Guidelines for Tissue Banking

ROTTO SOTTO
gifting life
REGIONAL AND STATE ORGAN AND TISSUE TRANSPLANT ORGANISATION (MUMBAI)

Regional and State
Organ and Tissue Transplant
Organisation,
Mumbai

GUIDELINES FOR TISSUE BANKING

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These Guidelines have been authorised by the Directorate of Health Services, Maharashtra, and have been drafted by the Tissue Expert Committee of the Regional cum State Organ and Tissue Transplant Organisation (ROTTO-SOTTO), Western Region and Maharashtra.

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INTRODUCTION

Human tissue transplantation is an accepted therapeutic measure for many medical conditions. It improves the quality of the recipient's life by enabling biological reconstruction of skeletal defects which may be congenital or caused by trauma or disease; it can avoid amputations in the treatment of malignant skeletal tumours; and it makes medical and surgical recovery quicker and less painful. It can even save lives when used in severely burned patients and in patients requiring heart valve replacement.

Tissues can be obtained from living or deceased donors. Tissue removed during certain surgical procedures such as hip or knee replacement surgery can be donated by living donors. Amputations due to trauma can also provide tissue. Amniotic membrane can be donated after childbirth. Deceased donors can provide a wide range of tissues including bone, tendon, cartilage, ligaments, fascia lata, skin, heart valves, pericardium, cornea, veins, adipose tissue and nerves.

Deceased donors are usually people who have died in accidents or from sudden illness such as heart attack or stroke. Every donor is screened and tested before donation can take place. Individuals with histories of any condition or high-risk behavior that could affect the safety, quality and long-term performance of the tissue are excluded.

Organs donors can also be tissue donors. In general, organ donors are brain dead, which is defined as the irreversible cessation of all brain function. Organ donation only occurs when mechanical support (i.e., ventilators) can continue the viability of the organs for a short period of time after the death of the patient. Organs (heart, liver, kidney, etc.) must be carefully matched to waiting recipients. Matching is done according to factors such as blood type, medical status of the recipient and size of the waiting recipient. Unlike organs, tissues do not require an intact cardiovascular system to be viable for transplantation. Thus, every death can be an occasion for potential tissue donation, whether it takes place in a hospital or outside, even at home. Consequently, there are many more potential tissue donors than organ donors. Tissue recipients do not have to be matched to their donors, as rejection is not generally a concern.

Tissues used for transplantation must be free from any transmissible disease, immunologically safe and retain their natural biological and biomechanical properties so that they are clinically useful. This involves a series of processes that are conducted in a Tissue Bank.

In addition, tissues may be processed into products. While donated tissues like corneas, heart valves, tendons and ligaments may be transplanted practically unaltered, other tissues are significantly changed before transplantation. Skin, for example, may be made available as conveniently sized dressings, or incorporated into sprays or gels, or decellularised. Bone may be cut into different shapes and sizes, morsellised or made into injectable putty. Its calcium may be removed to enhance incorporation and tissue regeneration. These products find use in almost every form of surgery – cardiovascular surgery, plastic surgery, neurosurgery, orthopaedic surgery, sports medicine and craniofacial/maxillofacial/dental surgery. Biological dressings produced from amniotic membrane may be used in out-patient settings or even at home.

The recovery, screening, testing, processing, storage and distribution of tissues are governed by the Transplantation of Human Organs and Tissues Act (THOTA), 1994, and the Transplantation of Human Organs and Tissues (THOT) Rules, 2014.

According to THOTA, 1994, "tissue" is defined as a group of cells, except blood, performing a particular function in the human body" [THOTA Section 2 (oa)].

The Act defines a "Tissue Bank" as a facility registered under THOTA, 1994, to carry out "any activity relating to the recovery, screening, testing, processing, storage and distribution of tissues, but does not include a Blood Bank [THOTA Section 2 (ob)].

SECTION A: GENERAL AND ORGANISATIONAL POLICIES

1. Scope and Purpose

1.1 These ROTTO-SOTTO Guidelines for Tissues apply to human tissues used for therapeutic purposes, excluding cornea, blood, reproductive and genetically modified tissues. They do not apply to animal tissues. The human tissue will include, but are not restricted to, bone, tendon, cartilage, ligaments, fascia lata, skin, heart valves, pericardium, veins, adipose tissue and nerves.

1.2 These Guidelines provide a basis for good tissue practice and cover the procedures necessary for tissue banking.

1.3 The purpose of these Guidelines is to establish Tissue Banks which can provide safe tissues of reliable quality for human transplantation, in compliance with THOTA 1994, and to lay down the basic requirements for the registration of Tissue Banks.

2. Registration of Tissue Bank [THOTA Section 14-A]

2.1 Rules for Registration

According to THOTA, 1994:

(1) No Tissue Bank shall, after the commencement of the Transplantation of Human Organ (Amendment) Act, 2011, commence or continue any activity relating to the recovery, screening, testing, processing, storage and distribution of tissues unless it is duly registered under this Act:

Any facility engaged, either partly or exclusively, in any activity relating to the recovery, screening, testing, processing, storage and distribution of tissue immediately before the commencement of the Transplantation of Human Organ (Amendment) Act, 2011, shall apply for registration as Tissue Bank within sixty days from the date of such commencement:

Further, such facility shall cease to engage in any such activity on the expiry of three months from the date of commencement of the Transplantation of Human Organs (Amendment) Act, 2011, unless such Tissue Bank has applied for registration and is so registered, or till such application is disposed of, whichever is earlier.

(2) Every application for registration shall be made to the Appropriate Authority as specified in Form 14, THOT Rules, 2014, and the application shall be accompanied by a fee of Rupees ten thousand payable to the Appropriate Authority by means of a bank draft which may be revised, if necessary, by the Central or State Government, as the case may be. **(Annexures 1 & 2)**

(3) No Tissue Bank shall be registered under the Act unless the Appropriate authority is satisfied that such Tissue Bank is in position to provide such specialised services and facilities, process such skilled manpower and equipment and maintain such standards as may be prescribed.

2.2 Certificate of Registration [THOTA, Section 15 & THOT Rules, 2014, No. 24]

(1) The Appropriate Authority shall, after holding an inquiry and after satisfying itself that the applicant has complied with all the requirements of this Act and rules made thereunder, [32]grant to the hospital or to the Tissue Bank, as the case may be, a certificate of registration as specified in Form 16, THOT Rules, 2014, and it shall be valid for a period of five years from the date of its issue and shall be renewable.

(2) If, after the inquiry and after giving an opportunity to the applicant of being heard, the Appropriate Authority is satisfied that the applicant has not complied with the requirements of this Act and the rules made thereunder, it shall, for reasons to be recorded in writing, reject the application for registration.

2.3 Renewal of Registration of Tissue Bank (THOT Rules, 2014, No. 25)

(1) An application for the renewal of the certificate of registration shall be made to the Appropriate Authority at least three months prior to the date of expiry of the original certificate of registration and shall be accompanied by a fee of Rupees five thousand payable to the Appropriate Authority by means of a bank draft which may be revised, if necessary, by the Central or State Government, as the case may be.

A renewal certificate of registration shall be issued as specified in Form 17, THOT Rules, 2014, and shall be valid for a period of five years.

(2) If, after an inquiry including inspection of the tissue bank and scrutiny of its past performance and after giving an opportunity to the applicant of being heard, the Appropriate Authority is satisfied that the applicant has not complied with the requirements of the Act and the rules and the conditions subject to which the certificate

of registration has been granted, shall, for reasons to be recorded in writing, refuse to grant renewal of the certificate of registration.

3. Payment

4.1 Monetary payment or advantages for the donation shall not be made to living donors, deceased donor's next-of-kin or any donor-related party.

3.2 Donors or their family may be compensated for donation-related expenses including the "defraying or reimbursing (of) the cost of removing, transporting or preserving" the donated tissues [THOTA, 1994, Chapter 1, Section 2(k)]. Donors or their family shall not be financially responsible for expenses related to retrieval of tissues.

3.3 Service charges may be levied to cover the expenses incurred by Tissue Banks for the retrieval of tissues, their transportation, testing tissues to ensure their safety, maintenance of donor records, processing, preservation, distribution and research to improve their efficacy. The cost for deceased donor management, retrieval of tissues, their transportation and preservation may be borne by the recipient, institution, government, NGO or society as decided by the State government [Rules 2014, Rule 9].

4. Anonymity

The anonymity between donor and unrelated recipient must be strictly preserved. However anonymous identification numbers must be employed to allow tracking of tissues between the donor and recipient.

5. Facilities

5.1 The Tissue Bank should be of suitable size and be designed and equipped for the specialized purposes for which it is to be used.

5.2 It should be designed to prevent cross-contamination. Where necessary, wet and dry processing areas must be separated.

5.3 Access to the Tissue Bank must be limited to authorised persons.

6. Environmental Monitoring

6.1 Environmental monitoring procedures when required must be established as part of the Quality Assurance Programme. The procedures should include particulate air samplings and work surface cultures. Each monitoring activity must be documented.

Facilities used for retrieval, processing or preservation, must be subjected to routine, scheduled and documented cleaning procedures.

7. Equipment

7.1 Equipment shall be designed, manufactured and qualified for appropriate cleaning and shall be sterilised or decontaminated after each use. Multiple uses of disposable instruments for several donors is not permitted.

7.2 There shall be SOPs for maintenance, calibration, and cleaning procedures for all equipment. Appropriate certification and maintenance records shall be maintained for equipment and instruments.

7.3 Equipment for processing freeze-dried bone and soft tissues includes but is not limited to the following:

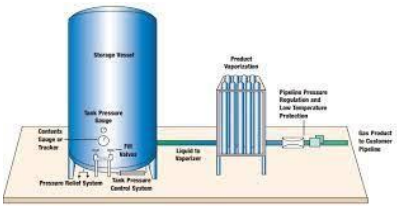
- Freeze-drier
- -80 degree C freezer
- Bone cutting Bandsaw
- Biosafety cabinet
- Refrigerator
- Moisture content analyser
- Electronic balance
- Surgical instruments for cleaning and cutting bone and soft tissue
- Sealer for packaging

7.4 Equipment for processing of skin includes but is not limited to the following:

- Biosafety Cabinet/Laminar flow cabinet
- Mesher

- Dermatome
- Incubator
- Quarantine Refrigerator/Freezer
- Autoclave
- Triple H Kit (HIV, HBsAg & HCV combination rapid test for assessing Hepatitis B, Hepatitis C and HIV)

7.5 Equipment for processing of cardiovascular tissue includes but is not limited to the following:

- Biosafety Cabinet/Laminar flow cabinet
- Walk in Fridge/Freezer
- Autoclave
- Containers 250 ml, 500 ml
- Container Seal
- Preservation solution
- Computer for data entry
- Printer for Labels/ Records
- Liquid Nitrogen supply Tank
- 

8. Personnel

8.1 Personnel need to be available for the following responsibilities:

- Administration and Management of the Tissue Bank
- Screening of donors
- Retrieval of tissues from deceased donors
- Coordination of donation and collection of tissues
- Processing of tissues
- Compliance with Government regulations

- Policies for the functioning of the Tissue Bank
- Maintenance of equipment and supplies.
- Storage of tissues
- Distribution of tissues
- Quality assurance
- Documentation
- Maintenance of computer and printer, and IT support
- Research

8.2 The duties of each staff member must be described in a written job description. Staff must demonstrate competency in operations to which they are assigned.

8.3 Qualifications

8.3.1 The Tissue Bank staff must possess the educational background, experience and training, sufficient to ensure assigned tasks are performed in accordance with the requirements of THOTA and ROTTO-SOTTO, Mumbai.

8.3.2 The person in charge of the administration and management of the tissue bank must have a Master's degree in any relevant subject with 5 years experience in tissue banking with a minimum of 3 years in Senior Management.

8.3.3 The screening of donors must be conducted by a registered medical practitioner.

8.3.4 Tissues may be retrieved from deceased donors by registered health care professionals or technicians having the necessary experience or training [Rules, 2014, No. 28 D (10)] imparted by surgeons as per the curriculum of ROTTO-SOTTO **(Annexure 3).**

8.3.5 Heart valves may be retrieved by registered health care professionals only.

8.3.6 Persons engaged in the processing of tissues must undergo training in a registered tissue bank and/or be certified by a registered Tissue Banking facility.

8.3.7 Transplant Coordinators [Rules 2014 Section 29].

(1) The transplant coordinator must have qualification such as:

(a) Graduate of any recognised system of medicine; or

(b) Nurse; or

(c) Bachelor's degree in any subject and preferably Master's degree in Social work or Psychiatry or Sociology or Social Science or Public Health

(2) The tissue bank shall ensure initial induction training followed by retraining at periodic interval and the transplant coordinator shall counsel and encourage the family members or near relatives of the deceased person to donate the human organ or tissue including eye or cornea and coordinate the process of donation and transplantation.

9. Environmental Safety

9.1 Each Tissue Bank shall provide and promote a safe work environment by developing, implementing and enforcing safety procedures. Safety precautions and procedures for maintaining a safe work environment shall be included in the SOPs.

9.2 Safety procedures shall include, but are not limited to the following:

- Instructions for fire prevention and evacuation routes in case of fire or natural disaster and fire detection and management equipment;
- Procedures for prevention of worker injury including possible exposure to biohazards material;
- Procedures for proper storage, handling and utilisation of hazardous materials, reagents and supplies;
- Procedures outlining the steps to be followed in cleaning biohazard spills;
- Training in the handling of hazardous material including chemical, biological and radioactive hazards;
- Appropriate immunization of all non-immune personnel whose job-related responsibilities involve potential exposure to blood-born pathogens with documentation of receipt of vaccination or refusal of vaccination; the following vaccinations are advisable:

  a) Vaccines against Hepatitis B at zero, 1 month, and 6 months, repeated every 5 years.
  b) Vaccine against Tetanus 3 doses each one month apart or after an injury.

- The tissue retrieval team should be free of symptoms of any infectious disease at the time of tissue retrieval;

- Suitable attire for personnel engaged in the retrieval, processing, preservation and packaging of tissues to minimise the spread of transmissible pathogens among and between donors, tissue and staff. Any staff member with a serious infectious condition including symptoms of COVID-19, shall be excluded from the Tissue Banking activities including retrieval of tissue, until the condition is resolved.
- If any staff is positive for COVID-19, 14 days quarantine is compulsory, and a negative RT-PCR report for COVID –19 is mandatory before resumption of duties.

9.3 Human tissue and other hazardous waste items shall be disposed of in compliance with the Maharashtra Pollution Control Board (MPCB).

SECTION B. DONOR SUITABILITY

1. Consent for Retrieval of Tissue

1.1 Living Donor

1.1.1 Tissues are collected from living donors during a surgical/medical procedure where the material is collected for therapeutic purpose other than to obtain tissue (e.g. femoral head during hip replacement surgery, heart valves from the discarded hearts of recipients of heart transplants, and amnion post deliveries). These surgical and medical residues, which would routinely be discarded, can be donated to the Tissue Bank.

1.1.2 An Informed Consent in writing must be obtained from the living donor even if these tissues would have been discarded.

1.2 Deceased Donor

1.2.1 The process for tissue donation may commence after death is ascertained by a registered medical practitioner.

1.2.2 Informed Consent must be obtained in writing from the legal next of kin of the potential donor as stated in THOTA, 1994 **(Annexures 4 & 5).**

1.2.3 A registered medical practitioner prior to the removal of the tissues must ascertain if the potential donor had, in the presence of two or more witnesses, at least one of whom is a near relative, unequivocally authorised before his or her death, the donation of their tissue after death, as specified in Form 7, THOT Rules, or in documents like a driving license etc. **(Annexure 6)**

1.2.4 No removal of tissue can take place if it is ascertained that the deceased had subsequently revoked his or her aforesaid authorisation [THOT Rules, Section 5(4)(a)], or when there was an open or presumed objection on the part of the deceased [THOTA, Section 3 (2), (3)].

1.2.5 In case of a person less than eighteen years of age or legally incapacitated person, the consent of his/her parents or legal representative is required [THOTA, Section 3(7)].

1.2.6 Tissue can be retrieved only if it does not interfere with a forensic examination or autopsy as required by law [THOTA 4(1)].

1.2.7 Tissue cannot be retrieved from a deceased person at the time of internment, cremation or other disposal [THOTA 4(2)] without the written consent of the next-of-kin.

1.2.8 Tissues may be retrieved from a deceased donor when the body has been sent for post-mortem examination if the person competent under THOTA authorises their removal, provided the deceased person had not expressed any objection to this prior to his death [THOTA, Section 6].

1.2.9 When tissues are retrieved from medico-legal cases of deceased donors a No Objection Certificate (NOC) is required from the local police station.

1.2.10 In the case of brain-stem death of a potential tissue donor, a certificate as specified in Form 10 for Certification of Brain Stem Death must be signed by all the

members of the Board of Medical Experts who certify brain-stem death as per THOTA, 1994 [Rules 5(4)(c) and (d)].

1.3 Documentation

1.3.1 Consent for tissue donation must be documented. The consent form must specify which tissues are being donated and whether these are being donated for transplantation, research or education. The consent must also include consent to do the required blood tests including for HIV 1 and 2, Hepatitis B and C.

1.3.2 In the case of deceased donors a copy of the death certificate is essential.

1.3.3 In the case of brain-stem death of a tissue donor Form 10 for Certification of Brain Stem Death is essential.

2. Donor suitability criteria

1.1 Donor suitability criteria shall be established by the registered medical practitioner in charge of donor screening. Each donor shall be evaluated according to established criteria. The suitability of each donor shall be determined by a registered medical practitioner and is based upon medical and behavioural history, medical records review, physical examination, deceased donor autopsy findings (if an autopsy is performed) and laboratory tests **(Annexure 7).**

2.2 It is advisable for the tissue bank to have a Medical Advisory Board with qualified personnel with necessary expertise to provide medico-technical, scientific and medico-legal advice when required.

2.3 Donor evaluation includes an interview of the potential living donor or the deceased donor's next of kin, performed by suitably trained personnel. A qualified physician shall approve the donor evaluation process.

3. Exclusion Criteria

3.1 Exclusion criteria for tissue donors

The following conditions contraindicate the use of tissues for therapeutic purposes:

- History of chronic viral Hepatitis.

- Presence of active viral Hepatitis or jaundice of unknown etiology.
- History of, or clinical evidence, or suspicion, or laboratory evidence of HIV infection.
- Risk factors for HIV, HBV and HCV have to be assessed by a qualified physician.
- Positive results for HIV_1, HIV_2, Hepatitis B and Hepatitis C.
- Presence or suspicion of central degenerative neurological diseases of possible infectious origin, including dementia (e.g. Alzheimer's Disease, Creutzfeldt-Jakob Disease or familial history of Creutzfeldt-Jakob Disease and Multiple Sclerosis).
- Use of all native human pituitary derived hormones (e.g. growth hormone), possible history of dura-mater allograft, including unspecified intracranial surgery.
- Septicaemia and systemic viral disease or mycosis or active tuberculosis at the time of procurement. In case of other active bacterial infection, tissue may be used only if processed using a validated method for bacterial inactivation and after approval by the Medical Director.
- Presence or history of malignant disease. Exceptions may include primary basal cell carcinoma of the skin, histologically proven and non-metastatic primary brain tumour.
- Significant history of autoimmune or connective tissue diseases (e.g. systemic lupus erythematosus and rheumatoid arthritis) or any immunosuppressive treatment.
- Significant exposure to a toxic substance that may be transferred in toxic doses or damage the tissue (e.g. cyanide, lead, mercury and gold).
- Presence or evidence of infection or prior irradiation at the site of donation.
- History of COVID in the last 1 month
- Unknown cause of death

3.2 Additional exclusion criteria for heart valve donors

- Multiple CPR

- Systemic vasculitis and antiphospholipid syndrome, Annulo-aortic Ectasia, Marfan syndrome.
- Previous heart surgery
- Structural Heart Disease -Bicuspid Aortic Valve

4. Physical Examination

4.1 Prior to procurement of tissue, the donor body shall be examined for general exclusion signs and for signs of infection, trauma or medical intervention over donor sites that can affect the quality of the donated tissue.

4.2 If any of the following signs are observed or noted in any available record, and are deemed to be an indication of the risks, then the tissue shall be rejected:

- Physical evidence for risk of sexually transmitted diseases such as genital ulcerative disease, herpes simplex, chancroid
- Physical evidence consistent with anal intercourse including perianal condyloma
- Physical evidence of non-medical percutaneous drug use such as needle tracks, including tattoos
- Disseminated lymphadenopathy
- Unexplained oral thrush
- Physical evidence of sepsis, such as generalized rash/ petechiae
- Generalized vesicular rash

5. Autopsy

If an autopsy is performed, the results shall be reviewed by the qualified physician or designee before tissue is released for distribution.

6. Blood Tests

6.1 Blood specimens for donor screening for deceased donors should be taken at the time of procurement or within 7 days prior to death.

6.2 Blood for donor screening for living donors should be taken within 14 days prior to procurement of tissue and within 7 days after procurement.

6.3 Minimum Blood Tests shall include:

- Human Immunodeficiency Virus Antibodies (HIV-1/2-Ab)
- Hepatitis B Virus Surface Antigen (HBs-Ag)
- Hepatitis C Virus Antibodies (HCV-Ab)

6.4 Re-screening of living donors for HIV, HBV and HCV at 180 days following donation is recommended where possible. If NAT (RNA) screening is used at Day 0 for HIV-1, HBV and HCV then no re-screening is required.

6.5 If a viral inactivation method is used during processing of tissues instead of retesting, it must be documented and validated.

7. Bacteriological Studies of Donor and Tissues

7.1 Representative samples of each retrieved tissue have to be cultured, if the tissues are to be aseptically processed without terminal sterilisation. Samples shall be taken prior to exposure of the tissue to antibiotic containing solution.

7.2 The culture technique shall allow for the growth of both aerobic and anaerobic bacteria as well as fungi. Results shall be documented in the donor record.

7.3 If bacteriological testing of tissue samples obtained at the time of donation reveals growth of low virulence microorganisms, which are commonly considered non-pathogenic, the tissue may not be distributed without being further processed in a way that effectively decontaminates the tissue.

7.4 Tissue from which high virulence microorganisms have been isolated are not acceptable for transplantation, unless the procedure has been validated to effectively inactivate the organisms without harmful potential effects, taking into account possible endotoxins.

8. Age Criteria

8.1 Skin

The Medical Director and/or tissue bank Medical Advisory Committee shall determine deceased donor age criteria for skin according to the characteristics and quality of tissues, after physical examination of the donor and review of the donor's medical notes.

8.2 Musculoskeletal tissue

For musculoskeletal tissue the following age limits, for male or female donors, are recommended:

a) for bone, the minimum age for both sexes is 6 years. No upper limit is applied unless the bone is intended to be used for structural support, in which case younger donors (age 15-55 years) are preferred;

b) for osteoarticular grafts, cartilage and menisci, the age range is 15-45 years;

c) for tendons and fascia lata, the age range is 15-65 years, although the upper limit can be extended after a biomechanical validation study.

8.3 Cardiovascular tissue

For cardiovascular tissue the following age limits are recommended:

a) for arteries and veins the age range for males is 17-45 years of age, and for females 17-60 years of age.

b) for aortic valves the age range is up to 70 years

c) for pulmonary valves there are no age criteria if ECHO is normal.

8.4 There are no age limits for:

a) Autologous tissue donation.

b) Living donors

c) The birth mother, for the donation of amnion.

9. Deceased Donor Retrieval Time Limits

Tissues shall be retrieved as soon after death as is practically possible. Tissue retrieval shall commence within 24 hours of asystole provided the body was cooled or

refrigerated within 12 hours of asystole. If the body of the deceased donor has not been cooled or refrigerated procurement of tissues shall commence as follows:

Tissue	Donor Retrieval Time Limits
Skin	Within 06 hours of death.
Cardiovascular tissue	Within 06 hours of death.
Musculoskeletal tissue (Bone, ligaments, tendons, cartilage, fascia lata)	Within 15 hours of death.

In the case of organ donors, if the donor is on a ventilator and the heart is refused, heart valve retrieval can be carried out at the time of retrieval of the other organs. Heart tissue can be retrieved after clamping the aorta. In the case of deceased cardiac death donors (DCD) donors, 25,000 units of Heparin should be given intravenously immediately to prevent clot formation in the heart and great vessels.

SECTION C: TISSUE RETRIEVAL

1. Tissue Retrieval General

1.1 There shall be documented procedures, which detail all requirements for retrieval to ensure that these processes are carried out under controlled conditions.

1.2 Retrieval shall be performed using techniques and instruments appropriate to the specific tissue recovered, taking into consideration the eventual utilisation of the tissue **(Annexures 8, 9 & 10)**.

1.3 Tissue Bank physicians or physicians involved in removal or transplantation shall not pronounce death nor sign the death certificate of any individual from whom tissue will be collected.

1.4 Precise identification of the deceased donor shall be performed before procurement begins.

1.5 The sequence in which the various tissues are procured must be well defined to assure the quality of each type of tissue. The recommended procurement sequence,

whether carried out by separate teams or by a multi-tissue team, is: eyes, skin, cardiovascular and musculoskeletal tissue.

The procurement flow must be donor (organ /non-organ donor) and tissue appropriate and is dependent on the circumstances at the time of donation.

1.6 Where a deceased tissue donor has already donated organs, all surgical approaches to obtain the organs must have been sutured to maintain as far as possible the sterility of thoracic and abdominal tissues before their procurement.

If the procurement is performed simultaneously with organ procurement, the sequence varies: starting with the tissues from the cavities open for organ recovery, thorax and abdomen (arteries, heart for heart valves or vertebral bodies), then the recommended sequence of skin, eyes, cardiovascular and musculoskeletal should be followed. It is important that all the procurement teams involved know that tissues will be procured after organs, first to prepare the body before starting surgery, and second to guarantee sterile conditions during the whole procedure and to minimise the risk of cross-contamination.

2. Retrieval Conditions

All tissue shall be recovered in an aseptic or clean fashion using standard surgical preparation with sterile pack, instruments, and technique.

2.1 Deceased Donors

2.1.1 Tissue procurement from a deceased donor shall be accomplished in an operating room, or designated recovery room, or adequate mortuary facility which is reasonably clean and enables control of contamination and cross contamination. Skin may be retrieved in the residence of the deceased donor. Every effort much be made to reduce contamination of the tissue during retireval.

2.1.2 All instruments used during the retrieval must be sterile and should be stored on a back table which is covered with a sterile drape.

2.1.3 Tissues may be removed using either aseptic or clean/non-sterile procurement techniques:

- Aseptic technique:

Aseptic technique shall be observed throughout the procurement procedure. Procurement sites shall be prepared using a standard surgical technique; prior to retrieval a local sterile field must be created using sterile drapes; an appropriate antibacterial skin preparation agent must be used before commencing the retrieval; staff conducting the retrieval must be appropriately gowned in sterile clothing, and wear sterile gloves and protective masks; all methods shall be consistent with standard operating room practice.

- Clean/non-sterile technique:

Tissues procured using clean/non-sterile techniques are suitable for transplantation, if efficient validated sterilising methods are used to eliminate pathogens after retrieval.

2.1.4 Every effort should be made to minimise the number of people present during deceased tissue retrieval and to ensure that a post-mortem is not proceeding during the retrieval.

2.1.5 Where possible the retrieval should precede any post-mortem examination of the donor. In cases referred to the Coroner, the Coroner's consent must be obtained to enable the retrieval of tissues.

2.1.6 Samples for microbiological testing shall be taken, where applicable.

2.1.7 It is integral to the maintenance of the dignity of the donor that following tissue procurement, the donor's body must be cleaned and reconstructed to closely approximate its original anatomical configuration. Whenever long bones are removed they must be replaced with appropriate prostheses. All incisions should be neatly sutured. Skin must not be procured from the neck, arms, face or other areas to enable viewing of the body during funeral proceedings. Appropriate advice on the handling of deceased donors after retrieval should be given to mortuary and funeral home staff.

Efforts should be made to ensure that procurement procedures do not unnecessarily interfere with funeral arrangements or other formalities such as religious or cultural rituals. If this is not possible, the donor's family must be informed at the time of consent. Timely and effective communication with all parties involved can help to meet expectations in regard to delays.

2.2 Surgical residues

Surgical residues shall be collected under aseptic conditions during a surgical procedure in the operating theatre.

3. Packaging and Transportation to the Tissue Bank

3.1 Each tissue segment must be packaged individually as soon as possible after retrieval, using sterile containers in a manner, which will prevent contamination.

3.2 Specified, validated reagents or preservation solution shall be used, as specified in SOPs.

3.2.1 Following retrieval, heart tissue / valves are kept in cold saline or tissue culture medium.

Cardiovascular allografts disinfection is done using broad spectrum antibiotics in conjunction with an antifungal agent. Common contaminating bacteria are *Staphylococci, Propionobacterium, Streptococci,* and *Escherichia coli,* with the most predominant fungi being *Candida* species. Antibiotic protocols may be different in different heart tissue banks. Usually, Amikacin or Gentamicin and Vancomycin are combined with an antifungal agent like Nystatin, Polymyxin B or Amphotericin B.

The tissues are transported in a sterile container to which has been added the selected antibiotic / antifungal agent. The container is double wrapped in sterile plastic bags and

placed in an ice box filled with ice sludge. The temperature should not go below 4 degree C.

3.3 Procedures shall be used for ensuring and documenting proper storage temperature during transit.

3.4 After filling and closing the container, it shall not be re-opened nor the tissue removed until further processing by the Tissue Bank.

3.5 The procurement container must be labelled with the donor and tissue identification, in such manner that traceability of tissues will be achieved. The label must include at a minimum, the following:

- Name of the human tissue
- Name and address of the Tissue Bank
- Identification number (of the donating hospital) of the donor

3.6 Retrieved tissues must be stored at 0°C – 10°C temperature and transported in the cold to the tissue bank. Tissues should remain at these minimum temperatures for a maximum period as follows:

Musculoskeletal	72 hours
Skin	72 hours

3.6.1 In the case of cardiac tissue the container with the heart tissue is placed, along with the plastic bags, in a refrigerator with Controlled Temperature at 4 degree C.

3.6.2 After 24 hours the container is opened in a sterile environment and the solution is sent for aerobic / anaerobic and fungus culture.

3.6.3 After the culture the allograft tissue is transferred to a cryopreservation medium containing 10 % dimethylsulfoxide (DMSO) and cryo preserved in liquid nitrogen at -196 degree C .

3.6.4 Cardiac allografts are not used till all cultures are negative. This usually takes three days.

4. Documentation

4.1 Appropriate records of each donation procedure and all tissues retrieved shall be available and kept by the Tissue Bank.

All retrieved tissue shall be provided with an accompanying retrieval form including, at a minimum:

- The donor identity
- The date, time and place of the tissue retrieval procedure
- The identity of the person (s) performing the retrieval
- The tissue(s) retrieved
- Donor and tissue selection information
- Consent of the living donor or the next-of-kin of the deceased donor (Form 8)
- Death certificate of the deceased donor
- Time of death and conditions of storage of the body of the deceased donor.
- Donor screening form
- Blood reports of tests for HIV_1, HIV_2, Hepatitis B and Hepatitis C.
- Brain-stem death certificate of brain-stem death donor (Form 10)
- NOC from local police in case of medico legal case of deceased donor
- Form 9 for unclaimed body of deceased donor.

5. Donor Recognition

A personalized certificate honoring the donor for their generous support of donation may be issued to the next of kin **(Annexure 11)**.

SECTION D: DISTRIBUTION

1. Distribution of tissues

1.1 Tissues can be distributed for a specific patient against a prescription issued by qualified medical/dental professionals or to a storage facility located in another institution for local use or distributed to another Tissue Bank. Tissues must be

distributed according to the chronological order of the request except in emergency situations e.g. extensive/severe burns.

1.2 Requisitions must be in writing, and must include the name of the requesting hospital/tissue bank and surgeon, details of the recipient and the graft required, and information about the surgical/medical use of the graft **(Annexures 12 & 13**).

1.3 There shall be written documentation for all tissues distributed, indicating the graft type and number and details of the recipient.

1.2 The clinical team using the tissue must have instructions for contacting the Tissue Bank for any question they have and shall be made aware of the following:

- Action to be taken in the event of loss of integrity of the package
- Action for reporting of adverse event
- Action for the return or the disposal of unsuitable or unused tissue.

2. Traceability

2.1 There must be an effective system that enables the traceability of tissues between the donor, the processed tissue and the recipient.

2.2 It is the responsibility of the hospital tissue storage and distribution facility or clinician to maintain recipient records and to inform the Tissue Bank of the destination of tissues (implantation date, surgeon and recipient identification).

2.3 Tissue Banks shall maintain records which document the destination of distributed tissue: implantation (date, surgeon and recipient identification), disposal (date and methods) and any adverse event reports.

3. Transportation

Tissue must be transported in the recommended preservatives or at the recommended temperatures.

4. Return into Inventory

Issued tissues shall not be returned to the Tissue Bank without prior consultations with the Tissue Bank. If returns are permitted, the integrity of the container package, and labelling shall be examined for evidence of contamination or tampering. If there is any evidenced of contamination, tampering, mishandling, or failure to maintain required storage temperatures, tissue shall not be returned to the distribution inventory. Information pertaining to the return of cells and/or tissue shall be recorded in the distribution records as follows:

- Documentation of container examination;
- Documentation of end-user storage and transport conditions;
- Reason for the return;
- Disposition of the returned tissue; and
- Date and name of the staff member who evaluated and determined the disposition of the tissue

5. Adverse Events

5.1 Written feedback for the use of grafts is advisable but not mandatory **(Annexures 14 & 15).**

5.2 Written reports of adverse events shall be evaluated by the institution where the tissue was used and reported immediately to the Tissue Bank.

5.3 All adverse events shall be reviewed by the qualified physician attached to the Tissue Bank and appropriate action documented. Identified transmission of disease shall be reported to physicians involved in implantation of the tissue.

5.4 When donor to recipient disease transmission through tissue use is discovered, all facilities involved in the procurement and distribution of organs or tissues from the infected donor shall be notified without delay.

5.5 Written reports of the investigation of adverse events, including conclusions, follow up and corrective actions shall be prepared and maintained by the Tissue Bank in an adverse event file.

5.6 A written procedure shall exist for recall of tissues.

Reference:

Standards For Tissue Banking, Asia Pacific Association of Surgical Tissue Banking, 2016, 2nd Edition, Drafted by: Yong-Koo Kang (Korea), Astrid Lobo Gajiwala (India), Aziz Nather (Singapore), Azura Mansor (Malaysia), Chang Joon Yim (Korea), Ken Urabe (Japan), Nazly Hilmy (Indonesia), Norimah Yusof (Malaysia), Sharon Bryce (Australia), Suzina Sheikh Ab Hamid (Malaysia).