



Twin Research &

Genetic Epidemiology Unit

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NEWSLETTER AUTUMN 2006

The Twin Research Unit is supported by The Wellcome Trust, Arthritis Research Campaign, British Heart Foundation, Chronic Disease Research Foundation, The Guide Dogs for the Blind Association and the European Commission (GenomEUtwin, EuroClot and MolPAGE projects)

Welcome

This year has been an exciting and important one at the Twin Research Unit (TRU). We are coming to the end of our main project (TwinsUK) and had our most successful twin party ever in July (pictured right) with over 700 twins and coverage in the Times, the Mail and on BBC1's City Hospital. Last month City Hospital also filmed a twin visit and spoke to Usha Chinappen-Horsley, a PhD student at the TRU, about her exciting research on osteoporosis, and Dr. Lynn Cherkas, our genetic analyst, about the importance of twin research. With your help the media is recognising the unique contribution that our twin research is making to medical advances.

Currently the TRU is involved in research projects that range from hunting for genes that cause osteoporosis and arthritis, to finding out what influences aging as well as studies on the heritability of personality and musical ability. We are particularly excited about our research on aging which involves measuring telomere lengths (the ends of chromosomes) and we have already found a connection with



smoking, obesity, exercise, and socio-economic status. This research is hugely important and we have had several publications in high-profile scientific journals. We have summarised our telomere findings in the 'Breaking Scientific News' section on page three.

With this newsletter we are enclosing a new questionnaire asking about your general well being and emotions. This is vital research since we now know that our health is influenced by life events and how we cope with them.

We do appreciate you filling in the questionnaire - and as a thank you, we will enter all questionnaires returned by Monday 11th December into a draw to win one of 10 prizes of £25 M&S gift vouchers—just in time for Christmas!

If any of your contact details have changed please let us know immediately so we can update our records. When contacting us by email please quote your study number. If you do not know your study number please give your full name and date of birth so we can locate your details.

A big thanks to all those who have participated in a twin visit recently and also to those due to come in. We see around 20 pairs of twins each week and forward clinical information from your twin visit to both yourself and your GP. This includes cholesterol level, blood type, bone density, ECG and eye test results, blood pressure and glucose levels - a great health-check not available on the NHS, I am sure you will agree! A number of twins have told us that this medical information has literally been a lifesaver. If you would like to come for a visit, please call the Admin Team on (0207) 188 6759 / 6764/ 6 7 6 0 o r e m a i l twinrecruitment@gstt.nhs.uk.

Our other news is that on 1st September 2006 the TRU transferred from the NHS to King's College London (KCL) to reflect our increasing contribution to academic research. You will not experience any change. We will continue to be based at our current location in St Thomas' Hospital and there will be no change in the research visit or the staff — just to our letterhead!

Lastly, we are always appreciative of your participation in our studies. It is a unique opportunity, that few people in the general population have, to contribute so much to science, medicine and future potential therapies for common diseases.



Best Wishes for a happy and healthy 2007

Tim Spector

Current Studies

TwinsUK

We are now into our 3rd and final year of the TwinsUK project which is sponsored by the Wellcome Trust. This project aims to create a "twinbank" of DNA to expand research into genetic and environmental traits of common diseases. We have now seen over 4000 twins and are always looking for more volunteers.

To find out more about this study simply visit our website at www.twinsuk.ac.uk or call our admin team to book an appointment. If we have recently contacted you about the study please do let us know whether or not you can attend a visit.

MRI & Back Pain Study

Dr Frances Williams, our Senior Research Fellow and Consultant Rheumatologist is directing an Arthritis Research Campaign-funded project to look at changes in spines over 10 years using MRI scans.



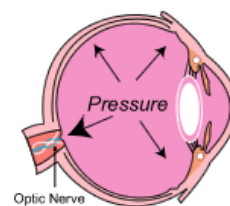
She says "Thank you to all involved in the original study ten years ago. We know that lying in the scanner was boring and noisy, however for those of you who participated, we need your help to continue the project with one further scan. We will compare the two scans and learn about what causes back pain. Our new scanner is much quieter and quicker, and based at a new

private hospital - you can even bring your own choice of music to play through headphones to pleasantly pass the time!" If you participated in the original MRI study we will be contacting you shortly to arrange another scan and hope to see you soon!

Dr Williams' research has already yielded important results. She found that small herniations (protrusions) of part of the vertebral disc (called Schmorl nodes) that are clearly visible only by MRI, are associated with degenerative change which causes back pain, but they do not cause back pain on their own. More results like this will be hugely important in the field of preventing and treating back pain.

Eye Study

We are asking twins who participate in the TwinsUK study to take part in our eye study. Dr. Chris Hammond is currently investigating the cause of glaucoma (study funded by The Guide Dogs for the Blind Association) and cataract formation.



Glaucoma causes blindness by damaging the optic nerve and is the second most common cause of blindness. Increased pressure in the eye is a risk factor, but even people with normal pressure and no other symptoms can lose vision to glaucoma. With your help we may find the cause of glaucoma, the first step to finding a cure. Your participation in eye studies has already helped us in the search for genes involved in short sightedness (funded by the Wellcome Trust).

~ Breaking Scientific News ~ Telomeres and Aging by Dr. Juliette Harris

Why do we age? Our chromosomes may contain the answer. DNA, our bodies' instruction manual, is packaged into chromosomes to avoid damage. If you think of chromosomes as shoelaces, then telomeres are the plastic tip, designed to protect our chromosomes from fraying at the ends. We all start life with nice long protective telomeres, but every time our cells grow and divide the telomeres get shorter. It is thought that at a critical point the telomeres are so worn down that they stop protecting our chromosomes. At this point the cells have 'grown old' and may cease to function. We know that cells that have been bombarded with toxins divide faster and faster. It is thought that this increased turnover wears down the telomeres leading to 'aged cells' at an accelerated rate.



The big questions are 'Is the aging process driven by the length of our telomeres?' 'If we are young (in years) but have short telomeres does this mean that our bodies ability to function is more advanced in years than our real-time age?' 'Are there life-style factors that shorten our telomeres that we can avoid?'

Here at the TRU we measured telomeres and collected details on smoking history, weight and physical activity levels on over 2000 female twins. We found that obesity, smoking and lack of exercise are associated with shortened telomeres, possibly causing faster aging. We also found that people with a lower socio-economic status had shorter telomeres, and this was not because of smoking, weight, diet or lack of exercise. We suggested that this might be linked to stress and depression and are researching this further. Finally we have found that people with arthritis had shorter telomeres than people without arthritis, leading us to think that arthritis may represent a form of aging. Other researchers have linked dementia, heart disease, high blood pressure and some forms of diabetes to shortened telomeres.

All these studies suggest that either shortened telomeres directly cause aging; or they are a by-product, a 'marker' of the aging process, but don't directly cause it. It is clear that we still have a lot to learn about the relationship between aging and telomeres, but thanks to you we have already published 6 telomere-related papers. Without a doubt, your participation in the research is leading the way to new knowledge which will hopefully help us to advise people on the best way to lead happy, healthy and long lives with long telomeres!



EuroCLOT and MolPage Studies: Funded by European Commission FP6 Programme



The TRU is coordinating a large Europe-wide study, EuroCLOT, to discover the genes associated with the clotting process and to investigate how changes in these genes may lead to stroke. We hope that identifying these genes will provide potential new drug targets for the prevention or treatment of early stroke. In the UK, we have collected the blood, medical and life-style information of over 2500 twins. This was a huge effort and thanks to both twins and staff alike.

Molecular Phenotyping to Accelerate Genomic Epidemiology (MolPage)



MolPAGE is a 4-year project to identify very early signs of diabetes so that treatment and prevention can be more effective. The TRU is involved in collecting fat biopsies from 40 identical twin pairs who have been seen twice and 20 non-identical twin pairs who have been seen once. Thank you to all those who have participated.

Pain Perception Study

As part of the TwinsUK study visit we will be assessing individual

perceptions of pain. In a brief assessment we will measure perceptions of heat sensations and other measures. These tests cause minimal discomfort yet provide enormous insight into the biological mechanisms determining why and how we feel pain. In addition it may enable us to search for different genes associated with the pain perception pathway which in turn could provide useful information on how to develop medications which are more effective at relieving pain. Identifying differences between people in their pain-perception genes could lead to more tailor-made medications rather than the one-size fits all approach to prescribing medication that is currently in practice.

Dietary Supplements Study

We are starting a new study to identify the genetic variations that influence an individual's response to dietary supplements including vitamins and minerals.

Twin Recruitment

We need more identical and non-identical (same sex), male and female twins to volunteer for our research. If you know of twins aged 16 or over who are not yet registered with us please pass on our recruitment telephone number to them: 0207 188-5555 or email twinrecruitment@gstt.nhs.uk

Recent TRU findings

Body Odour

Odours of identical twins (but not non-identical twins) can be matched by human non-twin sniffers at rates better than chance, even when the twins are living apart. These results indicate an important genetic influence on body odour.

Osteoarthritis

Eight genes have been identified as playing a major part in the development of osteoarthritis. In a press release Professor Spector said "Our findings will help in the development of diagnostic genetic markers to predict the risk of developing knee osteoarthritis and its rate of progression. These genes can now be pursued with confidence to uncover new mechanisms that could lead to new drugs".

Entrepreneurs

Genes are crucial in determining whether we are entrepreneurial and

likely to become self-employed. Nearly half (48%) of an individual's tendency to become self-employed is due to genetic factors probably linked to personality traits like extroversion and risk-taking behaviour. According to the research, contrary to previous beliefs, family environment and upbringing have little influence on whether a person becomes self-employed or not. This study was widely reported in the national newspapers.

Sportsmanship

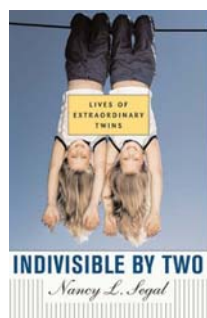
Women's second to fourth finger length ratio (2d:4d) has a substantial genetic component to its inheritance and a long ring finger is significantly associated with sporting ability!

Eye-sight

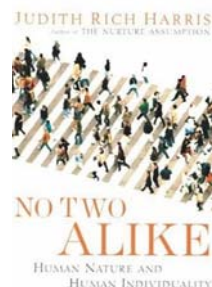
Genetic background is an important determinant of macular pigment optical density which is an indicator of age-related macular degeneration (ARMD).

Twins in the news

New Books on Twins



Indivisible by Two: Lives of Extraordinary Twins; Nancy L. Segal. Published by Harvard University Press (13 Sep 2005). ISBN:0674019334



No Two Alike: Human Nature and Human Individuality by Judith Rich Harris. Publisher: W W Norton & Co Ltd (27 Feb 2006). ISBN: 0393059480

Legislation

The Twin Bill in the US allows parents to determine same or separate placement of their multiple birth children within the classroom. Minnesota passed the first twin bill in 2005!

Attitudes

American scientists recently reported a provocative twin-based analysis of political attitudes and orientations. Differences between the responses of identical and non-identical twins suggested a small heritable component to political leanings. The authors of the study suggest that subtle genetic factors may underlie personality traits which may affect political attitudes.

Politics

The Kaczynski brothers are the world's only twins to hold the two highest posts in any country. Lech Kaczynski (pictured left) is the president of Poland and in July of this year appointed his identical twin brother, Jaroslaw (pictured right) to be Poland's prime minister!



We hope you enjoyed this newsletter. If you have any questions you would like us to address in future issues, please let us know.