NHS Blood and Transplant

TISSUE BANKING: THE WHY & THE HOW?

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NHS Blood & Transplant

Types of Grafts

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Many treatment strategies for repairing and replacing damaged tissues, depending on nature of damage.

Type	Source
Xenografts	Animal Tissue
Autografts	Graft from another site of recipient's body
Allografts	Donated by another person
Prosthetic	Artificial material
Bioprosthetic	Biological grafts combined with prosthetic

Which Graft?

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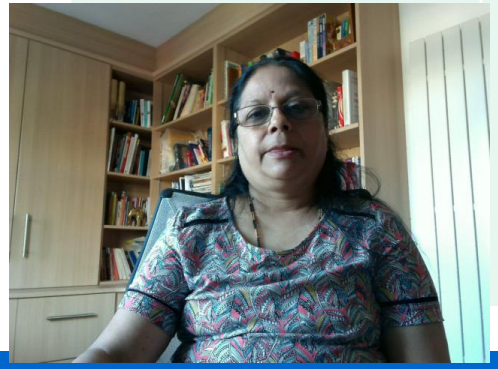
	Advantages	Disadvantages
Autograft	Gold standard – good clinical performance No rejection/disease transmission	Limited use Additional morbidity in donor site
Prosthetic Grafts	No restriction in supply	No integration Infection Thrombogenic (cardiac)
Xenografts	Availability	? Infection risk (zoonotic)
Allografts	Biocompatibility Biomechanical properties nearly similar to autograft	Perceived risk – infection transmission (donor derived or contamination) Access: Tissue Banking expertise



Evolution of Tissue Banking

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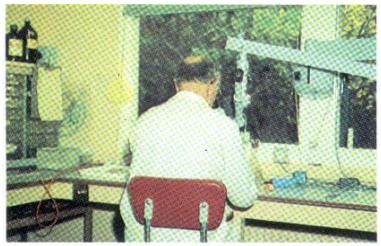


1960s

Small hospital based banks; usually banking one type of tissue with minimal processing and storage facilities and serving a single or small group of hospitals

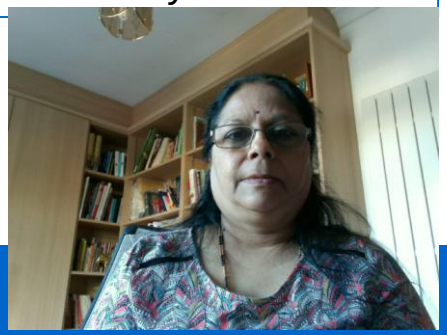
1980s

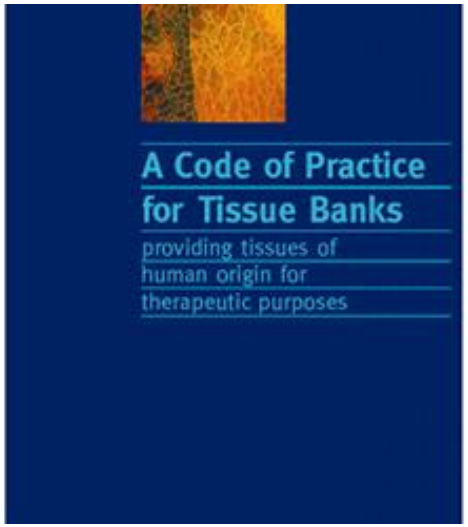
Larger, multiregional banks, serving a number of different hospitals with different types of graft, with specialised processing and storage facilities

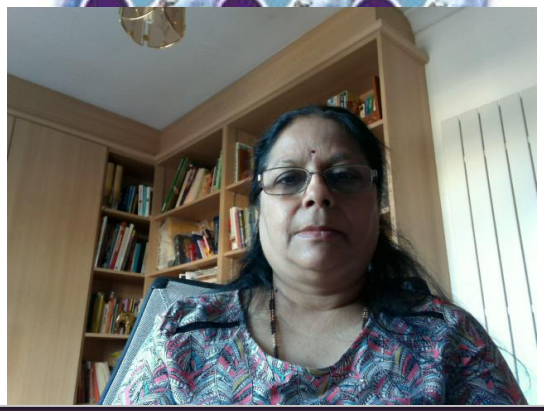
2000s

National banking service; large facility, with multiple clean rooms and specialised processing and storage equipment, providing all types of graft needed nationally

NHSBT provides around ~80% of allografts in the UK;
Other NHS tissue banks and commercial providers.







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Regulation

Pre-1990s

Until 1990s – Very little regulation.

National legislation forbids selling human tissue.

Some tissue banks obtain **voluntary accreditation** to ISO9001 quality management systems

1990s

National Code of Practice.

Voluntary accreditation by the **UK Medical Devices Agency**

2004

UK Human Tissue Act consent for donation and storage of tissue.

Mandatory licensing and inspection for consent and storage of allografts

2006

European Tissue and Cell Directive. Regulates consent, donor screening, processing, storage and distribution of allografts.

Mandatory inspection and licensing by Human Tissue Authority

Tissue Donation

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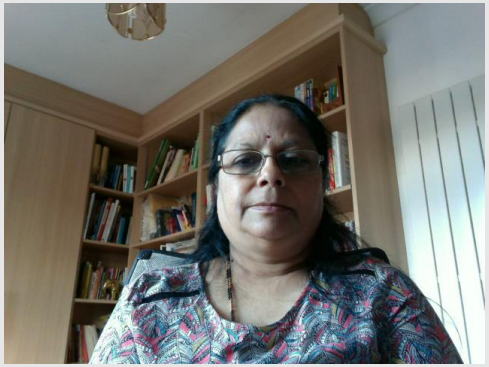
Living Donation Programme

Bone

Amniotic Membrane:



Deceased Donation Programme

- Musculo-skeletal: Bone, Tendons, Meniscus
- Skin
- Eyes : Corneas, Sclera
- Cardiovascular : Heart valves, Arteries

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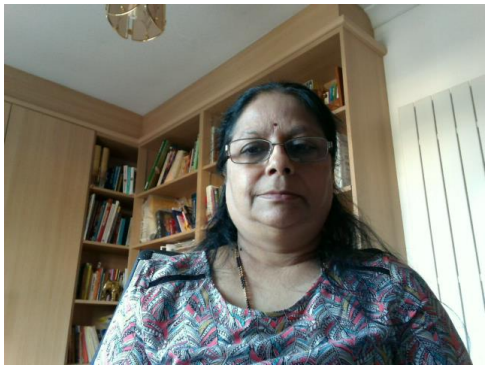
NHSBT Tissue Bank at Speke


DONOR SELECTION & CONSENT


TISSUE PROCUREMENT




TISSUE PROCESSING

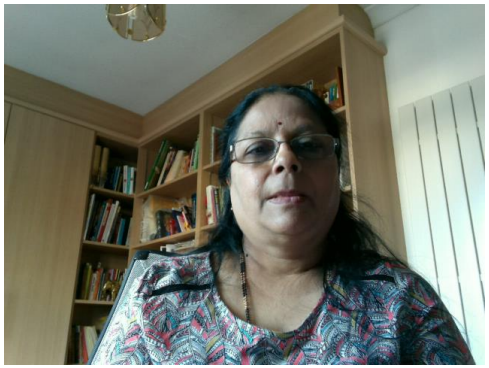

TISSUE STORAGE & ISSUE

Donation after death

Almost everybody can be considered for tissue donation after death.

•Age limitations for some tissues

- National Donor Selection Guidelines are used to screen donors (www.transfusionguidelines.org)
- Time limitation (donation within 48 hrs of death, eye donation within 24 hours)
- Subject to Coroner's consent

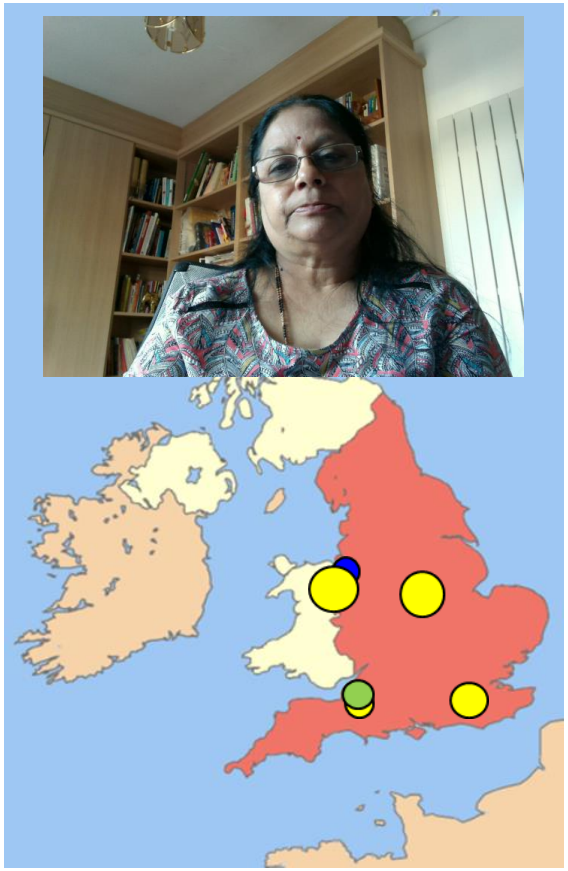


•Different Referral Pathways

•National Referral Centre (NRC) (or) Specialist Nurses Organ Donation (SNOD)

- NRC: Medical and behavioural history, and consent taken by telephone and recorded

NHSBT Tissue & Eye Service



- Processing, banking and distribution of musculoskeletal, cardiovascular, skin and ocular allografts (Speke, Liverpool)
- Processing, banking and distribution of ocular allografts (Filton, Bristol)
- Tissue procurement team base (Barnsley, Liverpool, London & Bristol)

Eye procurement – UK

Heart for tissue banking: taken in theatre
NHSBT TES manages National Fulfilment system

Tissue Processing

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Donated tissue grafts are processed

- **To make them safer (e.g. decontamination/sterilisation)**
- **To make them more clinically effective (e.g. decellularisation)**
- **To make them easier to store and transport (e.g. lyophilisation)**

The processing methods applied depend on required properties of the graft, and the type of graft; for example:

- **If cell viability is needed, only minimal processing can be applied**

Viable tissues must be processed **immediately** , for non-viable tissues unprocessed tissues can be **quarantined** post donation and activity planned

Following processing, the tissue must be preserved.

- Short term storage can be accomplished with hypothermia or normothermic organ culture (viable).
- Long term storage can be accomplished by cryopreservation (viable) , deep freezing or lyophilisation.

Bone allografts

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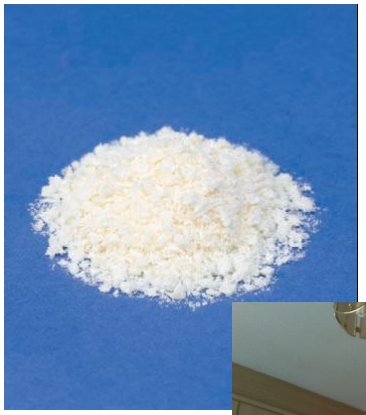
Massive allografts

Shaped cortico-cancellous

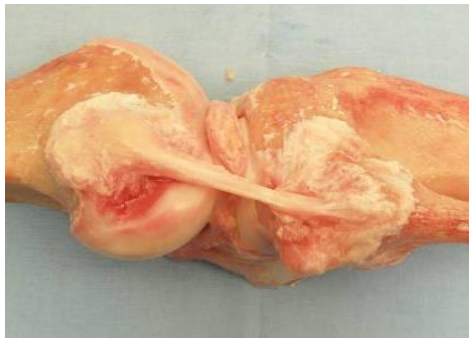
Shaped cortical

Demineralised Bone Matrix

Shaped cancellous



Morsellised cortico-cancellous



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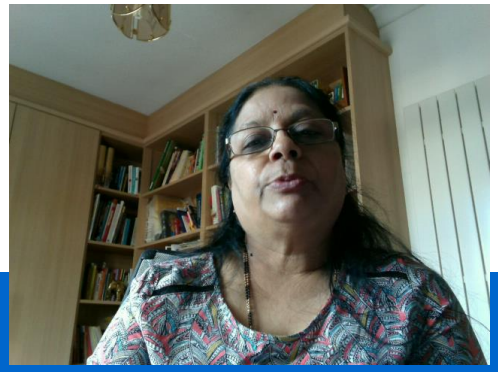
Bespoke Allografts

- Occasionally, patient specific requests are received.
- Principally for musculoskeletal allografts
- Precise size requirements, based on MRI/Xray
- May involve multiple bones & ligaments

- In this example, a patient had lost portions of his distal femur & proximal tibia following traumatic injury. A matching, composite allograft was provided



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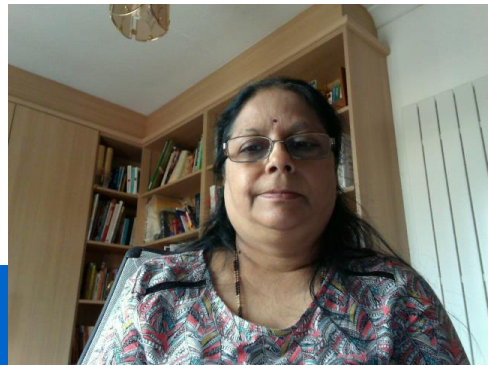
Research and development

- TES strategy:
  - Primary research is done in Universities
  - Close collaborations to facilitate transfer of new techniques into routine practice;
  - Collaborate with surgeons to introduce grafts into clinical use ‘bench to bedside’

dCELL Dermis- wound healing (University Hospital South Manchester) , MID FUT (national, Leeds) , DaVE (Imperial)

dCELL Dermis- Rotator Cuff – Royal Orthopaedic Birmingham



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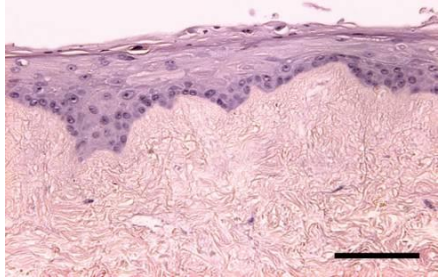
Allograft Development Pathway

In use | **In Use & in development** | **In development**

1ST GENERATION – TRADITIONAL ALLOGRAFTS

2ND GENERATION – DECELLULARISED MATRICES, TISSUE GELS

3RD GENERATION – MATRICES REPOPULATED WITH CELLS AND/OR BIOACTIVE MOLECULES



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Thank You for Your Attention

Questions?

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