

# Alanine Reverses the Inhibitory Effect of Phenylalanine on Acetylcholinesterase Activity

Stylianos Tsakiris<sup>a,\*</sup> and Kleopatra H. Schulpis<sup>b</sup>

<sup>a</sup> Department of Experimental Physiology, Medical School, University of Athens, P.O. Box 65257, GR-154 01 Athens, Greece. Fax: 0030-1-7775295. E-mail: stsakir@cc.uoa.gr

<sup>b</sup> Inborn Errors of Metabolism Department, Institute of Child Health, Aghia Sophia Children's Hospital, GR-115 27 Athens, Greece

\* Author for correspondence and reprint requests

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The aim of this work was to evaluate, *in vitro*, the effect of L-alanine (Ala) on suckling rat brain acetylcholinesterase (AChE) and on eel *Electrophorus electricus* pure AChE inhibited by L-phenylalanine (Phe) as well as to investigate whether Phe or Ala is a competitive inhibitor or an effector of the enzyme. AChE activity was determined in brain homogenates and in the pure enzyme after 1 h preincubation with 1.2 mM of Phe or Ala as well as with Phe plus Ala. The activity of the pure AChE was also determined using as a substrate different amounts of acetylthiocholine. Ala reversed completely the inhibited AChE by Phe (18–20% in 500–600  $\mu$ M substrate,  $p < 0.01$ ). Lineweaver-Burk plots showed that  $V_{\max}$  remained unchanged. However,  $K_M$  was found increased with Phe (150%,  $p < 0.001$ ), decreased with Ala alone (50%,  $p < 0.001$ ) and unaltered with Phe plus Ala. It is suggested that: a) Phe presents a competitive inhibitory action with the substrate whereas Ala a competitive activation; b) Ala competition with Phe might unbind the latter from AChE molecule inducing the enzyme stimulation; c) Ala might reverse the inhibitory effect of Phe on brain AChE in phenylketonuric patients, if these results are extended into the *in vivo* reality.