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# Effect of zinc and DHA on the epigenetic regulation of human neuronal cells

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## Abstract

Dietary intake of zinc and omega-3 fatty acids (DHA) have health benefits for a number of human diseases. However, the molecular basis of these health benefits remains unclear. In this study, we aimed to identify novel protein candidates that are differentially expressed in human neuronal cell line M17 in response to zinc and DHA that would explain the molecular basis of this interaction. Two-dimensional gel electrophoresis and mass spectrometry were applied to identify major protein expression changes in the protein lysates of human Ml7 neuronal cells that had been grown in the presence and absence of zinc and DHA. Four protein spots, which had significant differential expression, were identified as human histones H3 and H4. Both H3 and H4 were down-regulated by zinc and up-regulated by DHA. These proteomic findings were further supported by Western immunoblot and real-time PCR analyses. In addition, zinc and DHA influenced post-translational modifications (e.g. acetylation, methylation, phosphorylation) of histones H3 and H4. Specifically, we identified that while zinc reduced acetylation, DHA increased acetylation of histones, suggesting importance of zinc and DHA in the epigenetic regulation of neuronal cell gene expression. In summary, we show that dietary zinc and DHA cause a global effect on gene expression, which is mediated by the expression and post-translational modification of histones. Such novel information provides possible clues to the molecular mechanism of action of DHA and zinc in the brain that may contribute to the future treatment, prevention and management of neurodegenerative diseases such as Alzheimer's disease.

## Biography

Suphioglu graduated with PhD from the University of Melbourne in 1994 and has over 18 years of research experience (*h*-index: 22) and an international recognition on the (i) molecular and environmental analysis of pollen, latex and nut allergens, (ii) molecular analysis of phosphoinositide 3-kinase (PI3-K) isoforms in cardiovascular disease and (iii) importance of omega-3 fatty acids and zinc in human neuronal cell survival and epigenetics. Prof Suphioglu has more than 76 publications and several patents. He is currently the Associate Head of School (Development), Course Leader of Bachelor of Biomedical Science and Head of the NeuroAllergy Research Laboratory (NARL).