UK Parkinson's Disease Society Tissue Bank at Imperial College

Donate for the Future: How the UK Parkinson's Disease Society (PDS) Tissue Bank aims to advance Parkinson's and related research.

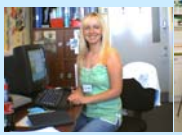
Who are we?

Left to Right
Dr David Dexter: Scientific Director
Prof Manuel Graeber:Neuropathologist
Prof Richard Reynolds:Technical Advisor
Dr Ronald Pearce: Consultant Neurologist

Left to Right
Dr David Dexter: Scientific Director
Louisa Djerbib: Research Technician
Dr Ronald Pearce: Consultant Neurologist
Helen Cairns: Research Assistant
Dr Kirstin Goldring:Tissue Bank Manager
Prof Manuel Graeber:Neuropathologist

Dr David Dexter: Scientific Director of the Tissue Bank

Helen Cairns: Research Assistant



Laura McKay: Secretary

Louisa Djerbib: Research Technician

Dr Kirstin Goldring:Tissue Bank Manager

What is the aim of the UK PDS Tissue Bank?

The aim of the new PDS Tissue Bank is to supply high quality samples of human brain and other tissue to scientists studying the causes and treatments of Parkinson's Disease.

Why do we need human brain tissue for Parkinson's research?

Thus far, there are no treatments for Parkinson's that can halt the disease or restore damaged nerve cells. In order to establish new and more effective treatments for Parkinson's, it is necessary to gain a better understanding of the changes that occur in brain tissue and to relate these to healthy ageing, by comparing Parkinson's tissue with results obtained from parallel study of normal brain tissue. Human tissue research has already contributed to the development of drugs for Parkinson's such as L-Dopa and greater understanding of how cells die in the disease and how we control movement. Hence, the donation of the human brain is one of the most important legacies that can be made to the progression of research into Parkinson's and other neurological disorders In addition: 1) Animals do not develop Parkinson's hence donated tissue is essential for examining the mechanisms of cell death, pathological changes etc, etc. 2) Studies on Parkinson's Tissue are complementary to animal & cell culture studies. 3) Research on human tissue can provide confirmation that animal studies are relevant to Parkinson's

"Looking at post-mortem brain tissue is like looking at the scene of a crime. You are trying to gather evidence to find out what has happened" says Professor Graeber, Tissue Bank Neuropathologist. "In the same way police gather forensic evidence, researchers can gather important clues as to how cells die in Parkinson's".

What is tissue is required?

Since PD is a progressive disease of the nervous system, the brain and spinal cord are used in research. The cerebrospinal fluid bathes the brain and spinal cord, so the study of this fluid may also provide useful information. We therefore routinely remove the following tissue:

– The entire brain – The entire spinal cord – A sample of cerebrospinal fluid

Who can donate?

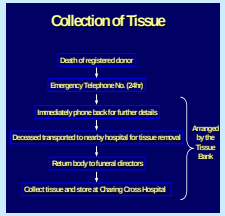
Firstly it is important to state that ANYONE can donate to the Tissue Bank! Not only is tissue from Parkinson's and Parkinson's plus movement disorders (Multiple System Atrophy (MSA), Progressive Supranuclear Palsy (PSP) and others) crucial for the work of the Tissue Bank, but also tissue from control donors with no neurological conditions is also vital. The control donors are key to provide a comparison to normal ageing tissue.

What is involved in the donation procedure?

If someone is interested in donation, they are sent an information sheet, to ensure they have sufficient information to make the important decision of whether to become a registered tissue donor. Then, once the person has discussed it with their family and has decided they wish to donate, there are required to complete three forms; a donor form, which they sign themselves to show that they wish to donate; a next-of-kin form for a relative to complete; an health information form. The next-of-kin form is essential, due to the fact that following the death of a donor; permission from the next-of-kin has to be obtained before any tissue can be removed. Once the Tissue Bank receives the completed forms, the donor is registered on our database and will be sent a donor card to carry with them at all times. The card has their own unique donor number and our 24 hours emergency contact number.

When and how will the tissue be retrieved?

The brain and spinal cord change very quickly after death and thus tissue taken from the body within 24 hours of death is of greatest value to research. Therefore we have put in place a procedure that ensures prompt collection and storage of donated tissues. We aim to collect the tissue within 24 hours, although this may not always be possible. At, or near the time of death, a person's next-of-kin, legal representative or GP should contact the Tissue Bank on the 24-hours telephone number on the donor card. One of the Tissue Bank team will be available at all times and will call back and ask for details. That person will then arrange for the funeral director to take the body to a hospital near the home or place of death to remove the brain tissue and any other tissues being donated. The brain and spinal cord are removed in a respectful and careful manner that permits display of the body after tissue retrieval. A member of the Tissue Bank team will immediately collect the tissue. This process should only add a few hours onto the funeral arrangements already made by relatives and they will not incur any cost.



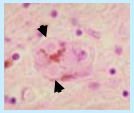
What will the donated tissue be used for?

Requests for tissue come from recognised Institutions both in the UK and around the world. Each request will be reviewed by an independent scientific panel, to check its scientific merit and its possible benefit to Parkinson's disease research. Once ratified the Tissue Bank will supply the appropriate tissue to the research team. The research team will provide a written report of the findings of research carried out on tissue supplied from the Tissue Bank.

The challenge for Parkinson's researchers lies in unravelling the complex mechanisms that bring about nerve cell death in people with PD. The ultimate aim is to understand Parkinson's and design effective treatments and ultimately find a future cure for the disease.

Substantia nigra from a normal (control) brain – darkned/pigmented area

Substantia nigra from a PD brain – pale/depigmented area



A histological section of Parkinsonian Substantia nigra depicting a dopaminergic neurones containing Lewy Bodies.

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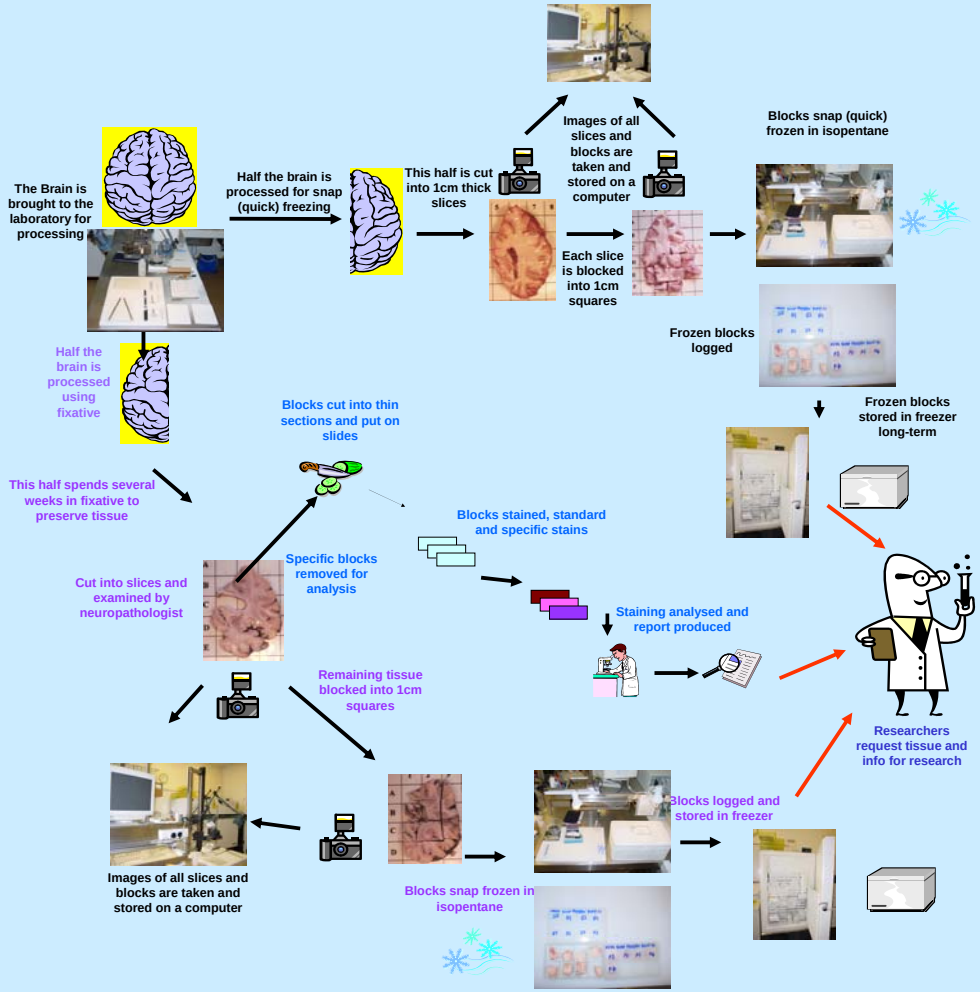
What happens to the human brain tissue donated to the Tissue Bank?



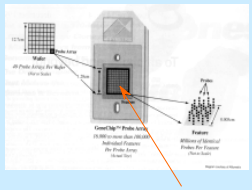
The brain is roughly made up of two equal halves. The brain is firstly cut into two, one half of the brain is fixed for neuropathological examination. The other half brain is sliced into thick sections, blocked and rapidly frozen, this is then stored long-term in a –85 freezer. From the fixed half brain, tissue blocks from various brain regions are cut. Tissue sections from such blocks are subjected to a variety of histological stains. A neuropathologist examines the sections under a microscope to confirm that the donor had a specific neurological disease or was free from any neurological disorder and combines this information with a clinical summary produced from the donors medical records. Once the neuropathological diagnosis has been confirmed, the frozen tissue blocks can be utilised for the various research projects.

What research is tissue from the Tissue Bank currently being used for?

Microarray-based research in the new PDS Brain Research Centre at Imperial College

Microarrays represent 'laboratories on a chip' that measure only centimetres in size (see below). They allow the *high-throughput* analysis of all genes expressed in tissues such as the nervous system. There are 33,000 genes to look at! The aim is to investigate if there is any up or down regulation of genes in Parkinson's tissue when you compare it to control tissue. Research on the genes involved in Parkinson's will concentrate on the genes responsible for the mechanisms of cell death that we have identified so far e.g. oxidative stress. Once we have identified genes that are either up or down regulated we will look at their expression at the cellular level i.e. does it occur in neurones, glia etc, using UV laser capture dissection (see below). Tissue from the Tissue Bank is vital for this research to take place.

Microarray Technology



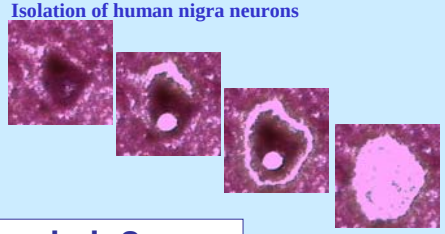
Editorial (1996) To affinity... and beyond. Nature Genet 14:367-370

Chee M, Yang R, Hubbell E, Berno A, Huang XC, Stern D, Winkler J, Lockhart DJ, Morris MS, Fodor SPA (1996) Accessing genetic information with high-density DNA arrays. Science 274:610-614

Isolation of Specific cells

UV Laser Capture Microdissection

Isolation of human nigra neurons



How can you help?

At the moment the demand for tissue for research is greater than the amount of tissue being donated to the tissue bank. The PDS and New Tissue Bank will make every effort to recruit more donors to the scheme so that we can supply tissue to all research projects that require tissue.

You can help by raising the awareness of the Tissue Bank to people affected by Parkinson's Disease and those family and friends not affected by the disease so that we can encourage more people to join the donor scheme.

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