It has been another busy and exciting year for the Unit. I am pleased to say that funding for our work has been renewed by the MRC. We received excellent scores for our previous work and for our new proposals for 2019-2024. The continuing high response rates from study members and your positive feedback made a major contribution to the MRC decision to continue to support our work.

Here are some of the questions we will address over the next five years:

- Brain and heart health are bound together. What factors acting across the whole of life determine this tight association? What can we do to keep people’s brains and hearts healthy in older age?

- Some people are more resilient, i.e. better able to bounce back from a challenge, such as illness, than others. What can we do to enhance or maintain this resilience?

- Can wearable technologies (e.g. heart rate, blood sugar and activity monitors) help us understand healthy ageing better? Can these wearables identify people earlier, who are not doing well, to target interventions?

We hope that by better understanding healthy ageing we will be able to make recommendations for actions which can be taken to improve health.

I would like to thank all study members for their continuing commitment to the study. Our work would not be possible without the continuing dedication from you all.

Happy birthday and best wishes for 2020.

Professor Nish Chaturvedi
Director of NSHD

The Birthday Card
The characters on this year’s birthday card have been drawn by families who participated in the “NSHD Game of Life”, one of the public engagement activities that we ran last year. The game starts with players randomly selecting a gender counter and drawing their character on it - the birthday card shows some of the characters people drew. The game is based on research findings from the NSHD, including the impact of a person’s gender on their health and wellbeing. We also asked players to try out some of the NSHD tests, such as standing on one leg with their eyes closed, and a memory test. Over 400 people played the game, with many saying they enjoyed learning more about this important study.

New measurements over the next three years
Over the next three years, we will be inviting all study members in England, Scotland and Wales to either come to a central London clinic for some intensive investigations or to have a research nurse visit your home. As before, the visit will consist of questions, measurements and tests; some of which are being repeated to look at changes in health, whereas others will be new. Some of you have kindly participated in advisory panels to discuss what we should be measuring and how best to explain what we’d like to do in the information sheets we send you. If you have any questions please contact Dr Andy Wong (andrew.wong@ucl.ac.uk).

Many of you kindly took part in the neuroimaging study, aimed specifically at looking at how ageing affects the brain and what influences the risk of dementia. We are indebted to those study members who have taken part.
Last year we said farewell to Prof Rebecca Hardy. Rebecca had been with the Unit since 1995 and was the lead of the Cardiovascular Health programme, as well as the Unit’s lead statistician. Rebecca’s new job is the Director of the Cohort and Longitudinal Studies Enhancement Resources (CLOSER) consortium, which aims to promote the value, use and impact of the UK’s remarkable longitudinal studies. The NSHD is one of the studies which make up CLOSER, so we will still be able to work with Rebecca.

After 10 years at 33 Bedford Place, we have moved back into 1-19 Torrington Place. This was a return home for the Unit as Torrington Place was our base before it moved to Bedford Place. The move involved over 160 crates and two trips in a large moving van.

This year Profs Marcus Richards and Alun Hughes appeared before the House of Lords Science and Technology Committee to showcase findings from the NSHD. The Committee recognised the importance of whole life experiences in affecting health status in older age. Marcus discussed the NSHD and the important role it plays in studying the processes of ageing. Alun spoke about how physical activity is thought to be beneficial for healthy ageing; affecting not just physical, but also mental health and keeping people independent for longer.

Sir Keir Starmer, the Unit’s local MP, met with staff, who explained the history of the NSHD and the most important findings. He learnt about Insight 46, the neuroimaging study, and the importance of identifying early markers of dementia to potentially slow or prevent its onset. He was particularly interested in understanding how people can age better, the extent of health inequalities across the country and what we can do to help shape future government policies.
Insight 46: The Neuroimaging Study

Over 500 of you came to UCL for a detailed brain scan to measure brain health, memory and thinking tests. We are doing the same tests two years later to see how brain health has changed and how this relates to heart health. We are well over halfway through the second phase of the study, which will finish this summer. The study has resulted in many important findings, which have been published in some of the top neurology journals, as well as being extensively covered in the media.

Key findings

• We know that high blood pressure adversely affects cognition in later life. But when do these effects start, and at what age are these effects most important? We have measured your blood pressure since the age of 36 years. We found that high blood pressure during early midlife (age 53), and having a large increase in blood pressure between ages 43 and 53, was the strongest determinant of poorer brain health in older age. This suggests that we should be treating blood pressure earlier in life and at lower levels than we currently do.

• We found that your brain health is linked to cognitive performance, even after taking account of other important life course influences on cognitive function, particularly childhood cognition and education.

• Doctors have worried that sensory loss, such as mild deafness, may increase the risk of Alzheimer’s disease. We found that mild hearing loss is not related to brain imaging markers of Alzheimer’s risk in later years.

• There is a suggestion that a better quality diet in midlife is associated with faster walking speed (i.e. better physical health) in later life.

To date, four students working on the project have completed their PhDs, and several other staff and students are currently working on the data.
Underlying biology

Although NSHD study members are all the same age, it’s clear that some people have aged biologically faster than others. We have measured your biological age from the blood samples you gave us at age 53, and ages 60-64. Dr Jane Maddock found that some markers of biological age do indeed associate with health status, such as grip strength, lung function and cognitive function in later life. She is working to see what these markers can tell us about underlying mechanisms of ageing.

Stress hormones and brain health

As part of the data collection wave when you were aged 60-64, you provided saliva samples over a 24 hour period. These samples were used to measured cortisol, the body’s natural stress hormone. We know that cortisol levels rise and fall naturally throughout the day, which is neurologically controlled. Work by Dr Alex Tsui showed that study members with a healthy variation in stress hormone levels scored better in the iPad cognitive measures at age 69 than those with a narrower range of hormone responses. This means that patterns of stress hormone release might indicate who is more likely to maintain brain health in later life.

Diabetes and memory

People with diabetes are found to have worse cognitive function than those without, and doctors are testing diabetes treatments to see if they can improve cognitive function. Using the unique, whole of life information in NSHD, Dr Sarah-Naomi James has shown that early life development affects both cognitive function in older age, and the risk of diabetes. She also showed that, once you take account these joint effects of early development, diabetes itself doesn’t impact cognition. Her findings imply that diabetes therapies on their own may not be helpful in improving cognitive function.

Health checks at age 68

Adults in the UK are eligible for free health checks at their GP surgery. These identify people who may be at high risk of disease, and allow the GP to institute early, preventive treatments. Dr Rebecca Wilson found that having more health conditions in midlife and not smoking were associated with higher health check attendance. Her work could influence policy in targeting such checks at people at high risk, e.g. people who smoke, and people who are currently free of disease who may believe that the checks are of no benefit to them.