A NEET SS (SURGERY) PREPARATION COURSE
BY MARROW, WITH A TEAM OF SELECTED
SUPER-SPECIALITY FACULTY

SURGERY NEET SS

PLASTIC SURGERY

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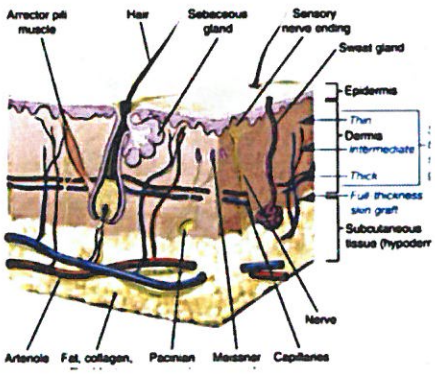
SKIN AND SKIN GRAFT

Embryology & function of skin 00:00:37

Largest organ (15% of adult body weight)
Starts developing from 4th week IUL : Differentiates from ectoderm (forms epidermis) & mesoderm (forms dermis).
Teeth & hair follicles, derived from skin(Ecto & mesoderm).
Toe nails & finger nails also derived from skin (Ectoderm).
Epidermal appendages : Hair follicles, sebaceous, sweat, apocrine glands.

Functions of skin :
Physical protection.
Protection against UV light.
Protection against microbial invasion.
Prevention of fluid loss.
Regulation of temp.
Sensation.
Immunological surveillance.

Anatomy of skin 00:02:05



Epidermis :
Stratified squamous epithelium.
Ectodermal in origin.
Keratinocytes are predominant cells.
Substratified into 5 layers.
Varying thickness :

Average thickness : 100micrometer.

Thickness in eyelid : 50micrometer but in palms & soles : upto 1mm.

Layers of epidermis :

Stratum Germinativum : Actively proliferating layer, contains melanocytes, linked to basal lamina.

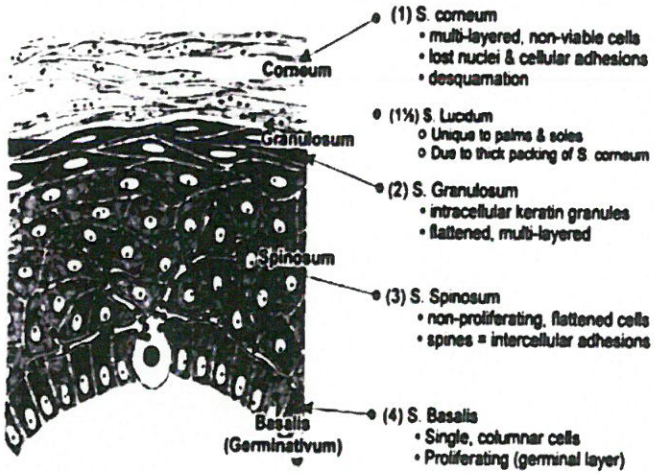
Stratum Spinosum : Large Keratinocytes → cytokeratin → tonofibrils → desmosomes (Helps in adhesion).

Also called as prickle skin layer.

Stratum Granulosum : Mature keratinocytes containing Keratohyalin granules. Protein synthesis site.

Stratum Lucidum : Only in palm and soles.

Stratum Corneum: Non viable cells, protection & insulation.



Dermis :

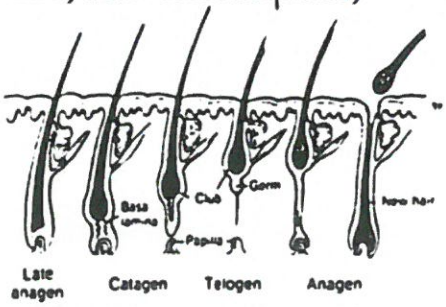
Mesodermal origin.

95% of skin thickness.

Fibroblasts - dominant cell type. Others : Mast cells.

Constituents : Collagen T1 (mature) & T3(immature), Elastin.

Ground substance : Hyaluronic acid, Dermatan Sulphate, Chondritin sulphate.



Layers of dermis :

Papillary dermis : Loosely arranged collagen fibers, provides nutrients & heat exchange.

Reticular dermis : Dense irregular collagen & dermal elastin.

a horizontal plexuses of vessels connected by bridging vessels

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traverse the dermis.

Appendages :

- Hair follicles :

Parts : medulla, cortex, cuticle.
Inner root sheath (superficial)
Vs outer root sheath (deep).
Growth phases - Anagen (growing 90%)/ Catagen (regressing 1-2%)/ Telogen (resting phase 10-12%).

- Glands :

Eccrine : Palm, sole, axilla (absent in lips, penis, clitoris, labia minora, areola).
Apocrine : Axilla, eyelid (moll), groin, areola.
Sebaceous : Produce sebum, present on the forehead, nose, cheek, mostly contain Keratin.

Skin grafts basics 00:15:27

Definition :
Complete detachment of a portion of skin from a donor site & transferring to a host bed where a new blood supply is acquired.

History :
Origin : India, approximately 3000 years ago for nasal reconstruction in tile maker caste.
Reverdin 1869 : Pinch graft.
Ollier 1869, Thiersch 1871 : Split thickness graft.
Wolfe and Krausse : Full thickness graft.
Sir Astley Cooper : In 1817, used skin graft to cover an amputated thumb.

Important aspects :

- Thickness varies region wise.
- Thickest - trunk, palm, sole.
- Thinnest - eyelids, postauricular.
- Children & elderly - thin in general.
- Dermis thins after 4th - 5th decade.

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- men have thicker skin.

Types of grafts 00:21:12

As per donor :

1. Autograft : donor & recipient is same individual.
2. Allograft : donor & recipient of same species.
3. Xenograft : donor & recipient of different species.
4. Isograft : donor & recipient genetically identical – twins.

As per thickness of skin :

1. Split thickness (STSG) :
   Epidermis with variable amount of dermis.
   Also known as partial thickness skin graft.
   - Thin – 0.15 – 0.3mm.
   - Intermediate – 0.3 – 0.45mm.
   - Thick – 0.45 – 0.6 mm.

   Repeat graft extraction can be done from thicker areas.
   Epidermal grafting – Commonly used in vitiligo surgeries.
2. Full thickness (FTSG) : Complete dermis included.
   Repeat graft extraction can not be done.

Contraction of grafts 00:28:53

1. Primary contraction :
   At time of harvest.
   Elastin mediated
   more in FTSG (~40%)
   STSG – medium: 20%, thin: 10%
2. Secondary contracture :
   During healing at wound bed.
   myofibroblast mediated.
   more in STSG.

In cases, requiring large areas to be grafted, STSG preferred as large amount of FTGS cannot be harvested.

But in cosmetic cases, FTGS preferred as to avoid secondary contracture and thus disfigurement.

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	Advantages	Disadvantages
STSG	Graft take more reliable. Donor heals in 7-14 days.	more wound contraction. Does not grow. Not durable. Minimal hair growth/ sweating.
FTSG	Less scar contraction. Grows with age. Better match. Hair and glands normal once innervated.	Graft take less reliable. Donor needs primary closure or STSG.

Recipient sites 00:35:51

- Suitable sites :
  muscle, fascia, fat, periosteum, perichondrium, paratenon, granulation tissue.
- Unsuitable sites :
  Bare cortical bone/tendon/cartilage, irradiated tissue, necrotic or infected tissue.

Phases of graft take/ Revascularisation 00:38:45

1. Imbibition :
0-48 hrs.
Ischemic/ anaerobic phase.
Nourishment by diffusion.
Graft appears edematous & white.
Keeps graft moist and capillaries patent.
Attachment by fibrin only.

2. Inoculation :
No more valid.
Kissing capillaries.
Unidirectional angiogenesis at fibrin interface.
48 to 72 hours, microvascular growth of capillary-sized vessels (averaging 10–11 μm in diameter).
Peak in vessel density - Day 7

3. Revascularisation :

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Angiogenesis established in conduits : 3 methods :
Inosculation, reangiogenesis, neovascularisation.
Lymphatic drainage established, edema resolved.
Graft appears pink.
Collagen links form between graft and bed.
mediated by mmpa.

4. Cellular hyperplasia :
After 1-2 weeks.
Epidermis thickens 7-8 fold.
Scaling and crusting.
Returns to normal by 4 weeks.

5. Maturation / Remodelling :
Occurs by interaction of graft and wound bed.
Secondary contraction is seen.
Pigmentation : FTSG better match, STSG may develop hyperpigmentatation, sun avoidance x 6 months.
Reinnervation : starts in 4-5 weeks, complete by 12-24 months, FTSG>STSG.
Sequence of return of sensation : Pain – light touch – temperature.
Care regarding thermal injury necessary in early days as temperature sensation returns last.

Sites of harvest 00:47:57

- STSG

1. Medial Thigh as cosmetically less disfiguring.
2. Buttocks
3. Scalp
4. Back

- FTG

1. Post Auricular
2. Groin
3. Supra Clavicular area
4. Inner side of arm

Graft harvesting 00:50:07

FTSG :
Free hand scalpel.

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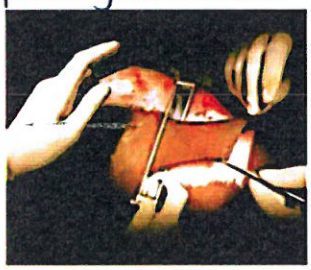
Template used.

Planned oversized to accommodate primary contraction.

Defat before placement.



STSG :

Instruments

Handheld knife : Humby, Goulian.

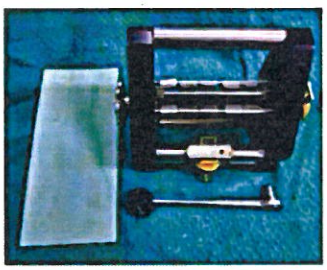
Dermatome : drum – Padgett,

Reese air / electric powered Bleeding patterns.

Tiny punctate bleed closely placed – thin STSG.

Widely spaced bigger bleeding points – thick STSG

Graft expansion 00:54:19



- Meshing :

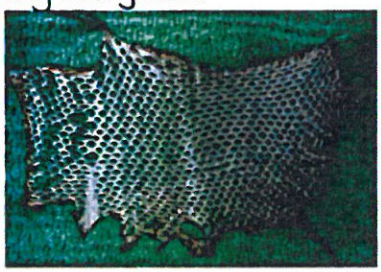
Manual or mesher.

1:1.5 – usual, 1:9 maximum.

Allows drainage of exudate & blood.

Cobble stone appearance.

Significant contraction, so avoid using over joints.



- Pinch graft :

Graft divided into tiny pieces.

- Meek Island Grafting :

Special dermatome and p

refolded gauze used.

Skin graft cut into pieces using cork plates & then rolled into a machine placing onto a prefolded gauge.

On opening the gauge, islands of separated skin are present, which then placed on the wound surface cause skin regeneration in between.

Expansion ratio 1:9.

- Microskin grafting :

Sheet graft minced with Tanner-Vandeput dermatome.

Expansion ratio 1:10.

- Intermingled transplantation :

Autograft alternating with allograft.

Fixation of graft & Causes of graft failure 01:02:24

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- Hematoma (mc).
- Infection (and mc).
- Seroma.
- Movement.
- Excess pressure.
- Arterial insufficiency.
- Venus congestion.
- Lymphatic stasis.
- Upside down graft placement.
- Poor fixation.

Tie over dressings :

Help immobile/fix the graft over the wound.

Used commonly for mobile areas, facial wounds.

Donor site healing & dressings 01:08:15

Donor site healing :

FTSG

- Primary closure
- STSG

STSG

Epithelial migration from appendages and edges.

Starts in 24 hrs, complete in 7-10 days, not durable.

Dermis does not regenerate.

Serial STSG can be harvested from donor with thick dermis

Donor site dressings :

Open – cheap, prolong healing, painful, infection risk.

Semiopen – Scarlet red, Biobrane, Vaseline gauze, Xerofoam.

Semi occlusive : Allevyn, Opsite, Tegaderm.

Occlusive – Duoderm.

Biologic – Amniotic meberane, cultured cells, allograft, Xenograft, skin substitutes.

Allograft is revascularized before rejection, Xenograft is rejected before revascularisation.

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SKIN SUBSTITUTES AND WOUND DRESSINGS

Ideal wound dressing 00:00:54

Ideal wound dressing :

Protection of wound physically and microbiologically.
Non toxic and non allergenic.
Maintains humidity.
Removes excess exudate.
Allows gasseous exchange.
Removes necrotic material.
Promotes epithelialisation.
Promotes granulation.
Atraumatic application and removal.
Inexpensive with long shelf life.

Wound dressing : Classification 00:04:14

Could be temporary or permanent :

1. Temporary biologic dressings :
   - Organic.
   - Synthetic.
2. Permanent biologic dressings :
   - Autograft.
   - Skin substitutes.

Classification (synthetic) :

1. Low adherent dressings :
   Tulles (open weave soaked in paraffin).
   Textiles (mepitel).
   Perforated plastic films (Telfa).
2. Semipermeable films :
   Permeable to gas and vapour (not to liquids and bacteria).
   Opsite and tegaderm with adhesive (polyurethane).
   Omiderm is without adhesive.

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