Dr Sarah James

Tell me about your research
I’m interested in the link between the biology of the brain and behaviour. My PhD was in mental health where I learnt the techniques of epidemiology (how to study groups over long periods of time). I’m currently working on a study with a group of people who were all born in March 1946. The group has been followed since birth and are tested every five years.

500 members of the group had brain scans at 70 years old as part of a sub study called Insight 46. We’ve been looking at changes in the structure of the brain and how this links to other aspects of their lives such as their blood pressure, whether they smoke, what physical exercise they have done and when.

What motivates you?
I’m hopeful that there are ways to reduce the risk of dementia, and to find more treatments. I’m personally motivated by being able to measure and see the changes in someone’s brain during dementia. If we can improve brain health and slow down the symptoms, people can live well with dementia for longer.

Are there any myths about your work which bother you?
Some believe we’ll never be able to find a cure, which I also believed at first. There’s also a myth there is nothing you can do to reduce your own risk when there are things we can do to protect our brain health and build in reserves to keep symptoms away for longer.

There is a window of hope between the first brain changes appearing and the symptoms of dementia occurring 15 years later.

In an ideal world, where do you see your work in the future?
The work would inform policies and how doctors and other clinicians work. The connections we find would provide ways to reduce risk. There would also be a greater understanding that it’s never too late to reduce someone’s risk of dementia.

About the artwork
Sarah talked so passionately about studying groups of people over a long period of time, I felt I had to represent that on her page. I also wanted the brains to be visible to emphasise that brain health is important at all stages of life - Hana

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Tell me about your research
My research starts at the beginning, looking at what goes wrong and what causes symptoms. I’m not bound by the established view that brain cells die because proteins build up. This is an overly simplistic explanation for a complex disease.

Dementia with Lewy bodies is the third most common type of dementia, where small clumps of protein (Lewy bodies) build up inside brain cells. The brain cells which die are those with high energy demands and those which regulate other processes. In dementia caused by Alzheimer’s disease memory declines over time, whereas in dementia with Lewy bodies, memory fluctuates over time.

We look at human brain tissue and cells under microscopes, looking at lots of different proteins. We hope to monitor the electrical patterns in the cells looking at the difference between regular and irregular rhythms.

What motivates you?
Meeting people with dementia and their families is all the motivation I need. I work with support groups in North East England and there’s so much hope but also knowledge that there’s nothing in the pipeline. I want to be able to walk in to these groups and tell them we’ve done it!

Are there any myths about your work which bother you?
There’s an arrogance in researchers thinking we know more than we do. We need to be open to new ideas until we know more answers. The media reporting of science needs to be more honest and we need to be careful of giving false hope.

In an ideal world, where do you see your work in the future?
Realistically, I’d like to have a more complete understanding of why some cells die in Lewy body disease. More aspirationally, I’d like to show what cell death in the brain looks like and for there to be a drug available to stop this.

About the artwork
When I spoke to Daniel on the phone, he drummed out an irregular beat to explain how cell signals can change in dementia with Lewy bodies and that stuck with me. This is represented in the border and the uneven traces between the neurons - Hana

This project was kindly funded by:

Alzheimer’s Research UK
Tell me about your research
My research looks at care for people diagnosed with dementia and their interactions with healthcare. We are looking at socio-economic factors (e.g. deprivation), geography (e.g. where somebody lives) and protected characteristics (e.g. age, gender, ethnicity) to identify whether, and to what extent these factors impact care use and quality and outcomes for people living with dementia.

We want to reflect the routes people with dementia take through primary and secondary care, using GP, hospital and A&E data. My aim is to improve pragmatic use and enhance the quality of people’s care when living with dementia. Using these datasets, I hope to support clinicians with a practical data-driven tool to use during care discussions with the individual and their care group.

What motivates you?
Having family members with dementia and meeting others with dementia motivates me. There are so many inequalities in public health which I want to find out more about. I think dementia is the most important health issue for the next 10 to 20 years.

Are there any myths about your work which bother you?
There is a worry my work could be seen as telling doctors and nurses what to do, but it is vital that we are working with clinicians and public advisors from the outset, getting input from everybody involved in caring for people living with dementia. We need to make it clear this is not to replace clinicians, but to give clinicians additional support in care discussions, to provide the right service at the right time for the individual.

In an ideal world, where do you see your work in the future?
The data-driven tool will be used by clinicians while talking to patients and carers and involving them in decision making. In an ideal world there would also be policy changes affecting care pathways.

About the artwork
Speaking to James, the overarching theme was confusion. This included the confusion felt by dementia patients and their families while trying to navigate all the different barriers and twists and turns of dementia care, as well as James’ own uncertainties as he was just starting his PhD.
Dr Naomi Hartopp

Tell me about your research
I look at the interactions between endoplasmic reticulum and mitochondria, two tiny parts of our cells. In healthy cells the membranes of the endoplasmic reticulum and mitochondria are linked, which helps them to communicate and carry out other functions which are particularly important to nerve cells.

In diseases such as Alzheimer’s, motor neurone disease and Parkinson’s disease, we think the link between the membranes is broken. I’m looking at cells in spinal cords to confirm this and also trying to figure out how the link is broken.

What motivates you?
My granddad had Alzheimer’s around the time I was studying biochemistry and finding neuroscience interesting. The interest and the personal connection combined to motivate me. I spent a year working in industry on neuroscience medicine and saw the progress being made and the potential to make more progress through little steps.

Are there any myths about your work which bother you?
There is a myth that dementia is just ageing, a natural process, but it is actually caused by diseases, and so there is the possibility to prevent or treat these diseases with continued research.

In an ideal world, where do you see your work in the future?
In an ideal world our work would help to develop a treatment for Alzheimer’s, motor neuron and Parkinson’s disease. I think this will most likely be a combination of drugs which slow the progress of the disease, but in an ideal world it would be a treatment that prevents them developing in the first place.

About the artwork
Naomi’s page shows a zooming in, from the spinal cord on the left to the nerve cells in the middle to the mitochondria and endoplasmic reticulum. The chain around the border represents the link which Naomi studies - Hana.

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This project was kindly funded by:

Alzheimer’s Research UK
Jo Sharpe

Tell me about your research
I study fruit flies, using them as a model to research frontotemporal dementia and motor neuron disease. The most common cause for both these diseases is a particular mutation, a mistake in the genetic code which tells our cells what to do. A piece of the code which usually has tens of repeats ends up with thousands of repeats instead. From the code, five different large sticky proteins are produced in cells. We don’t yet know why this causes frontotemporal dementia and motor neurone disease.

We work with flies because you can study a very large population in a very small space. They also have similar structures and cells in their brains to humans, and the same proteins are involved in cell death in flies and humans.

I look at four different types of fruit flies which each have a different genetic code, producing one of these unusual proteins in their brain cells. I film them climbing in order to measure their movement and we’ve found their ability to move declines with age, and that this decline is fastest in flies with certain proteins compared to others.

What motivates you?
Dementia can be horrible and it’s heartbreaking that there is so little we can do. I’m also fascinated by the complexity of the brain and find fly genetics really interesting.

Are there any myths about your work which bother you?
Flies aren’t valued enough in research and there can be some snobbishness about working with them instead of other animals or cells. However, you can get much better data because you’re working with a larger number of animals. 70% of the genes which cause disease in humans are also found in flies!

In an ideal world, where do you see your work in the future?
I would work out which pathways are affected and be able to test drugs which might help. The flies can be used to screen different drugs to narrow down which are most likely to work.

About the artwork
Jo’s page is both a literal illustration of her research as well as an illustration of her love for working with flies. The border is based on some beautiful images of cells taken by her colleague, Dr Ines Hahn - Hana

This project was kindly funded by:
Dr Mahmoud Maina

Tell me about your research
My research seeks to understand the contribution of tau protein in Alzheimer’s disease. Tau is one of the proteins that builds up in the brains of people with this disease. Tau is best known for its role in microtubules, which are rail-like tracks supporting the transport of cargo in cells. However, tau is also found in other areas of the cell. While exploring this during my PhD, I found it was involved in the production of raw materials for building parts of the cell, the way bricks are used to build a house.

 Tau is considered a drug target for Alzheimer’s and other types of dementia. It is important to know what else it does in case drugs targeting it have unintended side effects. My current research uses a basic science approach to understand how tau contributes to Alzheimer’s disease.

What motivates you?
The misconceptions around brain disease in my community while growing up led me to become fascinated with the brain.

When I worked in a Neuro-Psychiatric Hospital in Nigeria I encountered the view that dementia has spiritual causes, which affects the way sufferers are managed or if they seek care in hospitals. So I wanted to do research to help defeat dementia and address these misconceptions.

Are there any myths about your work which bother you?
The long-held view by many colleagues that tau’s main action is related to microtubules. We now know it has other roles which we need to understand to facilitate breakthroughs.

In an ideal world, where do you see your work in the future?
There is growing evidence ancestry affects Alzheimer’s development. Most research has focused on Europeans. We know little about how it develops in Africans, despite Africa’s genetic diversity. For example, research has shown that biomarkers like tau protein build-up are different in black and white people with the disease.

In an ideal world I see my future research dedicated to understanding these differences. This will be key to defeating dementia on a global scale.

About the artwork
The main page features Mahmoud in the lab while the tangles in the border represent the build up of tau proteins. The houses in the corners were inspired by how Mahmoud talks about raw materials in cells - Hana

This project was kindly funded by:
Tell me about your research
The focus of my PhD is to improve the quality of life for people living with dementia in UK care homes. Behavioural and psychological symptoms of dementia, such as agitation, anxiety, aggression and sleep disturbances are common and distressing for residents, carers and family members.

When non-drug therapies don’t work for these symptoms, patients are often prescribed anti-psychotic drugs which can be risky. I’m currently exploring whether a cannabinoid-based medicine is a safer alternative. We’re working with dementia residents in nursing homes to conduct a trial of an oral spray drug which is already approved for use in Multiple Sclerosis.

This project began after hearing relatives and carers had been using over-the-counter cannabinoid-based products to help patients without consistent evidence. More research was needed to find out if it was effective and safe for people living with dementia.

What motivates you?
I’m deeply motivated by positive patient outcomes. I had been working in dementia clinical trials for four years before my PhD. Seeing day to day life in care homes meant I knew my PhD would be in dementia research, with an ultimate goal to improve quality of life for care home residents.

Are there any myths about your work which bother you?
The first myth is cannabis is a panacea which will solve everything. We need solid evidence for what it can and can’t do. With a lot of commercial interest in cannabis, I’m also keen to ensure the independence and objectivity of our research. We are independently funded by Alzheimer’s Research UK and there is no external influence from the drug developer. The trial has been patient focussed with their input all along.

In an ideal world, where do you see your work in the future?
We would have a safer and more effective medication which can be used with other therapies such as massage and music therapy.

About the artwork
Chris talked a lot about people being at the heart of his work and how hitting the target and getting an effective therapy means including patients and carers in everything - Hana

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Tell me about your research

I look at dementia services and Urdu speakers’ experiences when they’re being diagnosed with dementia.

The tests used for diagnosis rely a lot on culture and language. For example, a question in the test asks people to recognise an image of a kangaroo but not everyone has grown up seeing or knowing what a kangaroo is. But if they get this question wrong they might be told they have dementia. This means people might get diagnosed with dementia even if they don’t have it because of cultural misunderstandings. People might also not get diagnosed properly because everyone assumes their problems are because of culture and language issues. There are also other problems such as the meaning of words and sentences being lost in translation.

I look at Urdu speakers’ experience and also talk to staff to see what can be improved. I’m working on a new test in Urdu as well as new staff training.

What motivates you?

I sort of fell into this area of research but have grown more passionate along the way. I originally didn’t want to work in dementia as I thought it would feel hopeless, but I ended up getting really interested in the topic. Seeing other South Asians, including my grandma, experiencing dementia was also part of my motivation.

Are there any myths about your work which bother you?

A lot of South Asian communities think dementia is just normal ageing, a punishment from God or black magic, rather than caused by disease. Many don’t realise how important a healthy lifestyle is. Some are worried their community will find out or their information will be passed on to the government if they take part in research.

In an ideal world, where do you see your work in the future?

I’d like to see my work for changing dementia tests to suit other languages and other cultures being used for other kinds of health tests too. I would also like to see the work I do in my PhD maybe one day be used in the NHS.

About the artwork

There’s a strong sense of people trying to navigate a confusing maze of dementia diagnosis in Nadine’s work. She also talked about women bearing the brunt of dementia care in South Asian communities which I wanted to represent. The border is inspired by Nadine’s project logo - Hana

This project was kindly funded by:

Alzheimer’s Research
UK
Tell me about your research
My work involves taking anonymised electronic medical records from GP visits across millions of people in the UK, identifying people in the data who have had dementia, and then looking back 20 years to see any signs, symptoms or medications that show evidence of cognitive decline much earlier. This could help us diagnose people with dementia earlier, and in turn help improve the treatment and care they receive.

I’ve thrown the kitchen sink of data science tools and methods at the data, trying to be as open-minded (and hypothesis-free) as possible. I’ve found some less surprising links such as with cardiovascular conditions and mental health. I’ve also found more surprising things, like those who regularly attend cervical smears are less likely to get dementia, probably because they tend to be of higher socio-economic status and are able and willing to attend appointments.

What motivates you?
A mixture of the science, a family link and what data science unlocks. I did neuroscience as an undergraduate and was really interested in the brain. Dementia really lends itself to data science because it is long term and affects people in lots of different ways and therefore there is huge variability across many dimensions. My late grandfather also passed away from dementia 10 years ago.

Are there any myths about your work which bother you?
There are a lot of scare stories around how health data can be used and it can take a while to convince people how much it can help. There are also myths around the stereotypical data scientist; the hooded man with no social skills. We also really need to engage better with patients and the public.

In an ideal world, where do you see your work in the future?
I’ve now generated a large number of new potential areas to explore with my analyses. It would be great for GPs and other medical experts to pick out the best signals to test further for true signals, as well as clinically meaningful areas to help patients.

About the artwork
Maxine’s work got me thinking about the moments in our lives when we interact with the healthcare system and what these can mean in her research. The border represents all the connections the data analysis can show between these fleeting interactions - Hana

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Tell me about your research
My research has a broad focus on dementia. There are different proteins which can cause dementia and I study two of them - amyloid beta and tau proteins.

When these proteins are broken down, they can be cleared from the brain through the recently discovered ‘glymphatic system’. I look at whether it’s possible to visualise the movement of fluid in this system. Star shaped cells called astrocytes have water channels that allow water to move through the brain.

What motivates you?
I was a research technician who had been working in dementia research for five years when a PhD position came up. The glymphatic system was a new area of research which was exciting, even though there was some scepticism as so few people were working on it.

Are there any myths about your work which bother you?
Small groups have latched on to the idea that massage can help this fluid movement, despite no evidence.

There are also myths around what can help prevent dementia. The evidence that brain training helps dementia is weak, but there is very strong evidence for exercise and some evidence for sleep having a protective effect.

In an ideal world, where do you see your work in the future?
I’d like to see more research into the impact of exercise on the glymphatic system. The water channels which allow this fluid flow could be a target for treatment if we can find a way to improve function.

About the artwork
The main image represents the fluid clearing system in the brain. It was adapted from work published by Jeffrey Illiff and colleagues (Illiff et al 2012). The border of stars is inspired by the star-shaped astrocyte brain cells which I’m fascinated by - Hana

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