



# Rigorous, Relevant **Research**

## Chronic Diseases

### Introduction

Chronic diseases are now the main causes of death, long-term debilitation and reduced quality of life in the UK and other western countries. Cardiovascular disease, cancer and neurological disorders are well recognised in this respect. Research at Aston is particularly directed towards an understanding of the pathogenic mechanisms as an opportunity to identify new therapeutic targets.

For example, cardiovascular disease is approached through atherosclerosis and the pervasive underlying role of pro-inflammatory conditions, oxidative stress and disordered metabolism. This links with research into metabolic diseases such as diabetes and obesity. New approaches to the treatment of obesity are emerging from studies into the biochemical disturbances of cancer cachexia, and in vitro neural culture methods are being developed for early detection of cellular toxicity.

#### Sponsors and funders

- EU FP7
- Dunhill Medical Trust
- UK research councils
- Unilever and various pharmaceutical companies
- Humane Research Trust
- Antidote Direct
- local health authorities

#### Key projects

- Biomarkers of ageing
- Lipid metabolism, insulin resistance and vascular complications in ageing
- Oxidised lipids, blood brain barrier and dementia
- Free radicals and periodontal inflammation
- Cytotoxicity of natural products
- Free radical mediators in hypoxia/reperfusion
- Proteomic approaches to identify biomarkers of lung inflammation
- Antiobesity activity of alpha2-glycoprotein (ZAG)
- Studies on the receptor for proteolysis-inducing factor (PIF) in cachexia
- Novel anti-cachectic agents for late-stage cancer Treatment
- Plant-derived anti-cancer compounds

- Development of post mitotic screening systems for adult neuro and astrocytic toxicity
- Development of 'neurosphere' modelling of human embryotoxicity
- Cellular toxicity analysis using human cell lines and DNA arrays
- Pathogenesis and interventional approaches against insulin resistance
- Development of novel antidiabetic and antiobesity agents
- Cell therapy approaches for pancreatic beta-cell replacement
- Effects of micro- and macro-nutrients on diabetes and its complications

#### Interesting and unexpected research applications

Aston scientists are collaborating with NASA scientists to incorporate eicosapentaenoic acid (EPA) into the diets of astronauts because previous research at Aston found that this substance prevents muscle wasting in cancer, and might now help to combat the muscle atrophy associated with long-term weightlessness.

How can we determine embryo neurotoxicity without using human embryonic stem cells? At Aston, we are developing differentiated post-mitotic three-dimensional 'neurospheres' that model the first few days of human embryonic life.

#### Link to group web page:

www.aston.ac.uk/lhs/research/biomedical/chronic

#### Key contact

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