NAME AND CONTACT DETAILS
Stephen R Pennington
Current Position: Professor of Proteomics
Location: UCD Conway Institute, University College Dublin, Belfield, Ireland.
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CAREER PROFILE (Education and Employment)

Doctoral (1982-1966)	Dept. of Biochemistry, University of Cambridge,
Post-Doctoral (1986-1989)	Elmore Medical Research Fellowship, Department of Biochemistry University of Cambridge
Wellcome Trust Lecturer (1989-1996)	Department Human Anatomy and Cell Biology, University of Liverpool
Lecturer (1996-2001)	Department Human Anatomy and Cell Biology, University of Liverpool
Senior Lecturer (2001-2003)	Department Human Anatomy and Cell Biology, University of Liverpool
Professor of Proteomics (2003-Present)	UCD Conway Institute, School of Medicine, University College Dublin

INNOVATION/COMMERCIALISATION ACTIVITY

Steve has also founded a UCD spinout company **'Atturos'** (Dec 2014) to bring a prostate cancer blood-based biomarker test using MRM mass spectrometry platform that has the capability to distinguish patients with organ-confined and non-organ confined disease that helps clinicians make better patient treatment decisions. The test is patent protected: International Patent Application PCT/EP2014/078914. Steve has obtained commercialisation funding from Enterprise Ireland to bring the test to market and has also received modest funding from the EU Horizon2020 SME Instrument (Phase1) for the development of Atturos business plan both in 2015. Over the past few years, Steve has also established collaborative agreements that are in place with Agilent Technologies to provide mass spectrometry instrumentation and support and have agreed to continue provide this for the technical development and clinical evaluation of the prostate cancer test that Steve and his team are working on.

T/GB99/00071 international filing date 08/01/98 'Use of mass fingerprinting for identification of protein affinity ligands' Granted. Patent application: EPO; Applera, Date of filing 1.05.05 Priority US/19.05.04/ USP 572826 Expression Quantification using mass spectrometry. Granted.

KEY ACHIEVEMENTS (Research and Impact)

Steve is a chemist (Imperial College, London) and PhD biochemist (University of Cambridge) by training. He has spent much of his research career using mass spectrometry to measure and characterise proteins. Steve has given over 200 invited presentations at international events, published over 80 scientific papers as well as editing and contributing to several books including editing one of the first books on Proteomics that was translated into Chinese and Japanese. He is on the editorial board of several journals including in a more senior capacity for 'Proteomics' and the 'Journal of Proteomics' and regularly reviews manuscripts and grants for a number of international organisations. Steve is a committee member of European Proteomics

Association and British Society for Proteome Research for which he is currently vice-President as well. He is currently the lead organiser of 16th Human Proteome Organisation (HUPO) World Congress, which will be held in the national Convention Centre in Dublin from 17-20th September 2017.

Steve is highly energetic, enthusiastic and focused on bringing protein biomarker research endeavours to clinical utility and value. His research group's interests and activities are joined by a common theme of measurement of protein expression and function on a comprehensive proteomics scale. His research group is currently actively engaged in 'Biomarker Discovery and Development'. New and better biomarkers are urgently needed to improve diagnosis and clinical decision-making in a wide range of diseases. In recent years it has become increasingly appreciated that novel biomarkers may only be effective when assembled as groups or panels and the 'omics are well-suited to deliver such multi-marker panels.

Current research interests and funded projects (Health Research Board, Horizon2020, Enterprise-Ireland, EU, Movember, Irish Cancer Society and St Luke's Institute for Cancer Research) are focussed on the mass spectrometry based discovery, measurement and validation of protein biomarkers to take them from discovery to clinical utility, predominantly in oncology and inflammatory disease. Steve's team are also investigating the mechanisms of disease progression focussing on prostate cancer and psoriatic arthritis. Projects are undertaken in collaboration with scientists and clinical colleagues within UCD and between institutions in Dublin/Ireland and internationally as a part of significant consortia.

Other Information as Appropriate

1996-present	Management Committee Member, British Society for Proteome Research (including period as Secretary, co-opted 2008); Currently Vice-President
2006-present	Council Member of European Proteomic Association
2008-present	Committee Member of Irish Mass Spectrometry Society.
2003-present	Senior Editor: Proteomics; Editorial Board Member: J Proteomics, Genome Medicine, Current Chemical Biology
2017	Guest Editor, Journal: Proteomes; Special Issue on 'Proteomic Biomarkers in Human Diseases'
2017	Senior Editor Clinical Proteomics

Lead organiser for **16th Human Proteome Organization (HUPO) World Conference** 17– 20th Sep 2017. www.hupo2017.ie and https://www.hupo.org/events/hupo-2017-dublin/

SECTION 2 – Publication Details (max. 3 pages)

A. SELECTED SENIOR-AUTHOR PUBLICATIONS

Rodriguez H, Pennington SR. Revolutionizing Precision Oncology throughCollaborative Proteogenomics and Data Sharing. Cell. 2018 Apr 19;173(3):535-539.

Tyekucheva S, Bowden M, Bango C, Giunchi F, Huang Y, Zhou C, Bondi A, Lis R, Van Hemelrijck M, Andren O, Andersson SO, Watson RW, **Pennington S**, Finn SP, Martin NE, Stampfer MJ, Parmigiani G, Penney KL, Fiorentino M, Mucci LA and Loda M. Stromal and epithelial transcriptional map of initiation progression and metastatic potential of human prostate cancer. Nat Commun. 2017;8:420.

Staunton, L, Tonry C, Lis R, Espina, V, Liotta L, Inzitari R, Bowden, M, Fabre, A, O'Leary J, Finn SP, Loda M, **Pennington SR .** Pathology-driven Comprehensive Proteomic Profiling of the Prostate Cancer Tumor Microenvironment. Mol. Cancer Res. 2017. doi: 10.1158/1541-7786.MCR-16-0358. PubMed ID: 28057717

Tonry CL, Armstrong JA, **Pennington SR.** Probing the Prostate Tumour Microenvironment I: Impact of Glucose Deprivation on a Cell Model of Prostate Cancer Progression. Oncotarget. 2017. doi: 10.18632/oncotarget.14605. PubMed ID: 28086232

Tonry CL, Armstrong JA, **Pennington SR.** Probing the Prostate Tumour Microenvironment II: Impact of Hypoxia on a Cell Model of Prostate Cancer Progression. Oncotarget. 11(5). 2017. Leacy E, Finn S, Pennington SR. Need for biomarkers in active surveillance of prostate cancer. Oncology News. Includes 'View from the Clinic – A Patient's Perspective' 2016.

Weblink: http://media.wix.com/ugd/17dcca_5fb070d908b74acf830138032fcd6dd8.pdf

Tonry CL, Leacy E, Raso C, Finn SP, Armstrong J, **Pennington SR.** The Role of Proteomics in Biomarker Development for Improved Patient Diagnosis and Clinical Decision Making in Prostate Cancer. Diagnostics. 26(3), 27, 2016. doi:10.3390/diagnostics6030027. PubMed PMID: 27438858

Extended Abstract published in UroWeb and OncToday.

Staunton L, Tonry C, Lis R, Finn S, Leary JO, Loda M, Bowden M, **Pennington SR.** Profiling the tumor microenvironment proteome in prostate cancer using laser capture microdissection coupled to LC-MS: A technical report. EuPA Open Proteomics. 10, 19-23. 2016. doi: http://dx.doi.org/10.1016/j.euprot.2015.11.001. EuPA Open Proteomics is not indexed on PubMed, hence no ID

Ademowo OS, Hernandez B, Collins E, Rooney C, Fearon U, van Kuijk AW, Tak PP, Gerlag DM, FitzGerald O, **Pennington SR**. Discovery and confirmation of a protein biomarker panel with potential to predict response to biological therapy in psoriatic arthritis. Ann Rheum Dis. 2016 Jan; 75(1):234-41. doi: 10.1136/annrheumdis-2014-205417. Epub 2014 Sep 3.

McArdle A, Butt AQ, Szentpetery A, de Jager W, de Roock S, FitzGerald O, **Pennington SR.** Developing Clinically Relevant Biomarkers in Inflammatory Arthritis: A Multi-Platform Approach for Serum Candidate Protein Discovery. *Proteomics Clin Appl.* 2015 Sep 2. doi: 10.1002/prca.201500046. PubMed PMID: 26332844.

Collins ES, Butt AQ, Gibson DS, Dunn MJ, Fearon U, van Kuijk AW, Gerlag DM, Pontifex E, Veale DJ, Tak PP, FitzGerald O, **Pennington SR.** A clinically based protein discovery strategy to identify potential biomarkers of response to anti-TNF-α treatment of psoriatic arthritis. *Proteomics Clin Appl.* 2015 Jun 24. doi: 10.1002/prca.201500051. [Epub ahead of print] PubMed PMID: 26108918.

Mc Ardle A, Flatley B, **Pennington SR,** FitzGerald O. Early biomarkers of joint damage in rheumatoid and psoriatic arthritis. *Arthritis Res Ther.* 2015 Jun 1;17:141. doi: 10.1186/s13075-015-0652-z. PubMed PMID: 26028339

Tonry CL, Doherty D, O'Shea C, Morrissey B, Staunton L, Flatley B, Shannon A, Armstrong J, **Pennington SR.** Discovery and Longitudinal Evaluation of Candidate Protein Biomarkers for Disease Recurrence in Prostate Cancer. *J Proteome Res*. 2015 Jul 2;14(7):2769-83. doi: 10.1021/acs.jproteome.5b00041. PubMed PMID: 26011319.

B. OTHER PUBLICATIONS

Percy AJ, Byrns S, **Pennington SR,** Holmes DT, Anderson NL, Agreste T, Duffy M. Clinical Translation of MS-based Quantitative Plasma Proteomics: Status, Challenges, Requirements, and Potential. Expert Rev Proteomics. doi: 10.1080/14789450.2016.1205950. Epub 2016 Jul 8. PubMed PMID: 27341553.

Malik UU, Zarina S, **Pennington SR.** Oral squamous cell carcinoma: Key clinical questions, biomarker discovery, and the role of proteomics. *Arch Oral Biol.* 2016 Mar;63:53-65. doi: 10.1016/j.archoralbio.2015.11.017. Epub 2015 Nov 25. Review. PubMed PMID: 26691574.

Ramm S, Morissey B, Hernandez B, Rooney C, **Pennington SR,** Mally A. Application of a discovery to targeted LC-MS proteomics approach to identify deregulated proteins associated with idiosyncratic liver toxicity in a rat model of LPS/diclofenac co-administration. *Toxicology.* 2015 May 4;331:100-11. doi: 10.1016/j.tox.2015.03.004. Epub 2015 Mar 13. PubMed PMID: 25772430.

d'Adhemar CJ, Spillane CD, Gallagher MF, Bates M, Costello KM, Barry O'Crowley J, Haley K, Kernan N, Murphy C, Smyth PC, O'Byrne K, **Pennington SR**,, Cooke AA, Ffrench B, Martin CM, O'Donnell D, Hennessy B, Stordal B, Finn S, McCann A, Gleeson N, D'Arcy T, Flood B, O'Neill LA, Sheils O, O'Toole S, O'Leary JJ. The MyD88+ phenotype is an adverse prognostic factor in epithelial ovarian cancer. PLoS One. 2014 Jun 30;9(6):e100816. doi: 10.1371/journal.pone.0100816. eCollection 2014. Erratum in: PLoS One. 2014;9(9):e108833. PubMed PMID: 24977712;

Hernández B, Parnell A, **Pennington SR.** Why have so few proteomic biomarkers "survived" validation? (Sample size and independent validation considerations). Proteomics. 2014 Jul: 14(13-14):1587-92. doi: 10.1002/pmic. 201300377. Epub 2014 May 16. PubMed PMID: 24737731.

Finnegan S, Robson J, Scaife C, McAllister C, **Pennington SR,** Gibson DS, Rooney ME. Synovial membrane protein expression differs between juvenile idiopathic arthritis subtypes in early disease. Arthritis Res Ther. 2014 Jan 13;16(1):R8.

Morrissey B, O'Shea C, Armstrong J, Rooney C, Staunton L, Sheehan M, Shannon AM, **Pennington SR.** Development of a label-free LC-MS/MS strategy to approach the identification of candidate protein biomarkers of disease recurrence in prostate cancer patients in a clinical trial of combined hormone and radiation therapy. Proteomics Clin Appl. 2013 Jun;7(5-6):316-26.

Doyle MS, Collins ES, Fitzgerald OM, **Pennington SR.** New insight into the functions of the interleukin-17 receptor adaptor protein Act1 in psoriatic arthritis. Arthritis Res Ther. 2012 Oct 31;14(5):226

Herbert AP, Riesen M, Bloxam L, Kosmidou E, Wareing BM, Johnson JR, Phelan MM, **Pennington SR,** Lian LY, Morgan A. NMR structure of Hsp12, a protein induced by and required for dietary restriction-induced lifespan extension in yeast. PloS One. 2012;7(7):e41975.

Gibson DS, Newell K, Evans AN, Finnegan S, Manning G, Scaife C, McAllister C, **Pennington SR,** Duncan MW, Moore TL, Rooney ME. Vitamin D binding protein isoforms as candidate predictors of disease extension in childhood arthritis. J Proteomics. 2012 Sep 18;75(17):5479-92.

Collins BC, Miller CA, Sposny A, Hewitt P, Wells M, Gallagher WM, **Pennington SR.** Development of a pharmaceutical hepatotoxicity biomarker panel using a discovery to targeted proteomics approach. Mol Cell Proteomics. 2012 Aug;11(8):394-410.

Gibson DS, Rooney ME, Finnegan S, Qiu J, Thompson DC, Labaer J, **Pennington SR,** Duncan MW. Biomarkers in rheumatology, now and in the future. Rheumatology (Oxford). 2012 Mar;51(3):423-33.

Monopoli MP, Raghnaill MN, Loscher JS, O'Sullivan NC, Pangalos MN, Ring RH, von Schack D, Dunn MJ, Regan CM, **Pennington S,** Murphy KJ. Temporal proteomic profile of memory consolidation in the rat hippocampal dentate gyrus. Proteomics. 2011 Nov;11(21):4189-201.

Oon SF, **Pennington SR,** Fitzpatrick JM, Watson RW. Biomarker research in prostate cancer--towards utility, not futility. Nat Rev Urol. 2011 Mar;8(3):131-8.

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Lau TY, Collins BC, Stone P, Tang N, Gallagher WM, **Pennington SR.** Absolute quantification of toxicological biomarkers by multiple reaction monitoring. Methods Mol Biol. 2011;691:417-27.

Collins BC, Lau TY, **Pennington SR,** Gallagher WM. Differential proteomics incorporating iTRAQ labeling and multi-dimensional separations. Methods Mol Biol. 2011;691:369-83.

Collins BC, Sposny A, McCarthy D, Brandenburg A, Woodbury R, **Pennington SR,** Gautier JC, Hewitt P, Gallagher WM. Use of SELDI MS to discover and identify potential biomarkers of toxicity in InnoMed PredTox: a multi-site, multi-compound study. Proteomics. 2010 Apr;10(8):1592-608.

McIlroy M, McCartan D, Early S, O Gaora P, **Pennington S,** Hill AD, Young LS. Interaction of developmental transcription factor HOXC11 with steroid receptor coactivator SRC-1 mediates resistance to endocrine therapy in breast cancer. Cancer Res. 2010 Feb 15;70(4):1585-94.

Lau TY, Power KA, Dijon S, de Gardelle I, McDonnell S, Duffy MJ, **Pennington SR,** Gallagher WM. Prioritization of candidate protein biomarkers from an in vitro model system of breast tumor progression toward clinical verification. J Proteome Res. 2010 Mar 5;9(3):1450-9.

Gautier VW, Gu L, O'Donoghue N, **Pennington S,** Sheehy N, Hall WW. In vitro nuclear interactome of the HIV-1 Tat protein. Retrovirology. 2009 May 19;6:47.

Gibson DS, Blelock S, Curry J, Finnegan S, Healy A, Scaife C, McAllister C,**Pennington S,** Dunn M, Rooney M. Comparative analysis of synovial fluid and plasmaproteomes in juvenile arthritis--proteomic patterns of joint inflammation inearly stage disease. J Proteomics. 2009 May 2;72(4):656-76.

Bane FT, Bannon JH, **Pennington SR,** Campiani G, Williams DC, Zisterer DM, Mc Gee MM. The microtubule-targeting agents, PBOX-6 [pyrrolobenzoxazepine 7-[(dimethylcarbamoyl)oxy]-6-(2-naphthyl)pyrrolo-[2,1-d] (1,5)-benzoxazepine] and paclitaxel, induce nucleocytoplasmic redistribution of the peptidyl-prolyl isomerases, cyclophilin A and pin1, in malignant hematopoietic cells. J Pharmacol Exp Ther. 2009 Apr;329(1):38-47.

Goodwin RJ, **Pennington SR,** Pitt AR. Protein and peptides in pictures: imaging with MALDI mass spectrometry. Proteomics. 2008 Sep;8(18):3785-800.

Pennington SR, Foster BJ, Hawley SR, Jenkins RE, Zolle O, White MR, McNameeCJ, Sheterline P, Simpson AW. Cell shape-dependent Control of Ca2+ influx and cell cycle

Currid CA, O'Connor DP, Chang BD, Gebus C, Harris N, Dawson KA, Dunn MJ, **Pennington SR,** Roninson IB, Gallagher WM. Proteomic analysis of factors released from p21-overexpressing tumour cells. Proteomics. 2006 Jul;6(13):3739-53. Erratum in: Proteomics. 2006 Jul;6(14):4203. PubMed PMID: 16739131.

Jenkins RE, Kitteringham NR, Hunter CL, Webb S, Hunt TJ, Elsby R, Watson RB, Williams D, **Pennington SR,** Park BK. Relative and absolute quantitative expression profiling of cytochromes P450 using isotope-coded affinity tags. Proteomics. 2006 Mar;6(6):1934-47. PubMed PMID: 16479536.

Barker CR, Hamlett J**, Pennington SR,** Burrows F, Lundgren K, Lough R, Watson AJ, Jenkins JR. The topoisomerase II-Hsp90 complex: a new chemotherapeutic target? Int J Cancer. 2006 Jun 1;118(11):2685-93. PubMed PMID: 16385570.

Greenough C, Jenkins RE, Kitteringham NR, Pirmohamed M, Park BK, **Pennington SR**. A method for the rapid depletion of albumin and immunoglobulin from human plasma. Proteomics. 2004 Oct;4(10):3107-11. PubMed PMID: 15378708.