

ESI-MS Analysis of Skeletal Muscle Phospholipids from Exercised and Sedentary Rats

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The effects of membrane phospholipid composition on cellular metabolism are extensive and well established.¹ Studies have also shown that the fatty acid (FA) component of membrane phospholipids are altered in skeletal muscle of both rats² and humans³ with regular exercise. There is, however, little research investigating the effects of exercise on whole phospholipid species. Recent advances in methodology⁴ have allowed such an investigation to be conducted using electrospray ionisation-mass spectrometry (ESI-MS).

In this study, a Micromass[®] Q-ToF 2 has been used to characterise and quantify exercise-induced changes in phospholipid speciation within rat skeletal muscle. Red and white vastus lateralis muscle from female Sprague-Dawley rats was homogenised in chloroform/methanol and the phospholipids extracted. The samples were then injected into the Q-ToF and analysed using ESI-MS to identify the phospholipid species present (Figure 1). Tandem mass spectrometry was then employed to characterise each phospholipid in terms of its constituent head group and fatty acid side-chains. Preliminary studies suggest specific changes in phospholipid speciation between exercised and sedentary control animals.

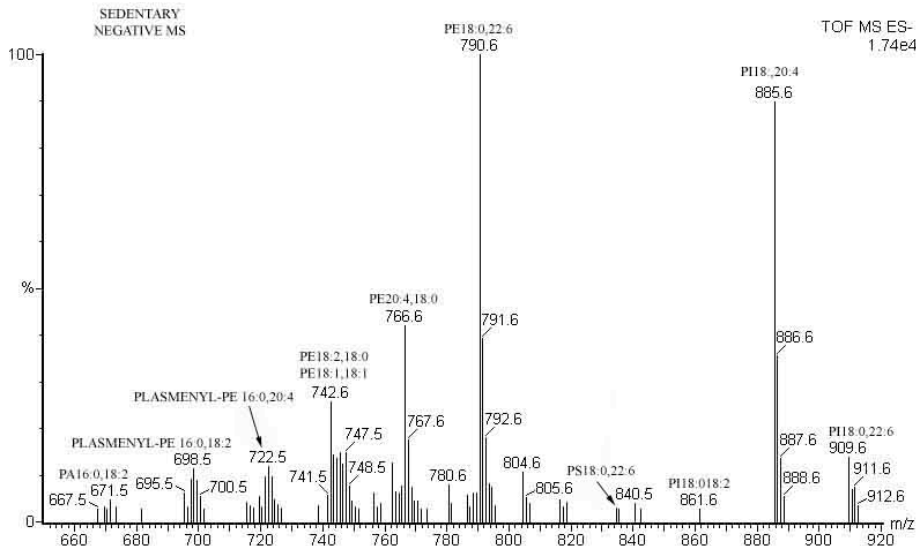


Figure 1: Negative ion ESI-MS spectrum of a phospholipid extract from red vastus lateralis muscle of a sedentary female Sprague-Dawley rat. PA = phosphatidic acid, PE = phosphatidyl ethanolamine, PS = phosphatidyl serine, PI = phosphatidyl inositol. 16:0 = Palmitic acid, 18:0 = Stearic acid, 18:1 = Oleic/Elaidic acid, 18:2 = Linoleic acid, 20:4 = Arachidonic acid, 22:6 = Docosahexaenoic acid

References:

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