

## **Bioscience:**

- (COPD)
- Anti-inflammatory properties of the protein TSG-6
- Cardiovascular physiology: mechanisms controlling tone; control of gap junctional communication
- Ecophysiology and behaviour of littoral marine species, especially with respect to environmental stressors such as pollutants
- Exercise-induced asthma
- Immune protection against *Rhodococcus equi* (including product validation and optimisation)
- Immunobiology and proteomic analysis of primary human alveolar epithelial cells, we are one of the few groups in the world that can successfully isolate these cells
- Microbial adhesion
- Pathophysiology of asthma
- Pathophysiology of transplant rejection, optimising viability of marginal donor transplant organs in renal and pancreatic diseases
- Prevalence and severity of asthma and allergic disorders in children
- Respiratory responses to environmental and occupational exposure
- Risk factors and quality of life in asthma and chronic obstructive pulmonary disease
- The role of GAGs in immune regulation, in particular the relationship between biosynthetic regulation and structure/function, including the development of bioinformatics analysis
- Vibration in biological systems
- Yeast physiology, particularly with respect to brewing

## **Drug Action - Pharmacology and Molecular Biology:**

- Behavioural pharmacology: cognition (learning & memory models, Korsakoffs syndrome) and anxiety
- Compliance monitoring in Asthma
- Distribution and roles for calcium activated chloride channels in CNS
- Electrophysiology: nerve, muscle and cardiovascular pharmacology (myocardial preconditioning, potassium channel modifying agents, antipsychotic drugs, omega 3 fatty acids)
- Epithelial or immune dysfunction in asthma, cystic fibrosis
- GABAA receptor systems in Human Dementia with Lewy Bodies and Alzheimers Disease. (in collaboration with MRC, Institute for Ageing & Health, Newcastle General Hospital)
- Histamine H3 receptors, Oleamide, Endocannabinoids (with the University of Durham)
- Humoral factors in regulation of vascular tone
- *In vitro* pharmacology (endocannabinoids, antidepressants)
- Neuroprotection: roles for mitochondria and growth factors (with Servier) and anaesthetic preconditioning (in collaboration with the University of Durham)
- Neuroscience: the mode of action of novel anticonvulsants/analgesics (collaboration with Schwarz Pharma)

- Neuroscience: voltage- & ligand-gated ion channels, sleep hormones, depressant/anaesthetic drugs, pathophysiology and treatment of neurological diseases (epilepsy, MS, stroke, pain)
- Protein assays for the quantitative determination of drugs
- Seeking new targets for the treatment of stroke (with Universities of Durham, Bradford, Berlin)

### **Drug Design and Analysis:**

- Cognition enhancing agents (in collaboration with Servier)
- Development of O- and C-glycosylation methods for assembling complex molecules with interesting biological properties
- Heterocyclic synthesis *tryptophan hydroxylase* in autism and the possible rôle of environmental factors in the symptomology
- Metal aggregates for use in metal ion transport
- Molecular modelling in drug design and reaction mechanisms
- Monitoring pharmaceutical agents, including nano-separations systems based on microfluidics systems coupled to bioreceptors, and biosensor systems based on antibodies and enzymes immobilized on micro- and nano-particles (funded by CENAMPS)
- New agents for the treatment of psoriasis (in collaboration with Stiefel Laboratories)
- Novel chromogenic substrates for bacterial detection (in collaboration with the Freeman Hospital and BioMerieux).
- Redox-active sensor systems
- The design of novel anti-cancer agents, (including protein tyrosine kinase inhibitors, novel agents for the treatment of prostate cancer, and gossypol analogues)
- The development of a new diagnostic assay for prostate cancer (in collaboration with Sunderland City Hospitals NHS Trust and funded by ONE North East / Centre of Excellence for Life Sciences)
- The development of new LC based assays for disease markers (including indolyl-3-acryloylglycine in autism and modified nucleosides in prostate cancer)
- The identification of the active principles of some Indian plants used in Ayurvedic medicine (in collaboration with Stiefel Laboratories)
- The synthesis of; improved cysteamine prodrugs, novel anti-cancer agents, novel agents for use in neurodegenerative diseases, novel supramolecular systems, dendrimers, natural products using carbohydrates as chiral templates, shikimate pathway intermediates and their analogues, and novel  $\beta$ -lactams

### **Medicinal Products - Pharmaceuticals:**

- Compactibility of film-coated pellets and drug release
- Development of research into transdermal drug delivery
- Drug targeting to the colon and gastrointestinal transit
- Fracture mechanics/mechanical properties of pharmaceutical materials
- Mechanical properties of polymer films used in modified-release preparations
- Physical principles of dosage form development and manufacture

- Powder technology; measurement and assessment of the role of interparticulate forces of adhesion and friction in dosage form design, powder flow and packing
- Semi-solid rheology
- Solid dosage form development (granulation, hard capsules, tablets (immediate and modified release), pellets, powder inhalations)
- The electrostatic charging process of pharmaceutical powders during processing and handling

### **Pharmacy Practice and Policy:**

- Medicines Management, compliance and drug use review especially in renal patients, osteoporosis and those taking anticoagulants or statins
- The side effect profiles and event rates of Disease Modifying Anti-Rheumatic Drugs
- Patients attitudes to biphosphonate therapy in osteoporosis: factors affecting compliance
- The rate and type of drug medication errors in ophthalmology
- Assessment of transcription errors and standard prescribing procedures: comparisons of pharmacist and medical led prescribing
- Latanoprost induced hypertrichosis: a tool to determine compliance
- The Pharmacist dispensing token scheme: the impact of recently introduced supplementary prescribing scheme