

# twinsUK newsletter

December 2018

## WELCOME!

Welcome to the annual TwinsUK newsletter.

We have lots to update you on this year, including plans for the next three years of TwinsUK's research, news about upcoming studies and our top research from 2018.

We have had a very successful and busy 2018. With your help, we have been setting up and starting our ground breaking new nutrition study PREDICT which will recruit 1000 participants by April 2019. We have also run several smaller studies and continued publishing numerous research papers into the genetic and environmental causes of disease.

Thank you for your continuing support and dedication to our research.

Best wishes,



Professor Tim Spector



## WELLCOME TRUST FUNDING RENEWAL

As you may know TwinsUK's research is funded by grants from research councils and other charitable organisations. One of our main funders is the Wellcome Trust. We apply to renew our funding every few years in line with the Trust's funding cycles. We are delighted to announce that we have recently secured core funding for the next three years, which means that we can continue our research into genetic and environmental causes of disease in twins. Applying for grant funding is a lengthy undertaking involving many of our staff. We are thrilled that our hard work has paid off.

As part of our grant renewal, we are making plans for a number of essential new initiatives, which will help us secure further funding in the future. One of the key initiatives is to work more closely with other UK cohort studies such as TEDS (Twins Early Development Study), ALSPAC (Avon Longitudinal Study of Parents and Children) and UK Biobank.

The UK is world renowned for its cohort studies, with some of the longest running studies in the world still ongoing. We will work with colleagues to undertake biosocial phenotyping. This means combining the health data we collect with social data. For example, we plan to start a new project where we will incorporate social science questions into our questionnaires, to increase the social science component of TwinsUK and to align ourselves with the types of data other cohorts collect. We will also be working on ways to combine health, social and environmental data.



NEW STUDIES · NEW STUDIES · NEW STUDIES



## TWOBIOME: OUR NEW PILOT STUDY OF WOMEN EXPECTING TWINS

Dr Jordana Bell, TwinsUK Senior Lecturer, in collaboration with Women's Health at King's College London, has just begun a small but very exciting pilot study looking at the late pregnancy health of women expecting twins and the early life health of the children. The study, called Twobiome, will recruit twenty women expecting twins from St Thomas' Hospital maternity department. This is the first time that TwinsUK will study twin babies and children and we are delighted that the study has now started.

As well as collecting biological samples such as blood and stool from the mother, cord blood, placenta, and stool samples from the babies, the study will help us find out how best to approach pregnant women about taking part in research both during their pregnancy and following the birth of their babies. We hope that this pilot will pave the way for a large-scale study as its aims fit well with our plans to extend TwinsUK research to twins under 18 years of age in 2019.

If you haven't been for a visit for four years and would like to arrange one, please contact us

 020 7188 5555  [twinsuk@kcl.ac.uk](mailto:twinsuk@kcl.ac.uk)



## PROJECT KEEPING TOGETHER - A HOME-BASED STUDY

We recognise that not all of our twins are able to carry on coming for research visits, so in the past few months we have been piloting a new home-based study called Project Keeping Together to help you continue to take part in our research. If you take part in this study, we will send you a postal box containing questionnaires and biological sample collection kits. If you are eligible to take part, we will contact you in the next few months.

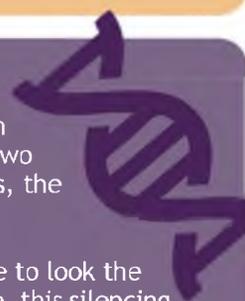
Following this pilot, we are hoping to extend the postal box idea to newly registered twins. Around 300 twins join TwinsUK each year but we are not always able to bring them in for research visits straight away. We want to collect valuable data and samples as soon as possible from new twins, so we want to start sending out postal boxes to collect basic information. If you have joined TwinsUK but not been invited for a twin research visit, we will contact you about the postal box in the next six months. Going forward, we will offer new twins either a research visit or this home box.

## THE GENETICS OF X CHROMOSOME INACTIVATION IN WOMEN

TwinsUK Senior Lecturer and geneticist Dr Kerrin Small has secured funding from the Medical Research Council to further our research into genetics and ageing by studying X-inactivation. Females carry two X chromosomes and males carry one X and one Y chromosome. X-inactivation means that, in females, the body silences one of the X chromosomes in every cell so that only one of them can switch genes on.

This silencing - that is, which of the X chromosomes is inactive - is mostly random, so that if you were to look the whole body, on average each chromosome would be silenced 50% of the time. However, as females age, this silencing starts to become skewed, with a preference to one of the X chromosomes. In women over 60, around 35% have the same X chromosome silenced in more than 90% of their cells. We do not yet know why this skew happens, but it is associated with diseases such as cancer and autoimmune diseases. We also know from twin-studies that this skew is heritable. Interestingly, some genes on the silenced (or 'inactive') X chromosome in fact stay switched on - they escape inactivation. It is thought that these escaped genes could explain differences in disease between men and women.

Using existing blood, fat and skin samples, Dr Small and her team will investigate how our genes and our environment influence the skew in X-inactivation as we age, how inactivation varies in different tissues, and the implication for developing cancer and other diseases. They will also sequence genes on the X chromosome to find out which ones escape silencing, and how this varies with age. The team hopes to find out if we can use X-chromosome silencing as an indicator of healthy ageing and predict disease in women.



## PREDICT - OUR PERSONALISED NUTRITION STUDY

PREDICT is our personalised nutrition study investigating how and why individuals respond differently to normal meals. The study started in June with the aim of recruiting 1000 participants by April 2019. At the start of November, we passed the 500 mark meaning we are well on track to reach our target - thank you very much to all who have taken part so far.

If you are aged 18 to 60 and regularly use a smartphone, you may be eligible to take part in PREDICT. If we have not yet contacted you about the study, please call +44 (0) 207 188 5555 or email [twinsuk@kcl.ac.uk](mailto:twinsuk@kcl.ac.uk).



## COLONOSCOPY STUDY

Earlier this year we ran a study that used colonoscopy and stool samples to characterise the gut microbiome of twins. In this study, funded by the Medical Research Council, we recruited twin pairs who had previously donated stool samples in our Flora Study to come for a twin research visit and have a colonoscopy as well as have some small tissue biopsies taken from the colon.

Using the colonoscopy data, biopsies and stool samples, the study aims to find out how heritable the human gut microbiome is and to understand how it is linked to an individual by comparing variation in the microbiome, human genetics and metabolism. We will also look at links between microbiome variation and human disease.

We have now finished collecting data for this study, with a remarkable 100 twin pairs having taken part. It is testament to the dedication of our twins that over 200 of you came for such an intensive research visit. Thank you very much for all those who took part. We hope to be able to share results of this study in 2019.

## OUR KEY 2018 RESEARCH RESULTS

### MORE THAN A HUNDRED GENES DETERMINE HAIR COLOUR

Earlier this year our Senior Lecturer Dr Pirro Hysi and a group of researchers from Kings' College London and Erasmus MC University Medical Center Rotterdam discovered 124 genes that play a major role in human hair colour. The study is the largest of its kind, using DNA data and self-reported hair colour information from nearly 300,000 people.

Previous studies have found that much of the variation in human hair colour is down to genetics, with around a dozen known genes, but this study largely completes the knowledge gap of which genes control hair colour. Around 100 of the genes the team discovered were not previously known to contribute to pigmentation. These new genes have also allowed the team to predict hair colour much more accurately than before.

The study is the largest genetic study on pigmentation ever undertaken and could advance our knowledge of diseases that are linked to pigmentation, such as skin cancer. The results could even be applied to forensic science.



### GENES AFFECT FAT DEPOSITION AND TYPE 2 DIABETES RISK

Back in April, our Senior Lecturer Dr Kerrin Small and her team published research building on their previous research that identified a variant of a gene called KLF14 that affects where fat is stored.

Using biopsy and blood samples from 856 female twins, fat biopsies from the Oxford BioBank and genetic data from the UK Biobank, their latest study found that variations of the KLF14 gene also makes it harder to generate new fat cells, leaving carriers of the gene with fewer, larger fat cells that are less efficient. These less efficient fat cells reduce the body's sensitivity to insulin and suggests that there is an increased chance of developing Type 2 diabetes.

Even more strikingly, these effects are specific to females; the researchers found that the gene only acts in women who inherit the diabetes-associated version from their mother. These women had around a 30% higher chance of developing diabetes than those without the diabetes-associated version.

These exciting results mean that we now have such a detailed level of understanding of this variant of the KLF14 gene that we know where and how it acts in the body as well as who it acts in. The team hope that these results will allow them to understand why the gene variant only affects women's chance of developing diabetes so that they can help develop better prevention and treatment options.

### RESEARCHERS IDENTIFY THREE NEW GENES THAT CAUSE CHRONIC BACK PAIN

A team of researchers from around the world, led by TwinsUK's Professor Frances Williams, has discovered three new genes linked to the development of chronic back pain. In a huge study of 440,000 people, ranging from 50 to 76 years old, the team studied the whole genome to look at genes that contribute to chronic back pain. They discovered that the genetics of back pain is very complex, with numerous different genes having an effect; however a group of three genes had a noticeably bigger effect.

The researchers had thought they would find that pain-related genes would be the main genes associated with chronic back pain. However, they instead found that the strongest link was with three genes involved in bone and intervertebral disc development. Crucially this suggests that degeneration of the spine influences chronic back pain, which is in line with previous TwinsUK research showing that spine degeneration predicts back pain episodes.

Spine degeneration is something that happens to us all as we age. The team hopes that further research into the three new genes will enable them to target new treatments to slow down the ageing process in the spine and therefore prevent long-term back pain.

### CDRF LEGACY GIFTS AND DONATIONS

Donations and legacy gifts are important decisions that can have a positive impact while supporting our valuable work. If you would like to consider leaving money in your will to directly fund research at the Department of Twin Research, please visit the Twin Zone website <http://www.twinsuk.ac.uk/twinzone/support-us/> for more information or contact [info@cdrf.org.uk](mailto:info@cdrf.org.uk).



## MEET THE CLINIC TEAM

Our eight strong clinic team are front and centre at TwinsUK, seeing all our volunteers for their twin research visits week in, week out. We thought you might like to know more about who they are!

The team is currently led by nurse Alyce Sheedy, an intrepid Australian who has visited 29 countries and counting. Alongside Alyce is Johanna Honey, also a nurse, and our longest standing clinic team member (except for Ayrun!) with us for over 5 years. Johanna has a talent for baking - everyone at TwinsUK loves her delicious cakes!

Nurse Angela Clifford hails from Germany and is a brilliant champion for sustainability at TwinsUK. Maxine Smith has been with us for two years and has an incredible 15 years of research experience. Interestingly she knows nurse Deeqa Ahmed (sadly missing from the photo above) from a previous research role so the two have been reunited at TwinsUK.

Marisa Hernandez is our resident coffee and brunch fan. She is Spanish but does not like hot weather, so this summer's heatwave was a struggle!

Our two final team members are Shukri Noor and Bridget Castles. Shukri is a skilled seamstress having made dresses for her friends. Bridget, a nurse, is the newest member of the team, having just arrived from Brisbane in Australia.



## PROFESSOR TIM SPECTOR CELEBRATES A BIG BIRTHDAY

Back in July our Director Professor Tim Spector celebrated his 60th birthday. Tim has dedicated an incredible 30 years of his life to genetic research, and over 25 years to twins. As our founder, we could not have done it without him. Here he is with his microbiome themed cake at the TwinsUK staff summer party.



## AYRUN'S BABY

If you have been a regular volunteer with TwinsUK, you will definitely have met our Clinical Operations Manager Ayrun Nessa who has led our clinic team for over 10 years.



If you have been to visit us in the past couple of months however, you may have noticed Ayrun has not been around. This is because she recently gave birth to a baby boy. Here is a photo of baby Ayman. Congratulations to Ayrun and her husband!

## PLANS FOR OUR CLINIC VISITS IN 2019



Now that we have secured further Wellcome Trust funding, we are busy making plans for our twin research visits in the next three years. From April 2019, once the PREDICT study is complete, we will re-introduce our longitudinal follow-up research visits so that we can continue data and sample collection for our research into genetics and ageing.

We also want to continue our new visit format of dynamic nutrition studies, similar to PREDICT.

## MERRY CHRISTMAS!

Finally, we would like to wish all our twin volunteers a very Merry Christmas! We hope you all enjoy the festive season and we wish you all the best for the New Year.



### CHANGE OF DETAILS?

If we don't have your current email address or to update your contact details, please email [twinsuk@kcl.ac.uk](mailto:twinsuk@kcl.ac.uk) with your full name and date of birth or call 020 7188 5555

Department of Twin Research,  
St Thomas' Hospital, Westminster Bridge Road, London SE1 7EH  
Tel: 020 7188 5555 | Email [twinsuk@kcl.ac.uk](mailto:twinsuk@kcl.ac.uk)

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