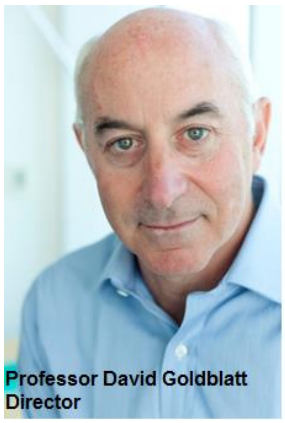
NHS
National Institute for Health Research

News from the NIHR Biomedical Research Centre at Great Ormond Street Hospital for Children NHS Foundation Trust and University College London

May 2015


Professor David Goldblatt
Director

Welcome to the May edition of our National Institute for Health Research (NIHR) Biomedical Research Centre (BRC) at Great Ormond Street Hospital (GOSH) for Children NHS Trust and University College London newsletter, which is designed to highlight our notable activity.

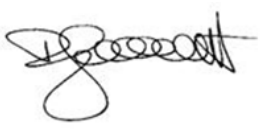
Our Special Feature this issue focuses on Her Royal Highness The Duchess of Cornwall's visit to The Arthritis Research UK Centre for Adolescent Rheumatology, which is a collaboration between the NIHR Biomedical Research Centre at Great Ormond Street Hospital for Children NHS Trust and University College London (NIHR Great Ormond Street BRC), and University College London Hospitals NHS Foundation Trust (UCLH).

The second visit of our International External Advisory Board (EAB) took place in March with the Board assessing in depth, two of our four themes. These important meetings are vital in ensuring that our NIHR Great Ormond Street BRC delivers its remit and for planning the strategy of the Centre going forwards (see General News for further details).

I am pleased to announce that BRC consultant, Professor Lucy Wedderburn, has been awarded an extension of her NIHR Rare Disease Translation Research Collaboration (RD-TRC) grant for her work on sub-phenotyping in juvenile dermatomyositis (JDM), a rare and serious autoimmune childhood disorder. The NIHR Great Ormond Street BRC currently hosts the NIHR Immunology RD-TRC which studies immunological rare diseases in partnership with UCL Hospitals BRC and NIHR/Wellcome Trust Manchester Clinical Research Facility.

Congratulations to Dr Ri Liesner, who has recruited the first global patient in a haemophilia study designed to evaluate the safety and efficacy of a recombinant fusion protein (Coagulation Factor VIII Fc Fusion Protein), sponsored by Biogen. This accolade is regarded by the NIHR, Department of Health and industry as the highest achievement in clinical research terms. Congratulations also go to Dr Anna Martinez for recruiting the first European patient into a Phase 3 trial investigating the use of SD-101 cream in patients with Epidermolysis Bullosa.

I hope you enjoy reading this newsletter and as always welcome any thoughts and contributions you would like to make. Please e-mail the BRC newsletter with any contributions.



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CONTENTS

SPECIAL FEATURE

The Duchess of Cornwall visits ground breaking research centre

Her Royal Highness The Duchess of Cornwall visited The Arthritis Research UK Centre for Adolescent Rheumatology, the world's first centre dedicated to understanding how and why arthritis affects teenagers.

The Centre, which opened in 2012, is a collaboration between NIHR Great Ormond Street BRC and UCLH and is funded by Arthritis Research UK and Great Ormond Street Hospital Children's Charity.

During the visit, The Duchess of Cornwall met Malaika, a 14 year old GOSH patient who was diagnosed with juvenile arthritis in 2011 and is working with the centre to develop a new mobile phone app to help other teenagers with the condition, as part of a range of support and information services being produced for young people. The Duchess of Cornwall was also shown immune cells under a microscope as part of a project defining how puberty and stress can affect the immune system and MRI scans which show how the progress of arthritis in teenagers is different to that of adults.

There are approximately 15,000 children and young people in the UK living with the pain caused by arthritis. Having arthritis as a teenager makes the physical, psychological and sexual changes teenagers go through more difficult.

Researchers at the Centre aim to understand why rheumatic diseases such as juvenile idiopathic arthritis (JIA) or juvenile systemic lupus erythematosus (JSLE) can be more severe in teenagers and why specific types of arthritis are more likely to occur in this age group. It is hoped that the research will lead to better treatments for teenagers and young people with the condition. Professor Wedderburn, Professor of Rheumatology at the UCL Institute of Child Health, NIHR Great Ormond Street BRC Consultant at Great Ormond Street Hospital and Director of the Centre said: "The Arthritis Research UK Centre for Adolescent Rheumatology is the world's first centre dedicated to understanding the very specific needs of young people who are growing up with arthritis. It was wonderful to have the chance to show The Duchess of Cornwall just some of our research which is focused on understanding why and how arthritis is different in adolescence, and what happens as the young people enter adult life. HRH was also able to meet some of our dedicated team who are working every day to dramatically improve treatment and care for young people living with these painful diseases."

The full press release can be read here.

GENERAL NEWS

International External Advisory Board visit - March 2015

On the 17th and 18th of March, the International External Advisory Board (EAB) visited the NIHR Great Ormond Street BRC. The focus of this visit was the two BRC themes, 'Diagnostic and imaging in childhood diseases' and 'Novel therapies for translation in childhood disease', led by Professors Neil Sebire and Francesco Muntoni, respectively. The aim of this 1.5-day visit was to assess the progress made within these themes over the past two and a half years and to determine the areas of focus for our reapplication in 2017. The overall feedback from the visit was very positive, with the Board indicating how impressed they were with the quality of the science and with the translational research being conducted at the BRC. The EAB members will visit again in early 2016 to review the remaining two BRC themes, and help shape the BRC's future strategy.

ProjectMatch

PROJECTMATCH

The NIHR Great Ormond Street BRC has recently supported the work of a trainee, Dr Jonathan Fisher, to develop ProjectMatch, an innovative online resource that aims to match potential trainees and researchers (clinician's, nurses or AHPs) with supervisors and research projects. This site uses the infrastructure of an 'online dating system' to match a trainee's preferences to available projects, which have been uploaded by supervisors. Trainees/potential researchers can specify things such as "area of interest" or "time commitment", and supervisors can create a profile detailing their research interests and upload multiple projects from one profile - each with its own taxonomy to help the matching process.

The system includes an internal "private message" function allowing initial contact between trainee and supervisor, which can then be taken further if desired. The aim of the site is to facilitate a successful research experience for a trainee, who, if correctly mentored and guided, could make a valuable contribution to development within their field.

ProjectMatch is a collaboration between Dr Jonathan Fisher and Dr Paul Winyard at UCL, Institute of Child Health (ICH) and has been met with much enthusiasm by the NIHR Infrastructure Team. It is currently being rolled out nationally to other NIHR centres, and further development is on-going to improve the matching complexity and usability.

How the role of the Clinical Research Nurse has changed - GOSH leads the way

Lorraine Hodsdon, Head of Nursing Clinical Research, was asked to contribute to a recent article in the Guardian on how the role of Clinical Research Nurses has changed as well as provide narrative for a NIHR clinical research nurse animation, both describing how research is core to care and as part of the patient's clinical care pathway, is everyone's business. At GOSH we now have over 40 Clinical Research Nurses working closely with Principal Investigators with the support of the Somers Clinical Research Facility (CRF). As part of Lorraine's role, she has responsibility for all the clinical research nurses based within the Trust as well as overseeing the allocation of staff to the most appropriate trials. In addition, she ensures there is as a structured training and development programme and the integration of research and clinical care. The NIHR Great Ormond Street BRC-funded Somers CRF is able to support GOSH/ICH staff undertaking clinical research, in particular early phase and experimental medicine trials. Contact Christy Rowley CRF Operations Manager for more details.

THEME NEWS

Molcular basis of childhood disease theme news

Rapid-WGS Programme

NIHR Great Ormond Street BRC-funded GOSgene facility is undertaking a Rapid-Whole Genome Sequencing (WGS) programme for neonates, which has now been tried-and-tested with the first patients to be selected in the next few weeks. The initial trial, utilising exome sequencing technology, confirmed the plausibility of the programme and allowed the development of the operating procedures required to bring this idea to fruition. The objective of this programme is to provide a rapid turnaround time (within 1 week) for the production of a whole-genome sequencing profile for very sick infants admitted to the Paediatric Intensive Care Unit (PICU) in the hope of further supporting treatment decisions through early diagnosis. This pilot will determine the feasibility of using whole-genome sequencing technologies and if successful it will hopefully form the basis for creating an NHS test at GOSH.

Whole exome sequencing identifies a novel *KCNQ2* mutation in a patient with vitamin B6-dependent epilepsy

Work carried out by BRC-supported PhD student, Emma Reid under the supervision of Professors Peter Clayton and Paul Gissen and Dr Philippa Mills, led to the identification of a *de novo* mutation in *KCNQ2* in a patient whose neonatal seizures showed a response to pyridoxine and who had a high plasma:CSF pyridoxal 5'-phosphate ratio, usually indicative of an inborn error of vitamin B6 metabolism. This work was conducted in collaboration with BRC-funded GOSgene and has been accepted for publication in the Journal of Inherited Metabolic Disease.

Whole exome sequencing was used to identify this *de novo KCNQ2* mutation in the patient. *KCNQ2* encodes a voltage-gated potassium channel and it is known that dominant mutations in this gene result in a range of epileptic disorders. The mutation detected in this child has been described in three other patients with neonatal epileptic encephalopathy. A review of the literature was performed to assess effectiveness of vitamin B6 treatment in patients with a *KCNQ2*-channelopathy. Twenty three patients have been reported to have been trialled with B6, in three of whom vitamin B6 treatment was used alone or in combination with other antiepileptic drugs to control seizures. The researchers hypothesised that the anticonvulsant effect of B6 vitamers may be more universal than thought previously and may be propagated by multiple mechanisms including; direct antagonist action on ion channels, antioxidant action on excess reactive oxygen species generated by increased neuronal firing and, replenishing the pool of pyridoxal phosphate needed for the synthesis of some inhibitory neurotransmitters. Whilst further work is required to understand these proposed mechanisms, vitamin B6 may be a promising adjunctive treatment for patients with channelopathies and the wider epileptic population.

Inheritance of most epilepsies is considered multifactorial, however some single gene causes are known, including the vitamin B6 dependent epileptic encephalopathies; pyridoxine dependent and pyridoxal phosphate-dependent seizures. Brain cells of children with these disorders have insufficient active vitamin B6. Their seizures are not controlled by antiepileptic drugs (AEDs) but stop immediately with large doses of vitamin B6. Whilst these are considered rare disorders, more common epilepsies can respond to treatment with B6 with several studies having reported the empirical use of pyridoxal phosphate as an anticonvulsant where treatment with AEDs has failed. In clinical practice, particularly in the Far East, vitamin B6 has been used to control seizures in infantile spasms and childhood generalised and focal epilepsy. The pathophysiology of these B6 responsive seizures has yet to be determined but they are likely to be genetically heterogenous.

Novel therapies for translation in childhood disease theme news

NEMO Study Research

In The Lancet Neurology, Dr Ronit Pressler and members of the NEMO consortium (treatment of NEonatal seizures with Medication Off-patent), reported the findings of the multicentre trial of the first anti-epileptic drug (AED) specifically developed for newborn babies, aimed at reducing brain damage.

Seizures are more frequent during the neonatal period than at any other time, but there are currently no effective treatments suitable for babies, who are at an increased risk of epilepsy and brain damage. Anticonvulsant treatment for neonatal seizure has not changed over the last 50 years and phenobarbitone remains the first line treatment worldwide, despite the fact that it is only effective in about half of all babies. This is in contrast to the development of nearly 20 new antiepileptic drugs for older children and adults. Reasons for this are ethical, logistic and financial difficulties of performing drug trials in newborn babies. With lack of evidence, effective treatments are potentially being withheld from this young age group.

Funded by an EU FP7 grant, the team at here at UCL, ICH and GOSH, along with other partners across Europe, tested how well a drug called bumetanide, safely used in babies as a diuretic for many years, prevents seizures in neonates that do not respond to standard therapy. 14 neonates were enrolled into the study; however the trial was abandoned ahead of schedule due to concern for possible increased risk of hearing loss and failure to achieve any benefit over the standard treatment of care.

While these findings proved negative in identifying a suitable alternative treatment for neonates with seizures, it highlights the risks associated with the off-label use of drugs in newborn infants before safety assessment in controlled trials. The team are now planning to evaluate the safety and efficiency of lidocaine in an international, multicentre randomised controlled trial to continue their pursuit for a second-line treatment in cases of neonate seizures not responsive to phenobarbitone.

Researchers Dr Ronjit Pressler and Professor Helen Cross are both supported by the NIHR Great Ormond Street BRC.

BRC supports research into *DYNC1H1*-associated Spinal Muscular Atrophy

Led by the NIHR Great Ormond Street BRC theme head, Professor Francesco Muntoni, Dr Mariacristina Scoto and colleagues published their research into the clinical spectrum of DYNC1H1-associated Spinal Muscular Atrophy in Neurology. Patients with this condition, due to mutations in the DYNC1H1 gene, were recruited from across the country to this study, here at GOSH and ICH. In collaboration with Dr Alexander Rossor at the National Hospital for Neurology and Neurosugery (NHNN) and Dr Matthew Harms (St Loius, US), this gene was sequenced in 30 cases from 16 families, leading to the identification of 10 new mutations. In addition, the researchers were able to conclude that the clinical presentation associated with mutations in this gene characterised by a neuronopathy affecting predominantly the lower limbs, was much more varied than had been previously found and included very severe cases, but also a number of children with a milder, lower limb weakness. This means that patients affected can present early on with multiple contractures at birth or later in life with minor motor difficulties prevalently related to the lower limbs (i.e. difficulty with stairs). The disease has a relatively stable course and generally patients that acquire the ability to walk remain ambulant. An association with learning difficulties has also been recognised in approximately one-third of the cases with behavioural characteristics resembling the ADHD disorder, although further studies are needed to clarify the role of DYNC1H1 in the CNS.

In the last few years many studies have focused on this gene and it's interaction with other genes leading to more prompt recognition of this disorder and ultimately a final diagnosis which can help patients/families understanding their difficulties and having a genetic counselling.

Gene, stem and cellular therapies theme news

Patients with severe form of immune condition are treated using gene therapy

NIHR Great Ormond Street BRC theme lead, Professor Adrian Thrasher and colleagues, including Professor Bobby Gaspar, Dr Karen Buckland, Dr Nourredine Himoudi, Dr Kimberly Gilmore, Dr Anne-Marie McNicol, Mrs Havinder Hara and Dr Christine Rivat, have developed a new therapy to treat patients with the most severe form of the immune condition, Wiskott Aldrich Syndrome (WAS). This treatment, published in The Journal of the American Medical Association, meant that children went from spending an average of 25 days in hospital in the two years prior to gene therapy to no days in the hospital after the treatment. It also allowed one child who was confined to a wheelchair to resume normal physical activities without the use of the chair.

Wiskott Aldrich Syndrome (WAS) is a genetic condition that affects between one and 10 children in every million worldwide and reduces their ability to fight infection. Symptoms may include bleeding episodes, eczema and other recurrent skin infections, and autoimmune disease although there is a broad spectrum of severity within the disease with some children being more affected than others. The most severely affected children often need to spend time in hospital.

The team gave a total of seven patients, recruited between here and Paris, gene therapy in order to treat their severe form of WAS and followed them for two years after receiving the altered genes. Six of the seven patients were doing well at last follow-up, their symptoms had disappeared and their immune systems had improved. In addition, none of the six patients had required hospitalisation over that period. This study demonstrates the feasibility of the use of gene therapy in patients with severe WAS, offering hope to patients for whom conventional treatments do not work. It represents an important first step in evaluating this treatment in clinical trials.

Professor Adrian Thrasher's work is supported by the NIHR Great Ormond Street BRC. Please click here for access to the full story.

Gene Therapy Trials for Netherton Syndrome

Gene therapy trials for Netherton syndrome, using genetically modified skin cells have recently opened. Netherton syndrome is an autosomal recessive multisystemic disorder characterised by a generalised congenital skin disorder, hair shaft abnormalities, atopic diathesis, and markedly elevated IgE levels. It is caused by mutations in a gene called SPINK5, which controls the formation of LEKTI, important for skin barrier function. Historically one in ten infants died before their first birthday. Currently there are no proven treatments to cure this condition.

The research team, led by Dr Waseem Qasim and Dr Wei Li Di, has developed an ex-vivo gene therapy approach to treat this disorder, using a disabled virus to carry a functional copy of the SPINK5 gene into skin stem cells. Proof-of-principle experiments have shown that researchers can restore the upper layer of the skin in skin grafts grown in the lab. Even if only a small number of cells are genetically modified to carry the corrected SPINK5 gene, there seems to be a correction over a wide area of the graft.

The trial, which has recently treated its first subject, involves grafting of autologous epidermal sheets generated from genetically modified skin stem cells. It is primarily a Phase I safety study but it is anticipated production and release of LEKTI protein from even a small patch of skin may be beneficial.

Diagnostics and imaging in childhood diseases theme news

BRC collaboration with UK biocentre

Life Study is the largest and latest of the UK's internationally renowned birth cohort studies. Led from the ICH (UCL) by Professor Carol Dezateux, it aims to create a unique resource – linking both survey data and environmental and biological samples, to address future questions on early life origins of disease, health and wellbeing and child development.

A major focus of Life Study is to gain an accurate picture of contemporary children's lives; to support this the Life Study team are working in partnership with NHS Trusts to open dedicated Life Study Centres in diverse communities and to enable recruitment of mothers during pregnancy. As part of the study a range of biological samples are collected from mothers, partners and their babies at each appointment and at birth – these include parental blood and urine, placenta and baby urine. The placenta samples will form a unique biobank and will support research and discovery science of novel genetic, epigenetic and inflammatory biomarkers in relation to children's health and development from a life course perspective.

The Life Study team are delighted to be working with NIHR Great Ormond Street BRC Theme lead Professor Neil Sebire and his colleagues in histopathology at GOSH to develop the methodology and protocols to process and store high quality placental samples. They are also providing expert advice to establish the tissue-processing service at the NIHR National Biosample Centre at Milton Keynes, following procurement of UK Biocentre as the Life Study biorepository partner. Professor Sebire and his team will provide an interim onsite tissue-processing and storage service for Life Study until December 2015.

For more information on Life Study please visit www.lifestudy.ac.uk.

The RAPID programme

The RAPID (Rapid Accurate Prenatal non-Invasive Diagnosis) programme, led by Professor Lyn Chitty, is a NIHR-supported project designed to develop the standards required to implement non-invasive prenatal testing (NIPT) using cell free DNA in maternal plasma. This new technology allows safer prenatal testing by taking a maternal blood sample to analyse the cell free DNA which circulates in the mother's blood. As such the need for invasive testing, which carries a small risk of miscarriage, is reduced.

This project is transforming the way that prenatal diagnosis is offered to families at high risk of genetic disorders. Research by the RAPID team has shown that women who have had non-invasive prenatal diagnosis (NIPD) for monogenic disorders, parents at risk of monogenic disorders and health professionals all welcome the additional safety achieved through decreasing need for invasive testing, earlier availability and potential for improved access that NIPD brings. In the UK, our Regional Genetics Laboratory at GOSH provides the largest prenatal diagnosis service for monogenic disorders. An audit of the service in January 2015 led to the finding that 32% of all diagnostic prenatal molecular tests were being done using NIPD, allowing many women to have prenatal diagnosis with no need for an invasive test.

We are also evaluating NIPT for aneuploidy in the NHS. Having developed this test in our Regional Genetics Laboratory at GOSH, we have now completed recruitment and a report is being presented to the National Screening Committee in June 2015, when they will decide if, how and when to implement this new test into the NHS maternity care pathway. In the meantime, we are now offering NIPT for aneuploidy through our NHS Regional Genetics Laboratory on a Trust to Trust basis.

The success of the RAPID programme demonstrates that experimental medicine research at GOSH is leading to better clinical outcomes in the NHS. The success of the RAPID Programme has been due to the

overwhelming support from over 40 centres UK-wide who are supported by NIHR Local Clinical Research Network (LCRN)-funded research support staff, as well as some key collaborations across UCL. The NIHR Great Ormond Street BRC continues to support this programme with staff, infrastructure and laboratories.

PATIENTS AND THE PUBLIC

Rare Disease Day 28 February 2015

GOSH and the UCL ICH invited children, their families and staff members to celebrate Rare Disease Day.

A stall was set up in the Lagoon on 27 February and participants were invited to hand paint the Rare Disease Day logo on canvas and meet researchers. The event was supported by the NIHR Rare Diseases Translational Research Collaboration and attracted lots of children and families, many affected by a rare disease, who were keen to hear more about the research being carried out into this area and get messy with paint!

Parent/Carer Research Advisory Group

We're looking for parents/carers who have a child with a health condition to help us improve research into child health. GOSH and the UCL ICH are setting up a group with parents and carers to improve the quality of research. No specialist knowledge in health or research is needed as we will provide training and support to help with getting involved. Parents/carers can help us by either attending meetings or getting involved from home.

If you're interested in finding out more, please contact Ruth Nightingale (Joint Lead for Patient and Public Involvement and Engagement in Research).

Research Awareness Week

To celebrate International Clinical Trials Day, NIHR Great Ormond Street BRC staff held our second Research Awareness Week this week with a variety of activities for patients, their families and staff to raise the profile of the research at GOSH and showcase examples of the work we do. Events included a Research Trail around the hospital with several departments participating with Superman's muscle lab, 3D face scanning and heart modelling to try out. Seminars were organised throughout the week to encourage staff to find out how to participate in research, led by Dr Kate Oulton and Professor Lucy Wedderburn presented 'Children have arthritis too – how medical research can help'. NIHR Great Ormond Street BRC supports the 'Health Innovators Programme' and UCL Business (UCLB) led a presentation on how this programme can support staff in developing their ideas for social ventures.

If you are interested in being involved in research communications or have any ideas about raising the profile of research in your area please, contact Nicola Logue.

TRAINING

GOSH features as leading BRC for nursing and AHP training and support

Dr Kate Oulton, NIHR Great Ormond Street BRC Clinical Academic Programme Lead for Nursing and Allied Health Professional Research at the Centre for Outcomes and Experience research in Children's health, Illness and Disability (ORCHID) recently contributed to 'Training Health Researchers', the first report form the NIHR infrastructure training forum. One of the key aims of the training forum is to attract individuals from varied backgrounds, especially those who are under-represented in academic health research and commit to building their careers. At NIHR Great Ormond Street BRC, Kate leads the strategy to develop a new cadre of academic nurses and allied health professionals and in the report describes the focus on enhancing the local academic research structure to make the clinical research career pathway for nurses and AHP's a more attractive choice for those employed at GOSH.

NIHR Doctoral Support Training Funds

Congratulations to the 10 trainees who have been awarded Doctoral Support Training Funds to support their PhD research. The NIHR Great Ormond Street BRC Doctoral Training Support Fund provides consumables funding for translational clinical research/experimental medicine projects being undertaken by PhD students within GOSH and ICH. In total, we received 45 applications, which exceeded all previous calls for this support fund. It is anticipated that another call for funding will be advertised early next year.

Research Internship opportunity for nurses/AHPs

Congratulations to Latifa Chentouf and Maneet Saini who have both successfully secured research internships hosted by ORCHID and funded by the NIHR Great Ormond Street BRC. These internships are designed to provide adequate training to allow the intern to prepare a NIHR Doctoral Research Fellowship application ahead of January 2016 deadline. This Doctoral Fellowship offers '3-years full-time funding' to undertake a PhD and it is expected that successful applicants will become independent research leaders within six to 10 years of completing the fellowship.

Barriers to research - Have your say

Thank you to everyone who took the time to share their views on GOSH being a research hospital. We received a fantastic 629 completed questionnaires! With the help of the audit team we have started analysing the results and will be sharing the findings soon. Those of you who asked to be contacted by a member of the ORCHID team can expect someone to make contact in the coming weeks. Well done to Daniela Hearst who was randomly selected to win £200 shopping vouchers.

ORCHID drop-in - do you have a question about research?

orchid
Centre For Outcomes And Experience Research In Children's Health, Illness And Disability

Do you have a question about research but are not sure where to start? The Centre for Outcomes and Experience Research in Children's Health, Illness and Disability (ORCHID) offers drop in clinics every Tuesday 12-2pm, Level 4 Barclay House. Advice on project design and opportunities within clinical academic careers is available. For more details on how ORCHID can support you research, please contact Dr Kate Oulton.

EVENTS

Translation of Research into Practice Conference: Friday 19 June 2015

The Centre for Outcomes and Experience Research into Children's Health, Illness and Disability (ORCHID) is holding a conference in conjunction with the NIHR Great Ormond Street BRC and London South Bank University (LSBU) entitled, 'It's the translation of research into practice that counts: examples from nurses and AHPs'. Friday 19th June, Leolin Price Lecture Theatre, ICH. This event is free, however booking is essential. Please follow link for further information and to book your place.

The Big Bang London: Wednesday 01 July 2015

We will be running workshops with school students at the Big Bang London Central at Westminster Kingsway College, just around the corner from GOSH. This event hosts a range of activities to inspire young people from all backgrounds with the potential of science, technology, engineering and maths.

Through running a series of mock clinical trials – using chocolate for pills – we will help young people from London schools to learn about clinical research and how we make sure medicine and other health treatment are safe and effective. More information can be found on the Big Bang website.

Our mailing address is:
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UCL Institute of Child Health | 30 Guilford Street | Bloomsbury | London | WC1N 1EH
www.gosh.nhs.uk/research-and-innovation