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Research Interests: Isotopic labelling, anthocyanins, Polyphenols, phytoestrogens, glucosinolates, nitric oxide donors, tryptophan metabolism enzyme immobilisation,

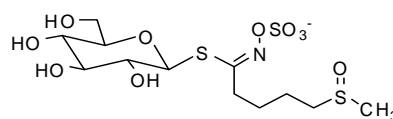
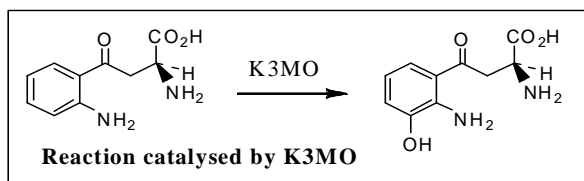


The synthesis of polyphenols (anthocyanins, isoflavones, lignans and flavones) labelled with stable isotopes (^{13}C , ^{15}N , ^2H), which can be used to study the health effects of these compounds *via* metabolic and bioavailability studies and also employed as internal standards for analysis^{1,2,3} Also the synthesis and biological evaluation of polyphenol metabolites.^{4,5} General interest in the development of novel methodologies for the site specific ^{13}C -labelling of phenols from small non-aromatic precursors.^{6,7}

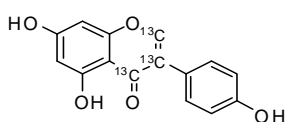
Studies on the synthesis, isotopic labelling, biological activity, metabolism and bioavailability of glucosinolates, important dietary constituents found in *Brassica* vegetables and potential cancer chemopreventative agents.^{8,9}

Development of novel site selective nitric oxide (NO) donor drugs for both cardiovascular disease and treatment of prostate cancer

Mechanistic studies on enzyme catalysed reactions and the design and synthesis of inhibitors as drug candidates. Current interest is centered on enzymes of the tryptophan metabolic pathway including, indolamine 2,3-dioxygenase, kynurenine 3-monooxygenase (K3MO) kynureninase¹⁰ and quinolinate phosphoribosyltransferase (QPRTase).¹¹

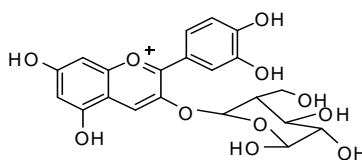


Glucoraphanin; A glucosinolate from broccoli and a potent anti-cancer agent

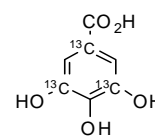


[2,3,4- $^{13}\text{C}_3$]Genistein

An isoflavone phytoestrogen



Cyanidin-3-O-glucoside; An anthocyanin



[1,3,5- $^{13}\text{C}_3$]Gallic acid

Selected Recent Publications

1. Synthesis of [3,4,1'- $^{13}\text{C}_3$]genistein, M. F. Oldfield, L. Chen and N. P. Botting, *J. Labld. Cmpd. Radiopharm.*, 2007, **50**, 1266-1271.
2. A Versatile Synthesis of [2,3,4- $^{13}\text{C}_3$]isoflavones, N. Al-Maharik and N. P. Botting, *J. Labld. Cmpd. Radiopharm.*, 2010, **53**, 90-103
3. The first synthesis of [1,3,5- $^{13}\text{C}_3$]gallic acid, L. J. Marshall, K.M. Cable and N.P. Botting, *Org. Biomol. Chem.*, 2009, **7**, 785-788.
4. An efficient method for the glycosylation of isoflavones, N. Al-Maharik and N. P. Botting, *Eur. J. Org. Chem.*, 2008.
5. The chemopreventive agents isoflavones are present as glucuronides in the human prostate, L. Guy, N. Védérine, M. Urpi-Sarda, A. Gil-Izquierdo, N. Al-Maharik, J.-P. Boiteux, A. Scalbert, C. Rémésy, N. P. Botting, C. Manach, *Nutrition Cancer*, 2008, **60**, 461-468.
6. The synthesis of substituted phenols from pyranone precursors, L. J. Marshall, K. M. Cable and N. P. Botting, *Tetrahedron*, 2009, **65**, 8165-8170.
7. Iridium-catalyzed C-H activation/borylation/oxidation for the preparation of bis-protected phloroglucinol derivatives, L. J. Marshall, K. M. Cable and N. P. Botting, *Tetrahedron Lett.*, 2010, **51**, 2690-2692.
8. The synthesis of isotopically labelled glucoraphanin for metabolic studies, J. J. Morrison and N. P. Botting, *Tetrahedron Lett.*, 2007, **48**, 1891-1894.
9. The synthesis of novel hexa ^{13}C -labelled glucosinolates from [$^{13}\text{C}_6$]-D-glucose, Q. Zhang, T. Lebl, A. Kulczynska and N. P. Botting, *Tetrahedron*, 2009, **65**, 4871-4876.
10. Purification and biochemical characterisation of some of the properties of recombinant human kynureninase, H. A. Walsh and N. P. Botting, *Eur. J. Biochem.*, 2002, **269**, 2069-2074.
11. Structure and mechanism of quinolinate phosphoribosyltransferase (HQPRTASE) from *Homo sapiens*, H. Liu, K. Woznica, G. Catton, A. Crawford, N. Botting and J. H. Naismith *J. Mol. Biol.*, 2007, **373**, 755-763.