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Medical Applications of Liquid Chromatography-Based Proteomics

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Abstract

Newly developed proteomic technologies now permit the routine identification of hundreds or even thousands of proteins in a single experiment. However, the global study of any proteome has unique challenges that set it apart from comprehensive studies of genes and transcripts. The detection of low-abundance, biologically relevant proteins poses a particular challenge, especially given that the dynamic range of proteins in cells is estimated to be 10^6 or greater. Nevertheless, the incorporation of proteomics into functional biochemical and biological investigation has proved to be a powerful tool when applied to cellular biology. This presentation will highlight recent proteomic approaches using multi-dimensional liquid chromatography to answer biological questions including the characterisation of over 300 proteins released from activated platelets. This releasate comprises of a multitude of inflammatory and vasoactive substances, many novel to the platelet, which can attract atherogenic leukocytes from the circulation, activate endothelial cells and by infiltrating the vessel wall, stimulate vessel growth and repair. Furthermore, neutralisation of these platelet-derived pro-inflammatory factors may become an interesting means for therapeutic or preventative intervention in atherosclerosis.

Biography

Patricia Maguire studied Pharmacology & Genetics at University College Dublin and obtained a PhD in Pharmacology in 1998. After a year as Research Manager with Procter & Gamble in Brussels, she returned to Dublin to take up a Research Fellowship in the Proteomics Core at The Royal College of Surgeons in Ireland. In 2004, Patricia moved to University College Dublin, where she works in the Conway Institute of Biomedical and Biomolecular Research as a Research Fellow/Proteomics Collaboration Scientist. Dr Maguire's research interests centre on the application of proteomics to disease characterization and identification of drug targets.



5 Most Relevant Publications

1. **Maguire P.B.**, Moran N., Cagney G & Fitzgerald D.J. (2004) Application of proteomics to the study of platelet regulatory mechanisms. *Trends Cardiovasc. Med.* 14, 207-220.
2. Coppinger J.A., Cagney G., Toomey S., Kislinger T., Belton O., McRedmond J., Cahill D., Emili A., Fitzgerald D.J. & **Maguire P.B.** (2004) Proteomic characterization of the proteins released from activated platelets leads to localization of novel platelet proteins in human atherosclerotic lesions. *Blood.* 103, 2096-2104. Epub 2003 Nov 20.
3. McRedmond J., Park S., Reilly, D., Coppinger J.A., **Maguire, P.B.**, Shields, D. & Fitzgerald D.J. (2004) Integration of transcriptomics and genomics in platelets: a profile of platelet proteins and platelet-specific genes. *Mol. Cell. Proteomics.* 3, 133-144. Epub 2003 Nov 25.
4. **Maguire P.B.** & Fitzgerald D.F. (2003). Platelet proteomics. *J. Thromb. Haemost.* 1, 1593-1601.
5. **Maguire P.B.**, Wynne, K.J., Harney, D.F., O'Donoghue, N.M., Stephens, G. & Fitzgerald, D.J. (2002) Identification of the phosphotyrosine proteome from thrombin activated platelets. *Proteomics*, 2, 642-648.