University of Birmingham

Dr Nik Hodges PhD

Senior Lecturer

School of Biosciences (/schools/biosciences/index.aspx)

Contact details

Telephone +44 (0)121 41 45906 (tel:+44 121 41 45906)

Fax +44 (0)121 41 45925

Email n.hodges@bham.ac.uk (mailto:n.hodges@bham.ac.uk)

School of Biosciences
The University of Birmingham
Edgbaston
Birmingham
B15 2TT
UK

About

Dr Nik Hodges is interested in the mechanisms of genetic toxicology, cellular oxidative stress and repair of oxidative DNA damage and his lab was the first to identify that the variant form of the repair protein OGG1 is repair deficient under conditions of oxidative stress which could have important consequences for individual susceptibilty to cancer.

Qualifications

BSc, MSc, PhD

Biography

After graduating from Nottingham in Biochemistry and Biological Chemistry I studied for an MSc and then a PhD in Toxicology in the laboratory of Professor Kevin Chipman where I worked on the rodent tumour promoter phenobarbitol. This is where I first became interested in mechanisms of cellular oxidative stress. After post-doctoral positions in Occupational Health (working on the genotoxic carcinogen hexavalent chromium) and then in the School of Biosciences (working on secondary genotoxicity) as an AstraZeneca funded research fellowship I am now a lecturer in Toxicology.

Teaching

I lecture on the Bio304 final year undergraduate module, and extensively on the MSc/MRes Toxicology programmes as well as teaching Toxicology more widely at Masters level (e.g. Occupational Health Masters course). I am the module organiser for modules 3 and 4 of the MSc Toxicology course and course director for the MRes Molecular Mechanistic Toxicology course.

Postgraduate supervision

For a list of possible PhD projects offered by Dr Hodges **www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Hodges (http://www.findaphd.com/search/customlink.asp?inst=birm-Biol&supersurname=Hodges)**

Research

Research Theme within School of Biosciences:**Molecular and Cell Biology (/research/activity/cellbiology/index.aspx)** - Toxicology

We are interested in the cellular consequences of pertubation of redox homeostasis both by chemical and biological mechanisms.

OGG1: The DNA repair protein OGG1 is critical in the repair of the oxidatively damaged base 8 oxo dG which if not removed before DNA replication mispairs with adenine and thymine causing point mutations. We are interested in the common ser326cys polymorphism in human OGG1 and are studying its activity and location compared to the “normal” protein. Work in our lab using genetically engineered cell lines has shown that the variant form of the protein is repair deficient particularly under conditions of cellular oxidative stress when it is needed most and we are currently studying the mechanistic basis for this observation.

Cellular oxidative stress: We are using a number of experimental approaches to study the consequences of intracellular oxidative stress: These include treatment with pro-oxidants, tungsten alloys, engineered nanoparticles, depletion of the protective factor glutathione and over-expression of cytochrome P450s for which there is evidence that once “un-coupled” for example by futile substrates like polychlorinated chemicals these enzyme systems can generate substantial level of toxic free radicals in cells. We are particularly interested in oxidative DNA damage through so called “secondary genotoxicity” and the existence of potential thresholds of effect in relation to these mechanisms of toxicity.

Cytoglobin: We are interested in cytoglobin a poorly understood homologue of haemoglobin with no known function but which may be involved in detoxification of reactive oxygen species as well as having signalling and oxygen transporter functions in a wide range of non muscle tissues especially those of a fibroblast lineage. Through collaboration with AstraZeneca were are studying the role of cytoglobin in fibrotic disease and as a potential target for drug toxicity. The cytoglobin gene also maps to a genetic disease called tylosis with oesphageal cancer (TOC) and in collaboration with The University of Liverpool we are working on the genetic regulation of this gene and trying to determine its molecular function.

Iron cylinders: In collaboration with Professors Mike Hannon and Kevin Chipman we are investigating the cellular properties of iron and related cylinders which have potent cytostatic effects in a broad range of cell lines. You can read more about these exciting molecules on the homepage of Professor Mike Hannon **http://www.chem.bham.ac.uk/staff/hannon.shtml (http://www.chem.bham.ac.uk/staff/hannon.shtml)** .

Other activities

Member of the BTS Educational Sub commitee, and local BTS representative to “champion” toxicology at The University of Birmingham. I also co-organise CPD courses in Advanced Toxicology for industry in collaboration with The University of Surrey. Consultancies in the area of toxicological risk assessment (e.g. Monsanto, VetXX, DFID).

Publications

Example recent publications from the Hodges lab:

DNA repair related:

Kaur MP, Guggenheim EJ, Pulisciano C, Akbar S, Kershaw RM and Hodges NJ. 2014. Cellular accumulation of Cys326-OGG1 proteins complexes under conditions of oxidative stress. Biochem Biophy Res Comm. 447, pp 12–18.

Kershaw RM and Hodges NJ. 2012. Repair of oxidative DNA damage is delayed in the Ser326Cys polymorphic variant of the base excision repair protein OGG1. Mutagenesis, 27(4) pp 501–10.

Zielinska A, Davies OT, Meldrum RA and Hodges NJ. 2011. Direct visualization of repair of oxidative damage by OGG1 in the nuclei of live cells. Journal of Biochemical and Molecular Toxicology. 25(1), pp 1–7.

Mirbahai L, Kershaw RM, Green RM, Hayden RE, Meldrum RA, Hodges NJ. Use of a molecular beacon to track the activity of base excision repair protein OGG1 in live cells. DNA Repair. 2010;9(2):144-52.

Oxidative stress related:

McRonald FE, Risk JM and Hodges NJ. 2012. Protection from intracellular oxidative stress by cytoglobin in normal and cancerous oesophageal cells. PloS1 7(2) e30587.

Harris RM, Williams TD, Hodges NJ and Waring RM. 2011. Reactive oxygen species and oxidative DNA damage mediate the cytotoxicity of tungsten-nickel-cobalt alloys in vitro. Toxicology and Applied Pharmacology. 250(1), pp 19–28.

Turner JE, Hodges NåJ, Bosch JA and Aldred S. 2011. Prolonged depletion of antioxidant capacity after ultra-endurance exercise. Medicine and Science in Sports and Exercise. 43(9), pp 1770–76.

Hodges NJ, Innocent N, Dhanda S, Graham M. Cellular protection from oxidative DNA damage by over-expression of the novel globin cytoglobin in vitro. Mutagenesis. 2008;23(4):293-8.

Green RM, Hodges NJ, Chipman JK, O'Donovan MR, Graham M. Reactive oxygen species from the uncoupling of human cytochrome P450 1B1 may contribute to the carcinogenicity of dioxin-like polychlorinated biphenyls. Mutagenesis. 2008;23(6):457-63.

Iron cylinder and ferrocene related:

Nguyen HV, Sallustrau A, Balzarini Y, Bedford MR, Eden JC, Georgousi N, Hodges NJ Kedge J, Mehellou Y, Tselepis C and Tucker JHR. 2014. Organometallic Nucleoside Analogues with Ferrocenyl Linker Groups: Synthesis and Cancer Cell Line Studies. J Med Chem. 57: pp 5817-22.

Cardo L, Sadovnikova V, Phongtongpasuk S, Hodges NJ, Hannon MJ. Arginine conjugates of metallo-supramolecular cylinders prescribe helicity and enhance DNA junction binding and cellular activity. Chem Commun (Camb). 2011 Jun 21;47(23):6575-77.

Ducani C, Leczkowska A, Hodges NJ and Hannon MJ. 2010. Noncovalent DNA-binding metallo-supramolecular cylinders prevent DNA transactions in vitro. Angewandte Chemie. 122(47), pp 9126–29.

Hotze AC, Hodges NJ, Hayden RE, Sanchez-Cano C, Paines C, Male N, Tse MK, Bunce CM, Chipman JK, Hannon MJ. Supramolecular iron cylinder with unprecedented DNA binding is a potent cytostatic and apoptotic agent without exhibiting genotoxicity. Chem Biol. 2008;15(12):1258-67.

Nanoparticle related:

Kendall M, Hodges NJ, Whitwell H, Tyrrell J and Cangui H. 2014. Nanoparticle growth in conditioned media: Effects of surface chemistry and surface-sequestered peptides. Philosophical Transactions of the Royal Society B:(Biological Sciences). *In Press*

Rogers NJ, Claire S, Harris RM, Zikeli G, Farabi S, Styles IB, Hodges NJ, Pikramenou Z. 2014. High coatings of Ru(II) complexes on gold nanoparticles for single particle luminescence imaging in cells. Chemical Communications. 50: pp 617-619