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## MEETING ABSTRACTS

# COUPLING OF ACETYLCHOLINESTERASE TO THE INTERFACIAL PHASE STATE

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The state of the lipid interface is known to influence activity of membrane-bound enzymes. Indeed, many enzymes exhibit changes in activity at phase transitions in the membrane to which they are attached. We utilized a Langmuir trough in which detergent-soluble *Torpedo californica* acetylcholinesterase (DS-*Tc*AChE)[1] was anchored to the solvent face of a phospholipid monolayer in order to study this phenomenon. A peak in activity was observed at the compressibility maximum accompanying the transition between the ordered and fluid phases. Neither molecular nor physical alterations affected this correlation qualitatively, as shown by varying lipid type, pH over 2 units, temperature over 20°C, and lateral pressure over 10 mN/m. Thus the only consistent correlation is between the thermodynamic state of the interface and the measured activity. Our data are consistent with a theory in which the interface state and its corresponding fluctuations control catalytic activity[2]. It was earlier demonstrated that pH-pulses initiated by local acidification of the monolayer propagate, in analogy to sound, at velocities up to 1.4 m/s[3]. We have now shown that such a pulse, by transiently modifying compressibility, can concomitantly and reversibly enhance the activity of DS-*Tc*AChE attached to the monolayer. Our data demonstrate a feasible mechanism for signaling between widely separated biological entities that differs fundamentally from the molecular mechanisms currently accepted, and is also very much faster.

*Keywords: acetylcholinesterase; Langmuir trough; monolayer; compressibility; acoustic propagation*

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