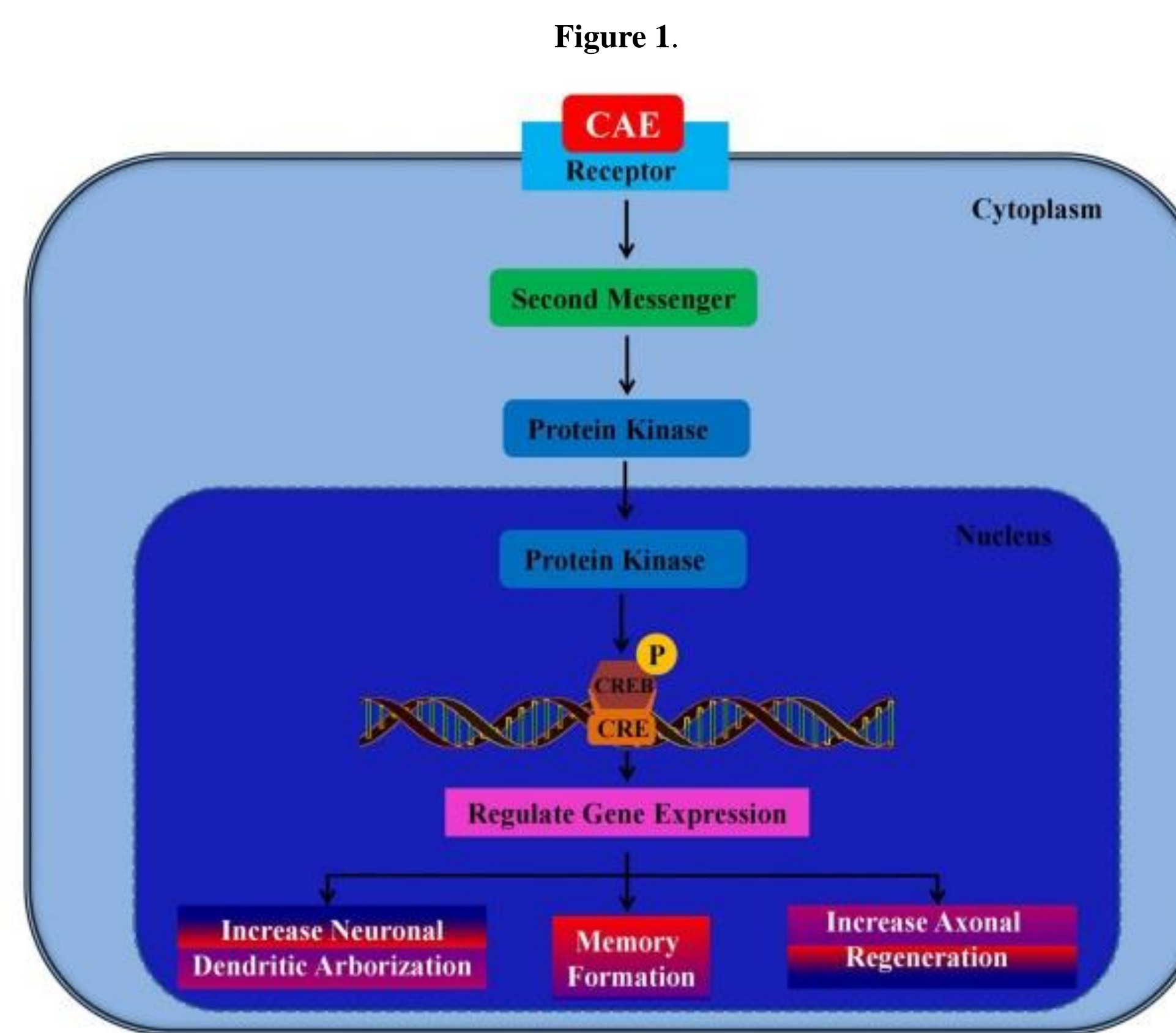
Malik, M., & Tlustoš, P. (2022). Nootropics as Cognitive Enhancers: Types, Dosage and Side Effects of Smart Drugs. *Nutrients*, 14(16), 3367. <https://doi.org/10.3390/nu14163367>

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**Fig. 1** Possible mechanism of action for anti-Alzheimer's action of *Centella asiatica* extracts. Binding of CAE to cell surface receptor generates a signal that causes the production of a second messenger, which in turn activates a protein kinase that translocates to the nucleus and activates CREB. The activated CREB then binds to a CRE region and regulates gene expression to enhance the arborization of neurons and improve cognitive performances [42]. CAE, *Centella asiatica* extracts; CREB, cyclic AMP response element binding protein; CRE, cyclic AMP response element



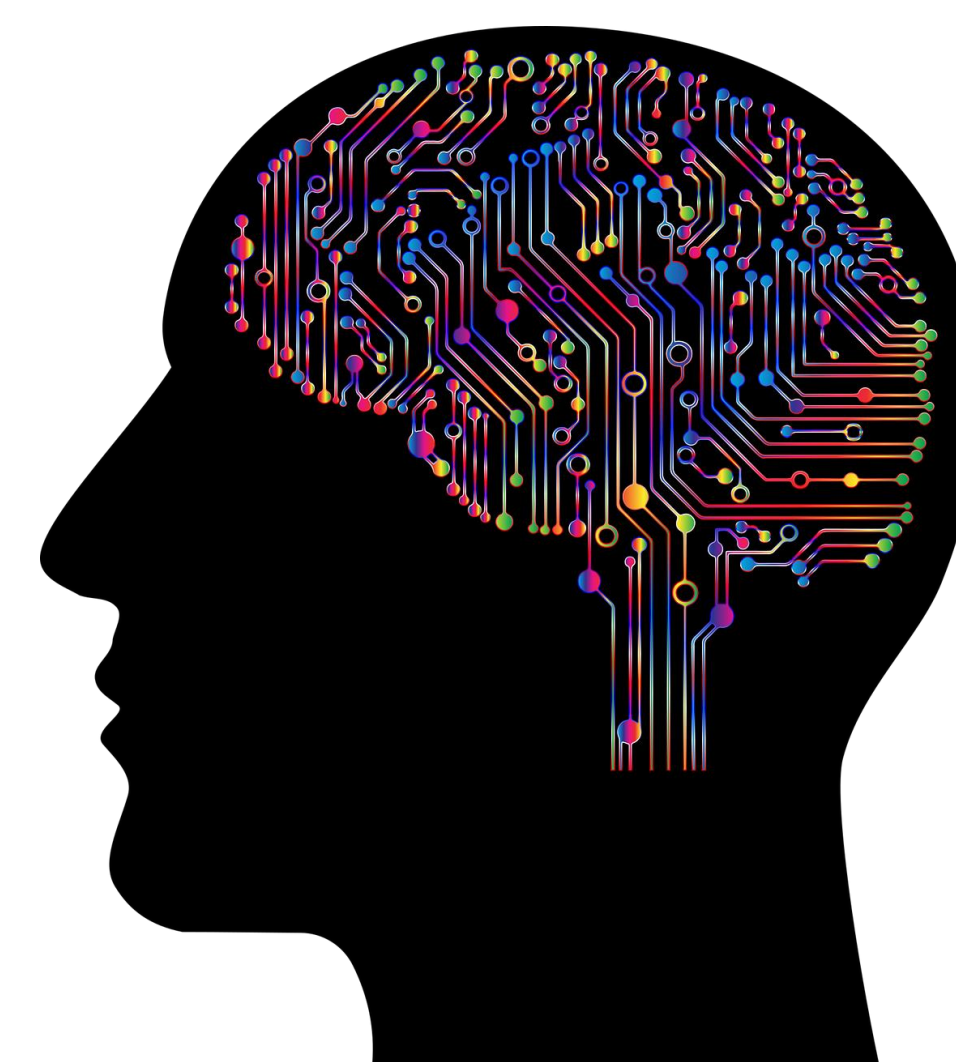
**Fig 1** from: Md, S. U., Mamun, A. A., Kabir, M. T., Jakaria, M., Mathew, B., Barreto, G. E., & Ashraf, G. M. (2019). Nootropic and Anti-Alzheimer's Actions of Medicinal Plants: Molecular Insight into Therapeutic Potential to Alleviate Alzheimer's Neuropathology. *Molecular Neurobiology*, 56(7), 4925-4944. <https://doi.org/10.1007/s12035-018-1420-2>

**Figure 2.**

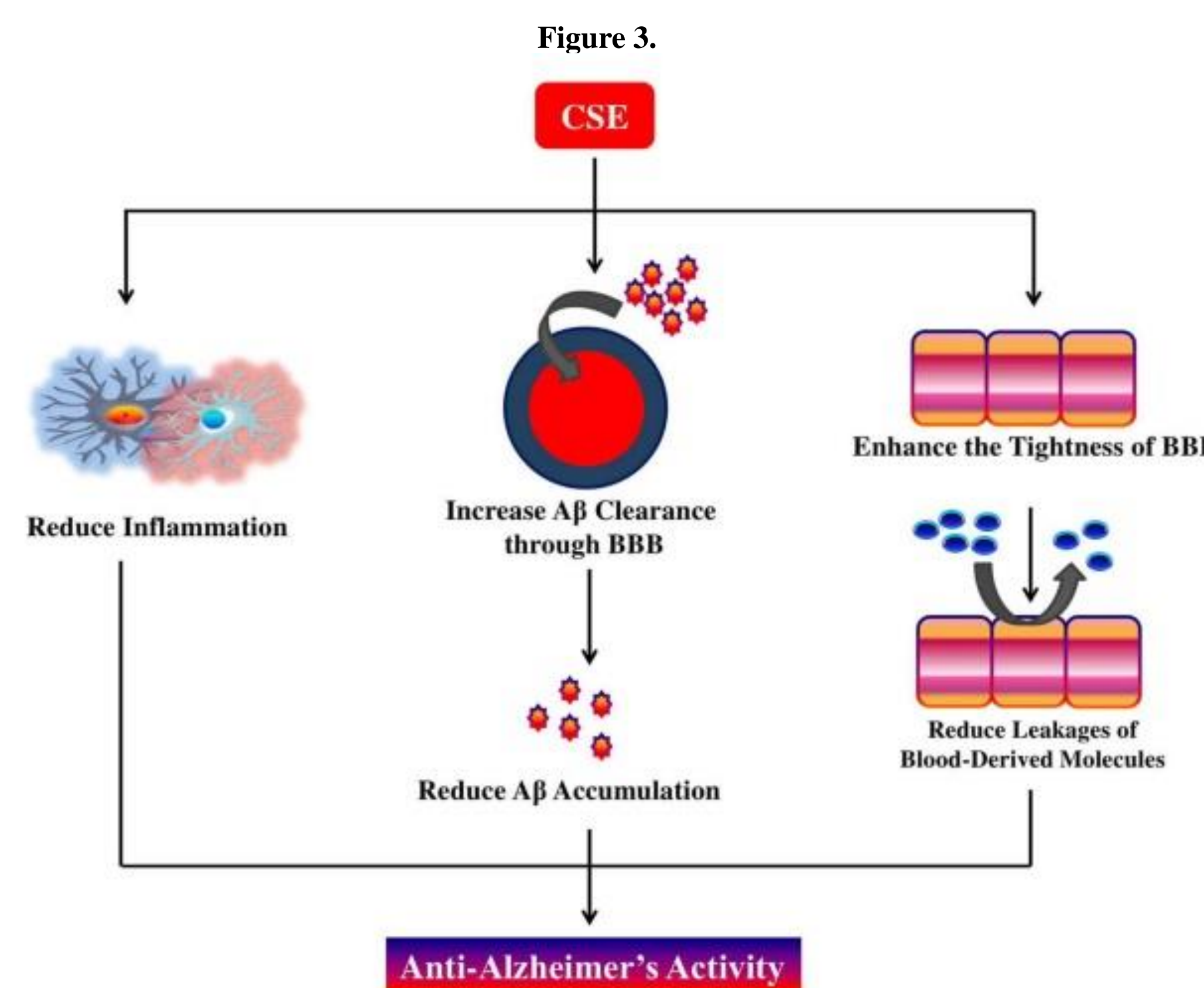


**Figure 2. Centella asiatica (Nootropic)**

Picture from: Kulkarni, R., Girish, K., & Kumar, A. (2012). Nootropic herbs (Medhya Rasayana) in Ayurveda: An update. *Pharmacognosy Reviews*, 6(12), 147-153. <https://doi.org/10.4103/0973-7847.99949>



**Fig. 3** Possible mechanism of action for anti-Alzheimer's action of *Crocus sativus* extracts. CSE enhances Aβ clearance across the BBB and improves the tightness of the BBB limiting entry of unwanted large molecules, as well as exerts an anti-inflammatory effect whereby it reduces astrocytes activation and brain interleukin-1 beta [120]. CSE, *Crocus sativus* extracts; Aβ, amyloid beta; BBB, blood-brain barrier



**Figure 3. C. Stavius, (Saffron Extract) from:** Md, S. U., Mamun, A. A., Kabir, M. T., Jakaria, M., Mathew, B., Barreto, G. E., & Ashraf, G. M. (2019). Nootropic and Anti-Alzheimer's Actions of Medicinal Plants: Molecular Insight into Therapeutic Potential to Alleviate Alzheimer's Neuropathology. *Molecular Neurobiology*, 56(7), 4925-4944. <https://doi.org/10.1007/s12035-018-1420-2>