



Twin Research &

Genetic Epidemiology Unit

St Thomas' Hospital TwinsUK

Newsletter Winter 2004/05

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Welcome

Hello everyone. As you will see 2004 was an extremely exciting year for the Unit and 2005 promises to be even busier. We were awarded a record number of grants last year and we are now looking to recruit many of you for these new and interesting studies. We were particularly pleased to receive large grants from the Wellcome Trust and the European Commission; the latter involves coordinating a heart disease project incorporating six European countries including twin groups in Sweden, Italy and Finland.

We have certainly expanded our horizons in the past year as we have also been involved in GenomEUtwin; a study that involves eight countries pooling their data on a range of traits including migraine, height, weight and blood pressure. By pooling data we have had more power to identify the genes involved and results are very promising.

On the home front, TwinsUK is a nationwide survey that aims to



see all of you in the next couple of years and is already going well. In 2005 we are holding a series of Twin Days throughout the UK so that we can visit you, instead of you travelling to London (see flyer enclosed). Many of you will have seen the press coverage from one of these days, which we held in London last summer.

As always, our statisticians have been very busy analysing the data collected from your visits to the TRU and from your numerous questionnaires. We are, as always,

extremely grateful for your co-operation and you will no doubt be relieved to see there is no questionnaire with this newsletter! We have had a number of papers published in high-ranking scientific journals as well as plenty of media coverage of our studies in a wide variety of areas relating to disease, habits and behaviour. You can read about them in this newsletter.

Best wishes,
Tim Spector



What is it like being a twin?

Since the St Thomas' Twin Register was started over 12 years ago you, twins, have answered innumerable questions about your health and lifestyle in order to help us in our research investigating the importance of genes and environment in clinical traits. However, being a twin myself (with a non-identical twin sister), I have always been interested in the nature of the relationship between twins. So, in the latest questionnaire I also included some questions about your relationship with your twin, which I hope you enjoyed answering. Now I thought you would be interested in the results!

Overall, half of you felt that neither twin dominates the other when you are together. However, among the other half, birth order appears to influence your relationship. Although only a minority of you admit to dominating your twin, first-born twins within a pair were significantly more likely to consider they were the dominant twin (21%) than were second born twins (only 12%). However, nearly two in five (40%) of second born twins feel their twin dominates them when they are together, compared with 28% of first-born twins who feel this way, so - as you can see - both twins in a pair did not necessarily perceive the balance of their relationship in the same way! These findings were the same for both identical (MZ) and non-identical (DZ) twin pairs.

As you have grown older, a quarter of you (23% overall) feel that you and your twin have become more similar, although this proportion is higher in non-identical (27%) than identical twins (19%). A similar proportion overall (25%) perceive they have become less similar over the years, but interestingly, this proportion is as high as one in three (35%) of identical twins compared with only 14% of non-identical twins. The rest of you (52% overall) feel

that you are just as similar or dissimilar now as when you were growing up (46% MZ and 59% DZ).

As far as your partners are concerned; the majority feel there is little or no similarity in either the physical appearance or personalities of your respective partners. However, on a scale of 1-10 (where 1 is "not at all" and 10 is "totally similar") 17% rated the physical similarity of their own and their twins partner between 5 and 10, whilst 23% rated their similarity in personality as 5 or over. Perhaps not surprisingly, these proportions were higher among MZ twins (22% and 27% respectively) than among DZ twins (13% and 19% respectively).

Many people believe twins have psychic abilities. We asked you whether you have the ability to know what is happening to your co-twin when you are not there. Overall, 46% said no, 39% said maybe and 15% said yes. However, zygosity was an important influence on responses; as MZ twins were significantly more likely to report psychic abilities (19%) than were DZ twins (11%).

When asked what is your *favourite* thing about being a twin, the overwhelming response was having someone close who understands you, to trust and confide in and who is always there for you, "a constant friend who never fails me". Some mentioned how they felt special and liked being different from everyone else. When asked what is your *least favourite* thing about being a twin, the preponderant response was "nothing!" However, many disliked being called "twin" instead of their name, not being treated as an individual and being compared to their twin, especially as a child at school. Some did not like having to share their birthday and presents!

Finally, it has been suggested

that twins may be more socially competent and have a lower rate of behavioural problems in childhood than singletons! If you are interested in reading further about twins, three books I can recommend are:

■ **TWO or The Book of Twins and Doubles** (An autobiographical anthology) by Penelope Farmer (1996 V i - rago ISBN 1 85381 7058)

■ **TWINS Genes, Enviroment and the Mystery of Human Identity** by Lawrence Wright (1997 Weidenfeld & Nicolson ISBN 0 2978 1976 3)

■ **TWINS** (describes 27 sets of twins with beautiful photos) Photographs by David Fields; Essays by Ruth and R a - chel Sandweiss (1998 Running Press ISBN 0 7624 0404 3)

Media Appeal

We are often contacted by the media who are very interested in twin stories. Channel 4 are keen to make a documentary on "extreme" twin relationships. Are you and your twin very competitive? Are you and your twin very different, physically or personality wise? Do you lead very different lives? If you have any interesting twin anecdotes, please contact Victoria Vazquez on 020 7188 6765 or via email at victoria.vazquez@gstt.sthames.nhs.uk



Enjoy your twinship!

Lynn Cherkas, Genetic Analyst

Current Studies

Myopia study (short-sight)

The twins myopia study has progressed well and many of you will

have seen some press coverage of the paper we published, showing the first genetic regions to be linked to myopia and a possible myopia gene called PAX6. A group of twins kindly came up to St Thomas' to help us publicize the study (*see picture on the front page*) and we were featured on local London television and the national newspapers.

We remain at the the forefront of research into reasons for wearing glasses and we have just been awarded a further grant to look into the genetics of age-related cataract, in which the lens of the eye goes cloudy: older twins beware, we may be asking to look into your eyes shortly!

Macular Pigment Eye Study

The macular pigment eye study is now in full swing and we have seen approximately 140 pairs of twins so far.

Macular pigments are similar to vitamins and are concentrated in the eye. They are derived from our diet and are found in various fruits and green leafy vegetables such as spinach and kale. There is growing scientific evidence that the more macular pigment you have, the better protected your retina may be from age related macular degeneration (ARMD). ARMD is a condition where the macula develops wear and tear changes, associated with increasing age, and can lead to varying degrees of visual loss including the inability to read or recognize faces. Macular degeneration is the commonest cause of poor vision in the United Kingdom and is becoming an increasingly important condition as people are now living longer.

The results of this study will show how heritable macular pigment is and will also indicate if we can modify the concentration of these pigments in our eyes through our diet, and possibly reduce the risk of macular degeneration. In other words, does 'eating your greens' really protect

your eyes?

Heartburn study

Thanks to all of you who have participated in the research on heartburn by completing recent questionnaires. Heartburn may affect up to one in five of the population on a weekly basis and we have recently published a paper in the journal GUT showing that the genetic contribution to this condition is around 50%.

We are now trying to assess the influence of lifestyle factors including diet and exercise on heartburn by analysing further questionnaire data from discordant twin pairs i.e., twin pairs where only one twin suffers from heartburn. All those twins who participated and requested a dietary analysis should receive their results soon. Finally, a small study conducted by Dr Imi Mohammed looking at the mechanisms of heartburn, by dropping two fine tubes into the stomach of a few very kind volunteer twin pairs, is proceeding well and should be completed later this year.

Sexual behaviour

We are very grateful to those twins who completed our recent sexual behaviour and attitudes questionnaires, for which anonymity is assured. Analysis of data from more than 1,600 pairs of female twins suggests that genetic factors influence infidelity (heritability of 41%), number of sexual partners (heritability of 38%) and sexual dysfunction (heritability of 34%). These results are important as they show that variation between women in sexual behaviour cannot be attributed solely to cultural influences. You will be relieved to know that twins behaviour was the same as other women. Furthermore, our findings will hopefully stimulate more research into understanding the biological basis of female sexual dysfunction and the development of

hormonal therapies.

Genetics of Attraction

Our collaborators in Newcastle are continuing to analyse data collected late March on the Genetics of Attraction Research Day. The main results so far relate to odours. Using the cotton pads worn underarm by participants on the night before the research day, the investigators asked "sniffers" in Newcastle to try to match the pads of twin pairs from a smelly "line-up". The "sniffers" could match these pads much better for identical twin pairs compared with non-identical twin pairs. Further odour collection has been organised since then using a new armpit sampling device, and chemical profiling of these odours also show much more similar profiles among identical twins. Both these results demonstrate a genetic basis for our body odour and are now being written up for publication.

Attention is now being turned to the preference tests done on the research day and these results are expected over the next few months. We would like to thank all those twins who contributed, especially to the postal odour collection.

Cognitive function

I am Jamie and I have just completed the second year of a 3-year PhD research project looking at the genetics of cognitive function and decline. Dementia and Alzheimer's disease currently affect around 700,000 individuals in the UK, the vast majority being over 65. My project is primarily concerned with the 'Nature versus Nurture' debate: to what extent are genes responsible for cognitive decline and what part does the environment play? I hope to be able to link specific aspects of cognitive function to the genes that may be involved. This will pave the way for others to study those genes, the biological mechanisms by which they act and the biochemical interventions that may help treat such illness.

So far, my research has revealed that genetic factors contribute substantially to 'episodic' memory- that which helps us recall events- and these are far more important than age itself in explaining variation in memory. For example, difficulty remembering where we leave our keys or glasses was found to have a heritability of 45%. In contrast, genetic influences are not as important as environmental influences when it comes to learning a new gadget- perhaps the instructions from IKEA have something to do with this!

Genetics of Skeletal Determinants

My name is Usha and I have recently started research for a PhD at the Twin Research Unit. Using the bone density scans from your visits, I am currently assessing the best technique for measuring bone lengths between a) manual observation of images on paper, b) direct analysis of images viewed on the DXA scanner and c) manipulation of images using graphics software. Once the most accurate method has been deduced via reproducibility studies, a data set of bone sizes and ratios will be created from the thousands of scan images which you have helped build in our database over the years. Subsequently, further statistical analyses can be performed to investigate the genetic determinants of skeletal size and its clinical relevance, for example, in fracture prediction.

Pain Perception

This twin study is funded by the Arthritis Research Campaign and started in April 2004. The study involves twins coming to the twin research unit together for 2.5 hours. The visit includes a series of tests, which measure perceptions of heat, cold and mechanical pain sensations. These tests cause minimal discomfort yet provide enormous insight into the biological mechanisms that lead to a person feeling different types of pain. The visit also includes completing questionnaires covering many issues that may affect how we respond to these painful stimuli. We have now seen over 100 pairs of female twins and hope to do further studies which will include those twins with a variety of painful medical conditions.

Finally, I would like to say a huge thank you to all those twins who have taken part in this study so far.

Gene hunting

Gene hunting at the TRU has continued over the last year with genome-wide screens for genes influencing measures of osteoporosis, blood pressure and myopia. Although linkage studies identifying genes for common disease have often been frustrating, with early studies failing to be replicated, there are some encouraging results beginning to emerge.

In a study published in January 2005, we have challenged a widely held assumption by researchers about the causes of osteoporotic wrist fracture. Although bone mineral density (BMD) and wrist fracture (WF) are known to be highly heritable, we have demonstrated that, somewhat counter-intuitively, the important relationship between them appears to be due to environmental risk factors. This has the important implication that genes remaining to be discovered for BMD and fracture may be different. In another study to be published shortly, we have demonstrated linkage to a candidate gene on chromosome 16 that appears to influence the chances of developing varicose veins in women.

Future work

Since the previous newsletter, Frances Williams, our Senior Research Fellow, has had two interesting papers accepted for publication. (See website for details)

Frances has also completed 2 major research grant proposals which, if awarded, will allow her to undertake a follow-up study of twins who have already had MRI scans of the spine to re-attend for further MRI scans to enable study of the progression of degenerative spine disease and the second proposal, submitted to the National Institute of Health in America will look at the aging process and its association with changes in body composition (muscle, fat and bone mass).

MoIPAGE diabetes and obesity study

We are about to start a new, exciting and important study aiming to find the genes for diabetes and obesity in conjunction with 16 other research groups within the European Union. We are looking for female twins, both identical and non-identical pairs, above the age of 50 to take part in the study. We are particularly keen to involve discordant twin pairs, i.e. only one twin in the pair has diabetes or is obese.

Volunteers will need to attend the Unit in London either in the morning or afternoon and we will ask you to fast for a certain period of time. One of our doctor's, Zarko, will take a fat biopsy sample from two different sites on your body using a local anaesthetic (numbing medicine) with similar effect to that used at the dentist. The size of the mark should not be bigger than a needle mark, similar to having routine blood samples taken.

If you are interested in this study, if you require any further information or would like some questions answered, please do not hesitate to contact the **Twin Research Unit on Tel. 020 7188 5555 Monday to Friday between 9am to 5pm and ask to speak to Tara or Zarko or email tara.chalk@gstt.nhs.uk**

Fat Cell

