L-Phenylalanine Effect on Rat Diaphragm Acetylcholinesterase and Na^+,K^+-ATPase

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The effect of different L-phenylalanine (Phe) concentrations (0.24–12.1 mM), on acetylcholinesterase (AChE) and Na^+,K^+-ATPase activities of diaphragm homogenates from 21-day old rats and pure enzymes, was investigated at 37 °C. AChE and Na^+,K^+-ATPase activities were determined after preincubation with Phe. AChE activity in diaphragm homogenate or in pure eel *E. electricus* enzyme showed a decrease, which reached a maximum of 18% with Phe concentrations of 0.9–12.1 mM. However lower Phe concentrations (0.24 mM) increased the enzyme activity (by approximately 22%), only in the diaphragm homogenate. Diaphragm-associated Na^+,K^+-ATPase activity showed a progressive and concentration-dependent decrease, by about 30–35% in the presence of high Phe concentrations. Pure enzyme activity (from porcine cerebral cortex) was not affected by high Phe concentrations (>0.48 mM), while it was increased by low concentrations. The above results suggest: a) A direct inactivating effect of high Phe concentrations on AChE and an indirect activating effect induced by low concentrations. b) A direct activating effect of low Phe concentrations and an indirect inactivating effect of high ones on Na^+,K^+-ATPase. c) The combination of high Phe concentrations effects on AChE and Na^+,K^+-ATPase could influence the levels of the diaphragm synaptic ACh.

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