

## King's Health Partners Annual Report 2015/16

### Research highlights

#### Quality of Research and Infrastructure

We have continued to make significant progress in basic, translational/clinical and applied research. King's is now ranked 8<sup>th</sup> in the world for "Clinical, Pre-clinical and Health" (*Times Higher Education*, 2015-16), improved from 11<sup>th</sup> last year (and from 27<sup>th</sup> in 2011). In the *QS World University Rankings*, we are now 21<sup>st</sup> for Medicine (up from 24<sup>th</sup>), 4<sup>th</sup> for Dentistry (up from 7<sup>th</sup>), 4<sup>th</sup> in Pharmacy and Pharmacology (up from 12<sup>th</sup>), 6<sup>th</sup> in Nursing and 21<sup>st</sup> in Psychology (up from 22<sup>nd</sup>). Over the past few years and across league tables, this shows a strong and consistent upward trajectory.

This year, a large number of infrastructural and strategic investments have been made by external funders, which collectively will make a substantial enhancement to our research activity, across the spectrum of fundamental, translational, clinical and applied science.

Several new research centres have been awarded, including:

- The MRC Centre for Neurodevelopmental Disorders (£3m, Director Professor Oscar Marin). This Centre brings together expertise in fundamental developmental neurobiology with disease-focused research (including clinical) in epilepsy, autism and schizophrenia, and with human neonatal brain imaging.
- We have been awarded £4m from the Wellcome Trust (subject to resolving some minor queries) to create a cross-London high-field (7T) magnetic resonance imaging (MRI) clinical research facility. This will be based at St Thomas', and builds on our existing excellence in medical imaging. It will be the first 7T MRI facility in London and the third in the UK, and the only one fully embedded in a clinical setting.
- The Asthma UK King's – Imperial College Asthma Centre (£2m, King's Director Professor Kasia Hawrylowicz) will support collaborative research across the institutions, focused on disease mechanisms and combining basic and clinical approaches.
- A new programme of research into Ebola Virology and Immunology has recently started, supported by an MRC Discovery Award (£1m, Professor Stuart Neil), as a partnership between the university and the KHP Sierra Leone Partnership. The KHP Sierra Leone Partnership has also been awarded European & Developing Countries Clinical Trials Partnership funding (Mr Andy Leather).
- Doctoral Training across KHP has been enhanced by the award of an MRC Doctoral Training Partnership, and further complemented by the renewal of the King's Bioscience Institute Translational PhD Programme. A new Wellcome Trust Strategic PhD Programme in Cellular Therapies and Regenerative Medicine (Professor Fiona Watt) adds to this.
- KHP-wide funding to support development of translational research (c.£2m/year, MRC and Guy's and St Thomas' Charity), renewed for another year.
- Continued strategic funding for our two twins cohorts – TEDS (£2m, Professor Robert Plomin) and Twins UK (£1.2m, Professor Tim Spector) – has been awarded by the MRC and Wellcome Trust respectively.

- A new collaboration between King's researchers in neuroscience and psychiatry and industry partners, focused on the remote detection of disease and relapse, has been supported by an €11m award from the European Commission.
- We have launched the KHP-wide "Prize Fellowships", attracting and supporting the most promising clinician and basic scientists (12 supported this year).

The quality of our academic research remains strong, as exemplified by recent Wellcome Trust Investigator Awards (Professors Mike Malim, Adrian Hayday, Riki Eggert, Dr Brian Stramer), European Research Council Advanced Award (Otsu), major EU (£1.7m, Professor Ralph Sinkus) and NIH (£2m, Professor Mary Rutherford) funding for cutting edge biomedical imaging.

Example research outputs for this year include:

- *Science Translational Medicine*: calcium sensing receptor (CaSR) in causing asthma (Corrigan, Ward)
- *Lancet*: Metabolic or bariatric surgery may be more effective than standard medical treatments for the long-term control of type 2 diabetes in obese patients (Rubino)
- *Cell*: The Genetic Architecture of the Human Immune System: A Bioresource for Autoimmunity and Disease Pathogenesis (Nestle, Spector)
- *Lancet Diabetes and Endocrinology*: Diet and exercise does not prevent gestational diabetes in obese women (UPBEAT study) (Poston)
- *New England Journal of Medicine*: two studies, introducing allergenic foods to the infant diet from three months of age may be effective in food allergy prevention; LEAP-On Eating peanut early reduces risk of allergy even with later abstinence (Lack)

### **Translational and Clinical Research**

Our translation of fundamental science to clinically-relevant research continues to expand, with major programmes developing in a wide variety of areas. Recent highlights include:

- The establishment of Leucid Bio, a spinout company encompassing multiple cellular therapy approaches for cancer developed by Dr John Maher (funded by MRC, CRUK, Wellcome Trust)
- Major partnerships have been established with Pfizer around AAV gene therapy technology (Professor Michael Linden), and with Collectis on lentivirus technology (Professor Farzin Farzaneh)
- A multi-peptide "vaccine" for type 1 diabetes has been licensed to UCB (Mark Peakman)
- Professor James Spicer is the PI on the VAPER trial (cancer vaccine) 'In Vivo Generation of Optimal Tumour Antigen-specific Anticancer Immune Responses, by Vaccination with Human Telomerase Reverse Transcriptase (hTERT) Peptides, in Combination with Specific Adjuvants and Elimination of Immunosuppressive Regulatory Cells, in Patients with Advanced Cancer (Phase I Study)'.
- Professor Andy Cope is leading a trial for Bristol Myers Squibb, on Abatercept for the prevention of rheumatoid arthritis.
- A new cell therapy trial using regulatory T cells to treat inflammatory bowel disease has been funded by the MRC (Professor Graham Lord)
- Two major programmes of work aimed at understanding disease mechanisms in human subjects, in pain (Professor Steve McMahon) and schizophrenia (Dr Oliver Howes), have been supported by the MRC experimental medicine challenge grants (total value c.£4m) CHECK - waiting for formal award letter as going through a bit of iteration

- MRI-guided cardiac electrophysiological ablation is under development, supported by the Wellcome Trust (£2m, Professor Reza Razavi) and MRC (Professor Jo Hajnal)
- A programme to evaluate of the introduction of a novel device in the management of hypertension and shock in pregnancy in low-resource settings has been supported by the MRC (Professor Andy Shennan, £1m)
- Professor Lucy Chappell has been awarded an NIHR Research Professorship focused on disorders of pregnancy.
- The REACH: Risk, Resilience, Ethnicity and Adolescent Mental Health has been supported by the European Commission (Professor Craig Morgan, £1.6m)

Translational research outputs this year include:

- *Lancet. Respiratory medicine*: Neuromuscular electrical stimulation to improve exercise capacity in patients with severe COPD: A randomised double-blind, placebo-controlled trial (Higginson)
- *Journal of Investigative Dermatology*: Promising results from a trial of a new stem-cell based therapy for a rare and debilitating skin condition recessive dystrophic epidermolysis bullosa (McGrath)
- *Lancet*: Metabolic or bariatric surgery may be more effective than standard medical treatments for the long-term control of type 2 diabetes in obese patients (Rubino)
- *Nature Immunology*: Adjuvanted influenza-H1N1 vaccination reveals lymphoid signatures of age-dependent early responses and of clinical adverse events (Hayday)
- Virtual 3D heart Researchers at King's College London have begun a new study to help improve surgery for newborn babies with a life-threatening heart disease called hypoplastic left heart syndrome (HLHS) using computational modelling (Niederer/Razavi)
- A 3D printed model of a patient's heart has been used by surgeons to help plan how to fix the heart. Researchers at King's College London have pioneered a ground-breaking technique whereby a 3D printer working from scans on the patient, creates a physical replica of a patient's organ. Dr Gerald Greil
- Preterm birth: Offering a standard biomarker test earlier in pregnancy could potentially help doctors to better identify women at risk of giving birth prematurely; also new app to help doctors predict risk of preterm birth (Professor Andy Shennan).
- The world's first medical device to detect shock and high blood pressure in pregnant women could cut maternal deaths in developing countries by up to 25%, saving more than 70,000 lives a year: the Microlife Vital Signs Alert (VSA) with a \$1 million grant from the Bill and Melinda Gates Foundation. The hand-held device measures blood pressure and pulse to calculate the impending risk of shock. It is designed for use in developing countries, where 99% of all worldwide maternal deaths occur. (Professor Andrew Shennan).
- Launch of breathelondon.org: A new public health website where people can plot low pollution routes to work has been created by air quality experts at King's College London (Frank Kelly).
- A wide range of outputs from the world-leading Institute of Psychiatry, Psychology and Neuroscience, including:
  - ❖ <http://www.kcl.ac.uk/ioppn/news/records/2016/February/Childhood-maltreatment-predicts-range-of-negative-outcomes-in-bipolar-patients.aspx>
  - ❖ <http://www.kcl.ac.uk/ioppn/news/records/2016/March/New-insights-into-reward->

[processing-could-aid-understanding-of-ADHD-and-addiction.aspx](#)

- ❖ <http://www.kcl.ac.uk/ioppn/news/records/2016/March/Scientists-pinpoint-molecular-signal-that-drives-and-enables-spinal-cord-repair.aspx>
- ❖ <http://www.kcl.ac.uk/ioppn/news/records/2015/december/Schizophrenia-associated-genetic-variants-affect-gene-regulation-in-developing-brain.aspx>
- ❖ <http://www.kcl.ac.uk/ioppn/news/records/2015/november/loPPN-research-drives-legislative-change-on-heroin-overdose-treatment.aspx>
- ❖ <http://www.kcl.ac.uk/ioppn/news/records/2015/October/New-research-offers-first-clinical-evidence-on-the-mental-health-toll-of-human-trafficking.aspx>
- ❖ [http://www.kcl.ac.uk/ioppn/news/records/2015/October/Treatments-offer-hope-for-Chronic-Fatigue-Syndrome-\(CFSME\).aspx](http://www.kcl.ac.uk/ioppn/news/records/2015/October/Treatments-offer-hope-for-Chronic-Fatigue-Syndrome-(CFSME).aspx)
- ❖ <http://www.kcl.ac.uk/ioppn/news/records/2015/September/Brain-cells-get-tweaked-on-the-go.aspx>