

The image shows the top portion of a presentation slide. At the top, the word "IMPERIAL" is written in large, blue, serif capital letters. Below it, on the left, is the Parkinson's UK logo, which consists of a blue circle with a white stylized 'P' and the text "Parkinson's UK" in bold, followed by "For every Parkinson's journey" in a smaller font. To the right of this is the MS Society logo, which is an orange triangle pointing right with the text "MS Society" inside. Below the logos, the title "Imperial Brain Bank" is written in large, blue, serif capital letters. Underneath the title, the text "Parkinson's UK Brain Bank & MS Society Tissue Bank" is written in a smaller, blue, serif font. At the bottom of this section, the text "The importance of neuropathology & a key link in the research chain" is written in a blue, italicized, serif font. In the bottom left corner, the name "Rory Turkmen Smith" and the date "18/09/2025" are written in a small, black, sans-serif font.

1


# Agenda

- 1 Who we are
- 2 What we do
- 3 Our processes
- 4 Outcomes

## Please ask questions!

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2



# Who are we?

Team and Background

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3

The composite image consists of two parts. On the left is a diagram illustrating the structure of the Multiple Sclerosis and Parkinson's Tissue Bank. At the top, the 'MS Society' logo (an orange triangle with 'MS' in white and 'Society' in black) and the 'Parkinson's UK' logo (a blue circle with a white 'P' and the text 'Parkinson's UK For every Parkinson's journey') are shown. Below these, 'MS Society Tissue Bank' and 'Parkinson's UK Brain Bank' are connected by arrows to a central oval. The oval contains the text 'Multiple Sclerosis Parkinson's Tissue Bank' and 'Funded through a Research Grant'. Below the oval, the 'IMPERIAL' logo is shown, with 'Department of Brain Sciences, Imperial' written underneath. On the right is a photograph of a laboratory setting. Several students, mostly women, are seated at a long white lab bench. They are working with various pieces of equipment, including microscopes and pipettes. The lab is well-stocked with supplies, and the students appear to be engaged in a practical session or research project.

4

# The Team

## Directors



**Professor Steve Gentleman**  
Director (PD research)



**Professor Richard Nicholas**  
Director (MS research)



**Dr Roberta Magliozzi**  
Director (MS research)

## Neuroopathologists



**Prof. Federico Roncaroli**



**Prof. Johannes Alpers**



**Dr Javier Alegre Abarrategui**

## Management



**Dr George Gveric**  
Manager



**Rory Turken Smith**  
Coordinator

## Technical Team



**Marta Garcia Camba**



**Aynne Jordan**



**Leyna Silveira**



**Eleanor Dakin**

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5



# What are we & what we do

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6

## Evolution of Understanding

Shaking Palsy →  $\alpha$ -synucleinopathy

- 1817 – An Essay on a Shaking Palsy, and more rigid definition of the condition in 1872
- 1899 – Discovery of the damaged Substantia Nigra (SN)
- 1919 – Konstantin Tretiakoff locates “Lewy Body” structures in the SN
- 1960 – Olek Hornykiewicz demonstrates loss of dopamine neurons in Parkinson's
- 1976 – Serendipitous observation of parkinsonism after MPP+ use, informs mitochondrial dysfunction
- 1980s – Deep Brain Stimulation first implemented as a treatment
- 1980s/90s – Cell based therapies introduced
- 1992 – UK Brain Bank Criteria for PD (Clinico-pathological correlation)
- 1997 – Discovery of  $\alpha$ -synuclein ( $\alpha$ -syn) as the most important component of Lewy bodies

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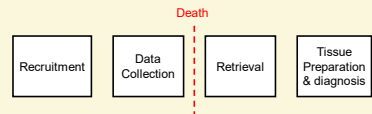
7

(Daniela Berg, et al. Defining Parkinson's Disease..., 2024)

19/09/2025

7

## Research Tissue Bank



- Collect tissue, perform neuropathological analysis, diagnose
- Research Service
  - Provide expertise to researchers
  - Promote research on human tissue
  - Receive applications to use tissue, reviewed by panel of experts
- Different from clinical trials



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8

## Donation Schemes



### NHS Organ Donation

- Focused on live transplant
- i.e. transplant of a healthy kidney from one person to another.

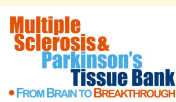
NHS Department



### Whole Body Donation

- Donation to a medical school
- To train medics on surgical procedures and to understand human anatomy

Medical School



### Research

- Focus on donation being used for research
- Clinical records are accessed and consent must be sought for this

Research Service

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9

## More than just tissue banking

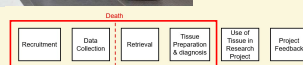


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10



## Our processes



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## Recruitment Scope



### MS Society Tissue Bank

- People living with MS
- Encouraged to sign up to MS Register for long term follow up, and access to medical records



### Parkinson's UK Brain Bank

- People living with Parkinson's
- And related disorders (including MSA, PSP, CBD)



### Imperial Brain Bank

- Control donations from "healthy individuals"

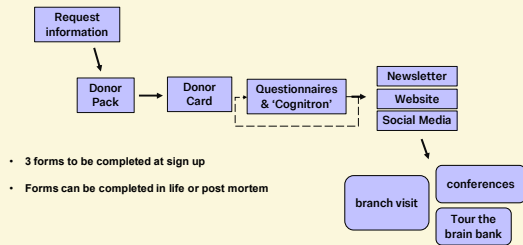
### Exclusion Criteria:

- death owing to cerebrovascular accident
- diagnosis of Alzheimer's Disease

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12

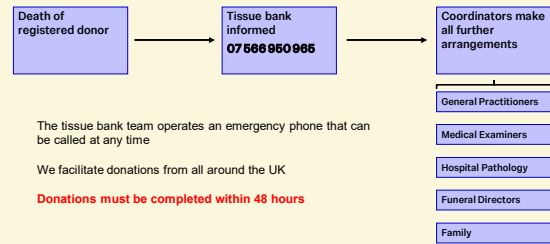
## Recruitment & Data Collection



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13

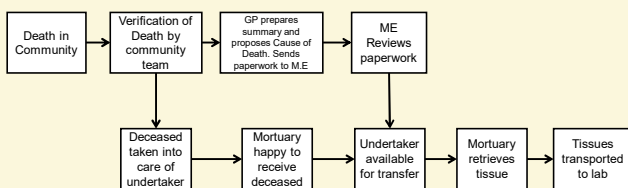
## Donation Process



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14

## Retrieval of tissue - community



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15

## Preservation of tissue

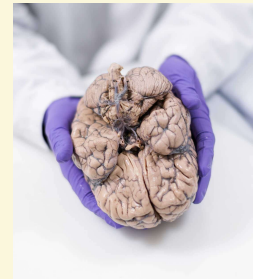
Ethical permission to take any tissues of research interest from post mortem.

Retrieval of the brain, pituitary gland, CSF and spinal cord is requested from the mortuary team as a minimum.

Often spinal cord retrieval is not possible.

Tissues are received at the lab fresh

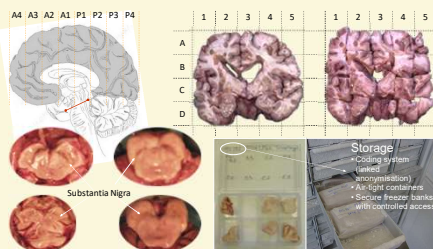
- Hemi-dissection is performed
- One hemisphere is fixed
- One hemisphere is frozen
- Each are kept indefinitely for supply to researchers



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16

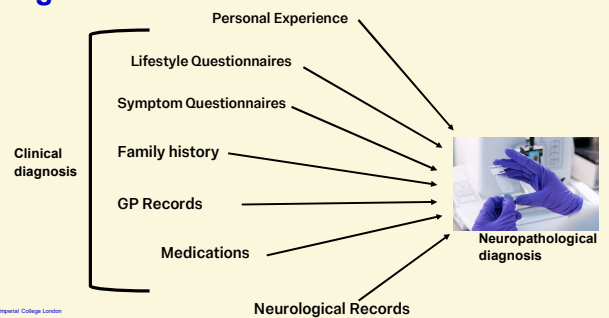
## Preservation of tissue



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## Diagnosis of tissue



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18

## Importance of Neuropathology

Female, age of onset 76y, disease duration 9y, COD – chest infection, PD  
Presentation: Micrographia, mild gait impairment, occasional tremor  
Clinical diagnosis: Tremor-dominant Parkinson's disease,  
with prominent fatigue/low energy levels  
**NP diagnosis: Parkinson's Disease (LBDN, B6), Alzheimer's Disease B2**

Male, age of onset 73y, disease duration 9y, COD – end stage PD  
Presentation: Memory disturbance and problems with balance and walking,  
postural tremor on L side  
Clinical diagnosis: Idiopathic Lewy Body Disease. Motor symptoms  
(Aknetic-rigid / Postural instability, Gait Difficulty-predominant) precede  
dementia by several years, PDD.  
**NP diagnosis: Alzheimer's Disease B6, Parkinson's Disease (LBDBS, B3) – Mixed  
Dementia**

Female, age of onset 71y, disease duration 9y, COD – unknown  
Presentation: Tremor in left hand  
Clinical diagnosis: Idiopathic Parkinson's Disease  
**NP diagnosis: Alzheimer's Disease B1 – normal control!**

**85% of the time  
neurologists  
are correct!**

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19

## Provision to research



- Researchers from anywhere around the world
- Application submitted via online form
- Reviewed within 4 weeks
- Tissue prepared to requirements and shipped
- Results reported back to tissue bank
- 40-50 project requests a year

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20

## Outcomes



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21

## Diagnostic Reporting

Report provided to family and opportunity  
to discuss results with the tissue bank  
team

Reports provided to neurologists and GP

Clinical case reporting

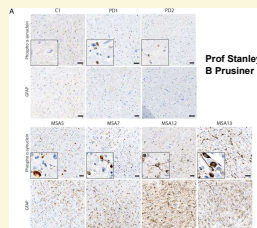
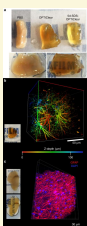


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22

## Research Outcomes

757 tissue requests fulfilled!



Prof Stanley B Prusiner

Dr. Anna Mallach

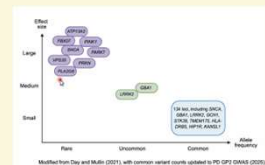
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23

## What we're doing

- Genetic testing of all cases – contributing to GP2 program

**DNA** → RNA → Protein

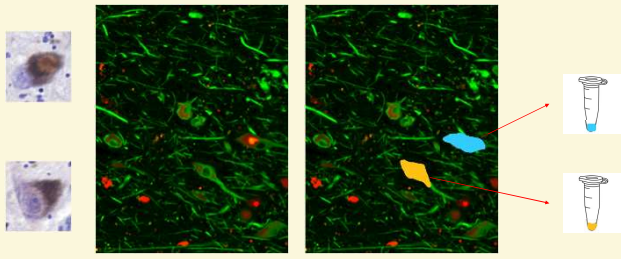


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24

## What we're doing

DNA → **RNA** → Protein



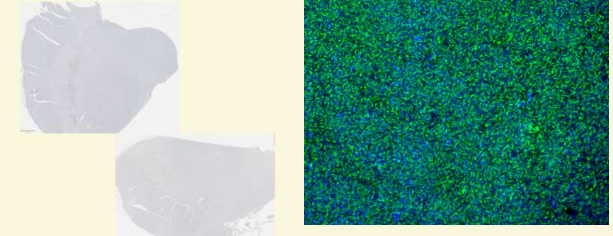
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25

## What we're doing


DNA → RNA → **Protein**

- Digital pathology and storage of HD images (AI)
- IPSCs (NESTIN)



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26

**IMPERIAL**  
 **Parkinson's UK**  
 For every Parkinson's journey

- 1 Who we are
- 2 What we do
- 3 Our processes
- 4 Outcomes

## Thank you

- Awareness - different from other donation schemes
- Covering gap in healthcare provision. This wouldn't happen without charity backing
- We're only going to truly understand this condition by examining it in human tissue. We encourage all those who feel comfortable donating, to do so!

27

## Further Reading

Kulcsarova, K, Matej Skorvanek, Postuma, RB & Berg, D 2024, 'Defining Parkinson's Disease: Past and Future', Journal of Parkinson's disease/Journal of Parkinson's disease (Online), IOS Press, pp. 1–15.

Lai, HM, Liu, AKL, Ng, HHM, Goldfinger, MH, Chau, TW, DeFelice, J, Tilley, BS, Wong, WM, Wu, W & Gentleman, SM 2018, 'Next generation histology methods for three-dimensional imaging of fresh and archival human brain tissues', Nature Communications, vol. 9, no. 1, p. 1066, viewed 9 November 2022, <<https://www.nature.com/articles/s41467-018-03359-w>>.

Mallach, A, Weinert, M, Arthur, JL, Djordje Gveric, Tierney, TS & Alaviyan, KN 2019, 'Post mortem examination of Parkinson's disease brains suggests decline in mitochondrial biomass, reversed by deep brain stimulation of subthalamic nucleus', The FASEB Journal, vol. 33, Wiley, no. 6, pp. 6957–6961.

Prusiner, SB, Woerman, AL, Mordes, DA, Watts, JC, Rampersaud, R, Berry, DB, Patel, S, Oehler, A, Lowe, JK, Kravitz, SN, Geschwind, DH, Glidden, DV, Halliday, GM, Middleton, LT, Gentleman, SM, Grinberg, LT & Giles, K 2015, 'Evidence for  $\alpha$ -synuclein prions causing multiple system atrophy in humans with parkinsonism', Proceedings of the National Academy of Sciences, vol. 112, no. 36, pp. E5308–E5317.

MS and Parkinson's Tissue Bank: [www.imperial.ac.uk/tissue-bank](http://www.imperial.ac.uk/tissue-bank)

A brief history of surgery in Parkinson's: <https://www.parkinsons.org.uk/research/research-blog/research-explained/brief-history-brain-surgery-parkinsons>

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28

# IMPERIAL

**Imperial Brain Bank Contact Details**

Email: [brainbank@imperial.ac.uk](mailto:brainbank@imperial.ac.uk) , [rory.smith1@nhs.net](mailto:rory.smith1@nhs.net)

Telephone: 020 7594 9732 / 9734

Emergency Telephone (on call): 07566 950 965

Website: <https://www.imperial.ac.uk/tissue-bank>

29