When we started on this research journey many years ago our initial aim was to better understand how to recognise dementia as it might affect someone with DS. We developed clinical assessments (the CAMDEX-DS and the CAMCOG) that allowed us to accurately diagnose dementia and also enabled us to explore how various cognitive skills and general living skills might deteriorate over time. These findings were reported in the scientific literature contributing, along with many other studies in different countries, to our understanding of this relationship between DS, which is present from conception and is apparent at birth, and Alzheimer’s disease, which is a disorder that manifests in later life.

As new technologies became available we were then able to ask questions about the reason for this risk for Alzheimer’s disease. With your help and with research done here and in other centres across the world the picture is becoming clearer. Conchy and Elijah have been analysing in great detail the brain scanning data we collected in our earlier study and this is suggesting that those areas of the brain where there is evidence of this protein called amyloid (the gene for which is on chromosome 21 and therefore inherited in triplicate in people with DS) there is also evidence of some thinning of the brain cortex in comparison to those areas where there is no evidence of amyloid. One paper reporting these findings is in submission and we are waiting to see whether independent assessors agree with our conclusions. There is a rigorous and sometimes challenging process of peer review before findings are published and others can read them. Maddie, who undertook the study of the eyes, is at a similar stage. She is about to submit her paper and this will go through the same peer review process. We also have other papers close to submission which together build a picture of how age and the presence of detectable amyloid in the brain may affect the way the brain functions and in the end our ability to think and to undertake those tasks necessary in daily life.

Our present brain imaging studies, funded by Alzheimer’s Research UK and the National Institutes of Health in the USA, include people with DS who now have had two and sometimes three scans over some years so that we can really track the changes that are occurring and determine how these changes may lead to loss of abilities. What I believe we are learning is that amyloid is likely to be an important driver of this process and it is also clear that this is associated with age-related structural changes in the brain. Other genetic and possibly lifestyle factors are also likely to be important and these might help to explain why some people develop cognitive decline and dementia earlier in life than others. In addition to submitting papers for publication members of the group are presenting these findings at various national and international meetings and by doing so hopefully we will ourselves have new ideas as well as inform others. Thank you again for all your help.

Professor Tony Holland
A call for participants

We are always so grateful to our participants who allow us to carry out our work and we are always looking for more people! If you know anyone aged 40-44 with Down’s syndrome who might be interested in taking part in the MRI/PET scanning study, we would be extremely grateful if you could let our NiAD team know by contacting ej268@medschl.cam.ac.uk or ajb333@medschl.cam.ac.uk.

Tel: 01223 465 268.

Study updates

The NiAD study is still forging ahead at full speed. Many of you have taken the time to come to Cambridge to help us investigate the links between Down’s syndrome and Alzheimer’s disease. We also have many new participants who have never taken part in any of our previous research into Down’s syndrome - welcome to you all!

Anna and Liz have been out recruiting new participants around the country from Surrey to Devon. They have seen some beautiful parts of the country and have met many wonderful families. This trip included recruiting a pair of twins and meeting a newly wedded couple (see page 3 for more details) and both are a first for any CiDDRG studies past or present!

Back in Cambridge Anna and Liz have been working hard with Conchy and Shahid to complete each participant’s appointments in order to reach the target of finishing 55 visits by August 2018. So far, the scanning has mainly gone smoothly and the team are slowly, but surely working towards their target number. All the families involved in the study have been amazingly co-operative and the whole team owe everyone a massive thank you – none of this would be possible without you! In America, a new site in Washington DC is preparing to replace our Arizona site and both Pittsburgh and Madison-Wisconsin have begun seeing previous participants for their second visit.

Amyloid deposition and cortical atrophy in DS

In a previous study, we used positron emission tomography (PET) imaging with $^{11}$C-labelled Pittsburgh Compound-B (PiB) radioligand for beta-amyloid and structural MRI to investigate the implications of amyloid burden on cortical morphology in a cross-sectional cohort of adults with DS (Mak et al., submitted). It was shown that the level of amyloid accumulation strongly and negatively correlated with the degree of cortical atrophy.

Dr Conchy Padilla followed up 11 participants (aged 34 - 51) of this cohort and re-examined them after 2 years to investigate whether the global and local-to-local relationships found between amyloid deposition and atrophy were still observed. After two years there was a pronounced decrease in temporo-parietal cortical thickness along with an increase in the frontal cortex. Interestingly, the amount of amyloid deposition at follow-up and baseline did not show a significant difference, which might indicate that amyloid deposition is reaching a plateau, given that amyloid deposition still kept progressively increasing as cortical thickness decreased. Multiple regressions confirmed that the concentration of amyloid deposition at baseline predicted the degree of cortical thinning, but the converse was not true. In summary,

Conchy’s study supports evidence for the consequence of amyloid deposition at baseline resulting in significant cortical thinning after a period of two years.
A NiAD day for a white wedding!

Congratulations to Sam and Katherine on their upcoming wedding! They told us about their big day:

Sam: We became friends at a drama group and had our first proper date about 6 years ago. We got engaged 2 years ago. I got down on one knee to propose. We moved into our house in July and feel very happy.

Katherine: It’s been very exciting planning our wedding. We have learnt a ballroom dance to some of our favourite music. I can’t wait to be Mrs Goodyear.

Visit 1 - compPETE!

Pete, a sibling control, talks about why he thinks the research is important:

I guess I think it’s important, as I have a twin brother with Down’s syndrome, so really part of it is from his point of view if there’s anything we can do to improve diagnosis of dementia in people with Down’s syndrome because obviously its very common.

It really is quite amazing that they’re [participants with DS] doing this because obviously its quite a big ask, people come from all over the country and there’s a few days involved, but I think you guys make the whole experience quite relaxing! But yeah it’s incredible that they’re doing it to help people in the future.

What it’s really like to be on the radio...

Amy, one of our participants, was recently interviewed by Radio 4’s Today Programme about taking part in our research looking at the link between Down’s syndrome and dementia. She was fantastic and, on the day the video was released, remained at no.4 on the BBC news app’s ‘Most Watched’ videos. You can listen to the piece here: https://www.bbc.co.uk/programmes/p06681dn.

Anna, our research assistant asked her some questions about her experience...

Hi Amy, you were fantastic on the radio, did you get a chance to listen to it?
Yep – yeah I listened to the radio thing, I was in Barcelona at the time!

How was your holiday?
Yeah it was good thank you, we had lots of nice dinners in tapas places and went for lovely walks along the beach.

How was it hearing your voice on the radio and what have your friends said about it?
Well not trying to show off too much, but I’ve actually been on Radio Cambridgeshire before, but not Radio 4, and I’ve always liked hearing myself! I’ve had a few people say how good it was, that it was interesting what I was talking about and they’re proud of me that kind of thing.

What was the best thing about the whole experience?
The point I was making across - that felt positive to me and the feeling that you might be making a difference. I quite enjoyed the whole thing, it was quite an experience!

What would you say to anyone who was thinking about taking part in research?
I’d tell them to go for it, I think I’d say something along the lines of how being part of a study could make a huge difference for people in the future. I’d tell them I’ve done research in the past and really enjoyed it.

Why is this research important to you?
Pretty much the same sort of thing, as a result of the research other people could be helped in the future!
Rising star award

Well done to our colleague Elijah Mak who was awarded the Rising Star in dementia research prize at the Alzheimer’s Society’s annual conference in May. The award recognises researchers in the earlier stages of their careers who have already made great progress in dementia research and have the potential to contribute much more to the field in the future. After completing his PhD at the Department of Psychiatry on a Gates Cambridge scholarship, Elijah now works as a Research Associate at the Old Age Psychiatry Group and is a Visiting Researcher with us here at the Cambridge Intellectual and Developmental Disabilities Research Group. The broad theme of his work is focused on identifying imaging biomarkers to help improve the timeliness and accuracy of diagnosis in dementia, as well as to facilitate disease-monitoring of treatment outcomes in future clinical trials especially in the early phases of disease. With this end in mind, his studies involve the use of multi-modal neuroimaging techniques, such as structural Magnetic Resonance Imaging and Positron Emission Tomography in the context of deep-phenotyping (i.e. detailed neuropsychological assessments, blood biomarkers, cerebrospinal fluid analyses, etc.) across the spectrum of at-risk adults with Down’s syndrome to geriatric cohorts of people with Alzheimer’s disease and dementia with Lewy bodies.

Maddie’s Hawaii conference

In April, Maddie attended the International Association for Research in Vision and Ophthalmology (ARVO) conference in Hawaii. This conference is all about the eye and how different techniques can be used to detect different diseases in the eye. Maddie uses optical coherence tomography to identify markers in the eye that may be useful in detecting Alzheimer’s disease. To do this research Maddie has collaborated with an ophthalmology group in London and this group also attended the conference. Maddie presented a poster detailing some of the results that we have found from our first eye study.

Maddie will soon be starting another eye study hoping to find additional markers in the eye and the retina related to Alzheimer’s disease. She would appreciate hearing from anyone who might be interested in taking part in this study, if you or someone you know would like to know more please contact Maddie on mjw208@cam.ac.uk or 01223 465261.

Goodbye Anna!

Many of you will have met Anna during the course of our current research project. She will be leaving us in August to start training to be a doctor. We are sad to see her go but are all very proud of her and wish her well in her new career.

Thank you!

Thank you again to everyone that takes part in our studies. We love working with people with Down’s syndrome and truly believe in the importance of the work we achieve together. Thank you also to our collaborators and partner organisations. If you would like more information on anything in this newsletter or to be added to future mailing lists please contact our administrator, Agnes Hoctor, phone: 01223 465 216, email: ah937@medschl.cam.ac.uk, post: Department of Psychiatry, Douglas House, 18b Trumpington Road, Cambridge CB2 8AH.