

Changes in Synaptosomal Membrane Lipid Composition in Response to Perturbations Induced by Anesthetics and High Pressures

G. Kostopanagiotou¹, I. Hamamoto², V. Hartwell² and E.M. Nemoto²

1. Dept of Pharmacology, Division of Anesthesia, Medical School., University of Athens, Greece.

2. Dept of Anesthesiology and Critical Care Medicine, University of Pittsburgh, Pittsburgh, PA, USA

AIM OF THE STUDY

The aim of this study was to determine the effects of high pressure inert (N₂) gas and anesthetics, both of which increase phospholipid (PL) monolayer surface pressure, on synaptosomal membrane lipid composition.

METHODS

Rat cerebral cortex synaptosomes in Krebs-Henseleit buffer containing 5 mM ATP were equally divided into 5-6 ml aliquots. One aliquot (control) was immediately extracted with chloro-methanol 2:1. Four aliquots were placed in steel chambers and incubated for 4 h at 37°C: Two chambers at 50 or 100 atm of 1.0% O₂/balanced N₂; and 2 at 1 atm room air, one with pentobarbital, 2 mg/ml. Lipids were extracted and assayed: free fatty acid (FFA) by thin layer chromatography (TLC) and gas chromatography (GC); neutral and acidic lipids by high performance thin layer chromatography (HPTLC); phos-

pholipids by high performance liquid chromatography (HPLC); and protein by Biorad. Statistical analyses were done by paired ANOVA with post-hoc Analysis by the SNK test at p<0.05.

RESULTS

Changes in synaptosomal FFA were characterized by increases (p<0.01 to 0.05) in 16:0, and 18:0 at 50 atm. Lower levels of 20:0, 22:1, 24:1, and 22:6 occurred at 100 atm. Sphingomyelin (SPM) was increased at 100 atm compared to all other groups.

DISCUSSION

50 and 100 atm N₂ altered synaptosomal FFA and SPM levels whereas pentobarbital did not. However, changes in PL molecular species, where changes are likely to occur have yet to be examined. The results support the notion of membrane pressure modulation of membrane lipid composition.