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About

My main commitment at the University of Birmingham is as Head of College of Life and Environmental Sciences, working with committed colleagues towards excellence with impact. We are moving ahead with new research initiatives expanding on our research strengths within the four schools of Psychology, Biosciences, Sport and Exercise Sciences and Geography, Earth and Environmental Sciences. We continue to develop strong learning and teaching activities which are research-led.

My personal research activity relates to mechanistic cellular and genetic toxicology, toxicogenomics and nanotoxicology in relation to both human health and the health of organisms in the aquatic environment.

Qualifications

BSc. PhD. FBTS. FRCPath. FSB

Biography

Kevin joined the University of Birmingham, where he is now Head of College of Life and Environmental Sciences, in 1983 following research at the University of Reading, St Mary's Hospital Medical School, London and Beecham Pharmaceuticals. His research team investigates mechanisms of cellular and genetic toxicity. Particular interest is in the genetic and epigenetic mechanisms of action of carcinogens and toxicogenomic studies in ecotoxicology. His laboratory was the first to publish on microarrays for studying toxicant effects in organisms from the field and he currently is extending the work on environmental toxicogenomics to risk assessment of chemicals and nanomaterials in the environment.

Kevin is a former member of a Drinking Water Inspectorate Committee, the DH/Food Standards Agency Committee on Toxicology and the UK Committee on Safety of Medicines. A former member of the NERC College, he also was Chair of the UK NERC Molecular Genetics Facility. He has been a member of advisory groups for the MHRA and EPSRC (nanoparticles). He is immediate past President of the British Toxicology Society and was recently Director of the International Union of Toxicology. He chairs an MRC NC3Rs working group and was also a trustee of the Toxicology Education Foundation based in the USA. He is on the Editorial Board of several International Toxicology Journals and has over 200 refereed publications.

Teaching

Major teaching activities relate to Toxicology particularly through the MSc and MRes courses in Toxicology and CPD activities with Industry.

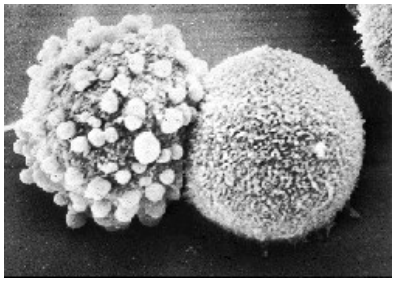
Postgraduate supervision

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

Research

Molecular mechanisms of cellular toxicity for human and environmental health

1. Mechanisms of Liver Carcinogenesis



A number of our projects investigate the mechanisms whereby chemicals contribute to carcinogenesis through genotoxic and non-genotoxic interactions. In particular, emphasis is given to the disruption of connexin-mediated gap junctional intercellular communication and CpG island methylation.

We have shown a heterocyclic amine carcinogen to be activated to DNA-damaging products by heterologously expressed human cytochrome P4501A2, illustrating human susceptibility. Potent protectants, such as dietary isoflavonoids and sulforaphane have been shown to modulate P450 and inhibit proliferation and DNA oxidation. The food carcinogen furan exhibits both genetic and epigenetic changes in rodent liver leading to cholangiocarcinoma.

2. Environmental Toxicology

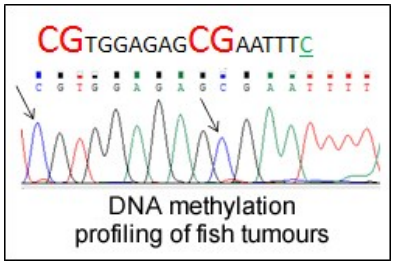
Environmental Biomonitoring

The main aim is to understand the molecular mechanisms of toxicity of environmentally relevant pollutants with the overall aim of identification of sensitive biomarkers for biomonitoring and chemical risk assessments using in-house developed microarrays.

Recently, “reverse engineering” of network analyses, combining transcriptomic responses through collaborations in metabolomics and bioinformatics, led to a better understanding of stress responses to environmental pollutants in the European flounder with potential benefits for environmental monitoring.

Environmental Toxicoepigenomics

An expanding area of research within our group is investigation of the role of epigenetic mechanisms in the regulation of responses to environmental pollutants and in the development of diseases, such as cancer in aquatic species. Using state of the art techniques at multiple “omic” levels, we have demonstrated a potential linkage between estrogenic effects of environmental pollutants, epigenetic changes and development of liver tumours in the wild flatfish dab (Limanda limanda). Currently, we are in the process of expanding our research to DNA methylation “fingerprinting” of other aquatic species, including water flea (Daphnia magna) following exposure to a range of environmentally relevant pollutants. This holds enormous appeal for environmental biomonitoring.



DNA methylation profiling of fish tumours

Nanoparticle Toxicity

Another major development is a collaborative approach to understand the mechanisms of nanoparticle toxicity in a range of biological systems. The omic approaches are particularly valuable in this search as they provide a non-biased analysis coupled with targeted analysis of e.g. oxidative stress mechanisms.

“Recent research is supported by NERC, Industry, EU, BBSRC and MRC”

Other activities

Immediate past –President and current Chair of nominations subcommittee of the British Toxicology Society, Former Director of the International Union of Toxicology, Nominations subcommittee of EUROTOX.

Publications

Selected Recent Publications

1. Moro, S., **Chipman, J.K**., Antczak, P., Turan, N., Dekant, W., Falciani, F., Mally, A. (2012) Identification and pathway mapping of furan target proteins reveal mitochondrial energy production and redox regulation as critical targets of furan toxicity. *Toxicol Sci*, (ahead of print).

2. Chen, T., Williams, T.D., Mally, A., Hamberger, C., Mirbahai, L., Hickling, K., **Chipman, J.K**. (2012) Gene expression and epigenetic changes by furan in rat liver. *Toxicology*, 292 (2-3): 63-70.

3. Mirbahai, L., Yin, G., Bignell, J.P., Li, N., Williams, T.D., **Chipman, J.K**. (2011) DNA methylation in liver tumourigenesis in fish from the environment. *Epigenetics*, 6 (11): 1319-1333.

4. Mirbahai, L., Williams, T.D., Zhan, H., Gong, Z., **Chipman, J.K**. (2011) Comprehensive profiling of zebrafish hepatic proximal promoter CpG island methylation and its modification during chemical carcinogenesis. *BMC Genomics*, 12 (3): 1-16.

5. Williams, T.D., Turan, N., Diab, A.M., Wu, H., Mackenzie, C., Bartie, K.L., Hrydziuszko, O., Lyons, B.P., Stentiford, G.D., Herbert, J.M., Abraham, J.K., Katsiadaki, I., Leaver, M.J., Taggart, J.B., George, S.G., Viant, M.R., **Chipman, J.K**., Falciani, F. (2011) Towards a system level understanding of non-model organisms sampled from the environment: a network biology approach. *PLoS Comput Bio*, 7 (8): e1002126.

6. Perkins, E.J., **Chipman, J.K**., Edwards, S., Habib, T., Falciani, F., Taylor, R., Van Aggelen, G., Vulpe, C., Antczak, P., Loguinov, A. (2011) Reverse engineering adverse outcome pathways. *Environ Toxicol Chem*, 30 (1): 22-38.

7. Antczak, P., Ortega, F., **Chipman, J.K**., Falciani, F. (2010) Mapping drug physico-chemical features to pathway activity reveals molecular networks linked to toxicity outcome. *PLoS One*, 5 (8): e12385.

8. Chen, T., Mally, A., Ozden, S., **Chipman, J.K**. (2010) Low doses of the carcinogen furan alter cell cycle and apoptosis gene expression in rat liver independent of DNA methylation. *Environ Health Perspect,* 118 (11): 1597-602.

9. Jones, H.S., Panter, G.H., Hutchinson, T.H., **Chipman, J.K**. (2010) Oxidative and conjugative xenobiotic metabolism in zebrafish larvae in vivo. *Zebrafish*, 7 (1): 23-30.

10. Hickling, K.C., Hitchcock, J.M., Oreffo, V., Mally, A., Hammond, T.G., Evans, J.G., **Chipman, J.K**. (2010) Evidence of oxidative stress and associated DNA damage, increased proliferative drive, and altered gene expression in rat liver produced by the cholangiocarcinogenic agent furan. *Toxicol Pathol*, 38 (2): 230-43.

11. Craft, J.A., Gilbert, J.A., Temperton, B., Dempsey, K.E., Ashelford, K., Tiwari, B., Hutchinson, T.H., **Chipman, J.K**. (2010) Pyrosequencing of Mytilus galloprovincialis cDNAs: tissue-specific expression patterns. *PLoS One*, 5 (1): e8875.

12. Van Aggelen, G., Ankley, G.T., Baldwin, W.S., Bearden, D.W., Benson, W.H., **Chipman, J.K**., Collette, T.W., Craft, J.A., Denslow, N.D., Embry, M.R., Falciani, F., George, S.G., Helbing, C.C., Hoekstra, P.F., Iguchi, T., Kagami, Y., Katsiadaki, I., Kille, P., Liu, L., Lord, P.G., McIntyre, T., O'Neill, A., Osachoff, H., Perkins, E.J., Santos, E.M., Skirrow, R.C., Snape, J.R., Tyler, C.R., Versteeg, D., Viant, M.R., Volz, D.C., Williams, T.D., Yu, L. (2010) Integrating omic technologies into aquatic ecological risk assessment and environmental monitoring: hurdles, achievements, and future outlook. *Environ Health Perspect*, 118 (1): 1-5.

13. Santos, E.M., Ball, J.S., Williams, T.D., Wu, H., Ortega, F., van Aerle, R., Katsiadaki, I., Falciani, F., Viant, M.R., **Chipman, J.K**., Tyler, C.R. (2010) Identifying health impacts of exposure to copper using transcriptomics and metabolomics in a fish model. *Environ Sci Technol*, 44 (2): 820-6.

14. Katsiadaki, I., Williams, T.D., Ball, J.S., Bean, T.P., Sanders, M.B., Wu, H., Santos, E.M., Brown, M.M., Baker, P., Ortega, F., Falciani, F., Craft, J.A., Tyler, C.R., Viant, M.R., **Chipman, J.K**. (2010) Hepatic transcriptomic and metabolomic responses in the Stickleback (*Gasterosteus aculeatus*) exposed to ethinyl-estradiol. *Aquat Toxicol*, 97 (3): 174-87.

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