

DMMC Course PROTEOMICS: METHODS & APPLICATIONS

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2-D Electrophoresis in Proteomics

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Abstract

The technique of two-dimensional gel electrophoresis (2-DE) in which proteins are separated in the first dimension according to their charge properties (isoelectric point, pI) under denaturing conditions, followed by their separation in the second dimension according to their relative molecular mass (M_r) by sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE), was developed more than 25 years ago. Nevertheless, it remains the core technology of choice for the majority of applied proteomic projects due to its ability to separate simultaneously thousands of proteins and to indicate post-translational modifications that result in alterations in protein pI and/or M_r . Large-format (24 x 21 cm) 2-D gels can routinely separate around 2,000 protein spots. Moreover, recent developments including the use of narrow range "zoom" gels and fluorescent dyes that facilitate the multiplex analysis of samples make it possible to achieve greater proteomic coverage combined with more accurate differential expression analysis. Additional advantages of 2-DE are the high-sensitivity visualisation of the resulting 2-D separations, compatibility with quantitative computer analysis to detect differentially regulated proteins, and the relative ease with which proteins from 2-D gels can be identified and characterised by mass spectrometry.

Biography

Mike Dunn is SFI Professor of Biomedical Proteomics at the UCD Conway Institute of Biomolecular and Biomedical Research, University College Dublin, where he and his team are carrying out a programme of proteomics research into cardiovascular disease, heart transplantation and neurological disease. The emphasis is on understanding molecular processes involved in disease and on identification of novel biomarkers of disease that can be developed as diagnostic markers and/or therapeutic targets. Mike is the current President of the British Society for Proteome Research and Co-Chair of the Human Proteome Organisation (HUPO) Cardiovascular Initiative (HCVI). He has an extensive bibliography and has contributed to many texts in the area of gel electrophoretic and proteomics technologies and applications. Mike is the Editor-in-Chief of the international journal, Proteomics.

