BREAST RECONSTRUCTION FOLLOWING MASTECTOMY

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About Me

- New Jersey
- Medical School
- General Surgery
- Plastic Surgery

Objectives

- Identify goals and benefits of breast reconstruction
- Understand options available to patients
- Explain rationale for immediate

General Principles of Breast Reconstruction

The Origins of Breast Reconstruction

The Origins of Breast Reconstruction

- 1895: Czerny
- 1963: Cronin's silicone gel filled breast prosthesis
- 1971 Snyderman's immediate silicone prosthesis reconstruction
- 1970's: Latissimus dorsi reconstruction
- 1982: Radovan's skin expansion technique
- 1982: Hartrampf refines TRAM flap

Origins of Breast Reconstruction

- Original goals
  - To improve appearance in clothes
- Current goals
  - To match the remaining breast in dimension, position, contour, and appearance

Why Offer Breast Reconstruction

- Restores normal anatomy
- Decreased symptoms of depression
- Alleviates feeling of being "deformed"
- Maintains feeling of sexual attractiveness
- Supports sense of femininity
- High Satisfaction

Goals of Reconstruction

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Patient Selection

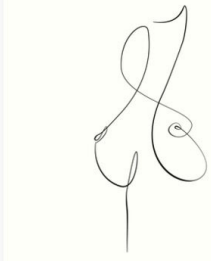
- Patient wishes
- Body habitus and proportions
  - Breast shape, obesity, abdominal scars
- Small vessel disease
  - Tobacco use, diabetes
- Psychosocial status
- Systemic medical diseases
- Radiation therapy

Advancements

- Evolution of mastectomy technique
  - Skin sparing
  - Nipple sparing
- Skin sparing techniques allow plastic surgeon to match opposite breast without reduction of normal breast

Skin-Sparing Technique

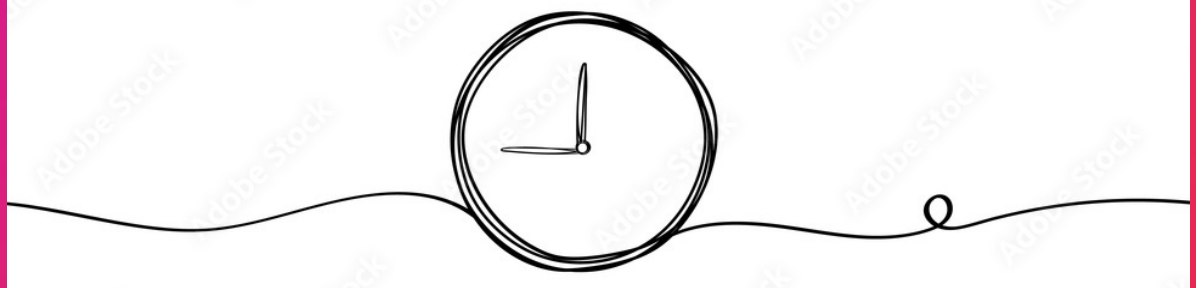
- Periareolar approach
- Favorable incision orientation
  - Tissue flaps
- Gentle tissue handling
- Preserve native skin envelope
- Preserve inframammary fold



What is the difference?

- Skin sparing vs. Non-skin sparing
- At 5 years, local recurrence and distant metastasis lower in skin sparing group
- Skin sparing does not increase risk of local or systemic disease
- Subsequent study by Carlson et al. confirms no increased risk of local recurrence

Timing of Breast Reconstruction



Indications and Timing – Immediate Reconstruction

- There are few reasons to relay reconstruction in any patient who meets criteria for mastectomy
- Reduces emotional impact/postoperative depression
- Skin flaps more pliable, preservation of inframammary fold
- Has become the norm in the U.S.
- Stage I/II good candidates
  - *Maybe* III/IV

Indications and Timing – Delayed Reconstruction

- Radiotherapy – may produce fat necrosis and capsular contracture
- Inflammatory breast cancer
- Flap thickness / Full thickness injury

Reconstruction after Radiation or Chemotherapy

- Wait 2-3 months after chemotherapy
  - Normalize blood counts, weight, stamina
- Wait 3-6 weeks after radiation for acute phase resolution
  - High implant/expander complication rate
  - TRAM complications increased
  - Consider delayed, bipedicled, or free tissue transfer

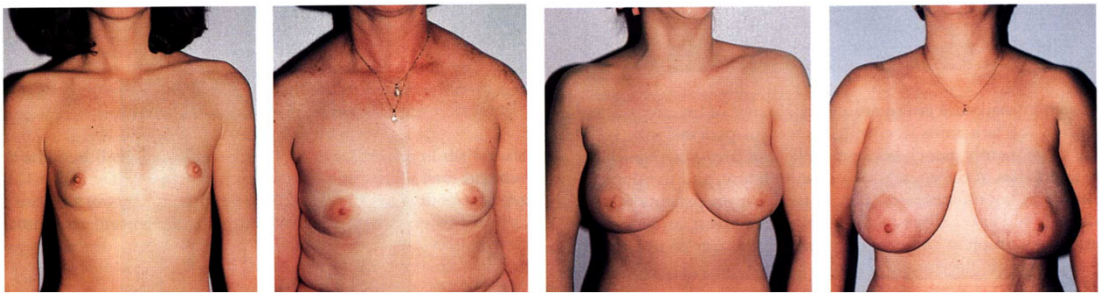
Immediate vs. Delayed

Group	Immediate	Delayed
TRAM	$17,957	$29,173
Tissue Expansion	$17,514	$25,411
Preop Radiation	$19,876	$29,687
No Radiation	$17,671	$28,184

- Mean corrected resource cost

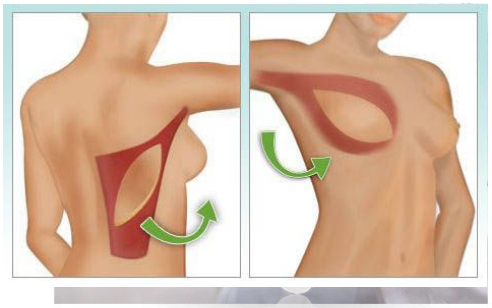
Reconstructive Options

Breast Types



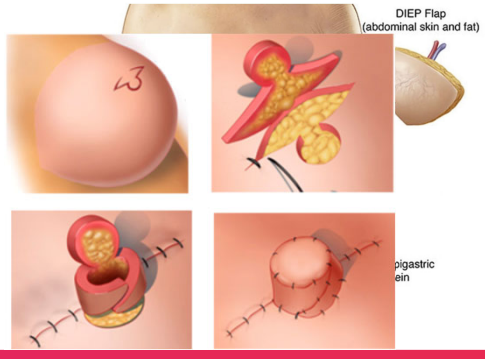
Reconstructive Options

- External prosthesis
- Internal prosthesis (implant)
  - Silicone
  - Saline
- Tissue Expansion
- Latissimus dorsi myocutaneous flap
  - With or without an implant/expander



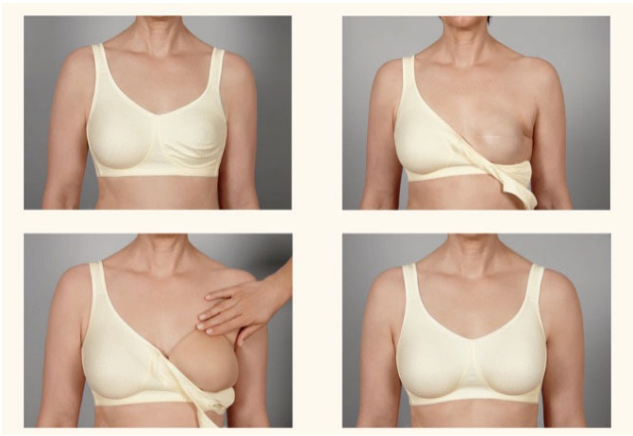
Reconstructive Options

- Transverse rectus abdominus myocutaneous flap (TRAM)
- Other Free Tissue Transfers
  - Deep Inferior Epigastric flap (DIEP)
- Nipple Areolar Reconstruction



External Prosthesis

- Low cost
- No morbidity
- "Burden and discomfort"
- Need to alter clothing



Expanders/Implants

- High risk in obese patients, smokers, and history of radiation
- Advanced age and bilateral reconstruction are NOT contraindications
- Essential to isolate expander/implant from incision – risk of extrusion

Expanders/Implants

- Submuscular implant placement is associated with lower capsular contracture than prepectoral placement
- Submuscular implants cause more discomfort, animation deformity, and less superior fullness
- Implants do **not** interfere with chemotherapy or block radiation doses.

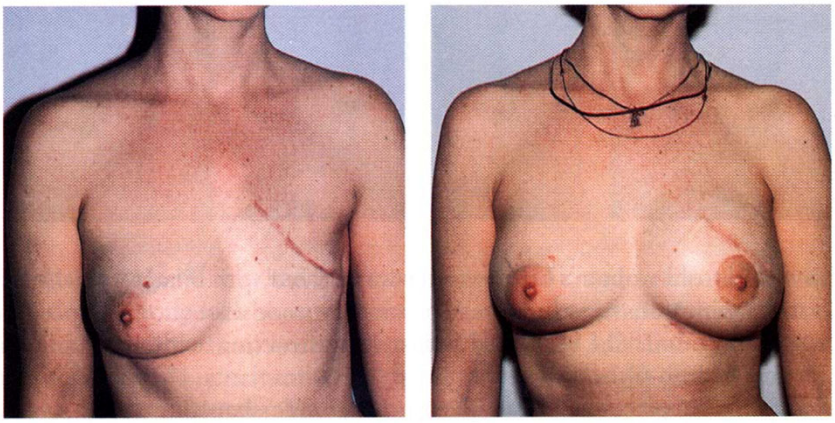
Internal Prosthesis (Implant)

- Simple
- Safe
- Saline or silicone
- Minimal morbidity
- No bridges burned
- Difficulty matching opposite breast
- Capsular scarring
- Implant failure
- Results worsen over time
- Complications with radiation therapy

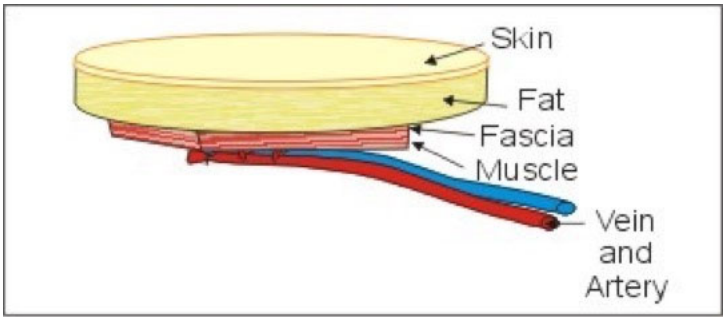
Tissue Expansion

- Simple
- Minimal morbidity
- Safe
- No bridges burned
- Prolonged expansion time
- Exchange expander for implant
- Capsular scarring
- Implant failure
- Results worsen over time
- Complications with radiation therapy

Tissue Expansion



Reconstructive Flaps
General Principles



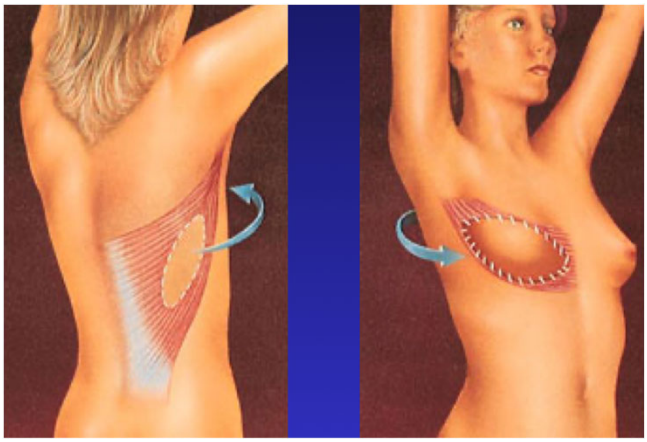
Autologous Tissue

- Results improve *over time*
- No foreign-body reaction
- More natural result
- More complex
- Must be suitable candidate
- Potential for greater morbidity

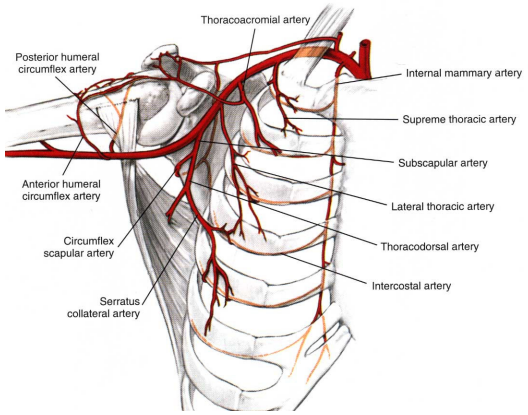
Latissimus Flap

- First used in 1977
- Can be combined with an implant or tissue expander to help match larger or ptotic breast
- Advantages are reliable circulation and favorable geometry
- Disadvantages are large donor site scar and likelihood of persistent fluid collection at donor site

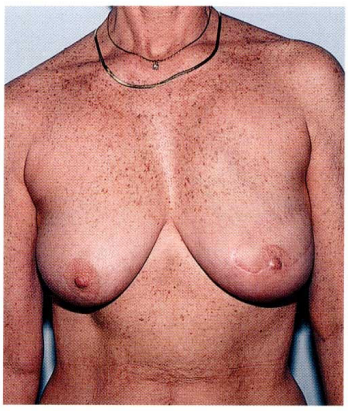
Latissimus Flap



Latissimus Flap – blood supply

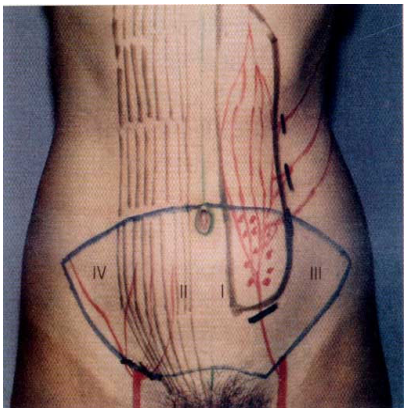


Latissimus Dorsi Myocutaneous Flap



Transverse Rectus Abdominus Musculocutaneous Flap (TRAM)

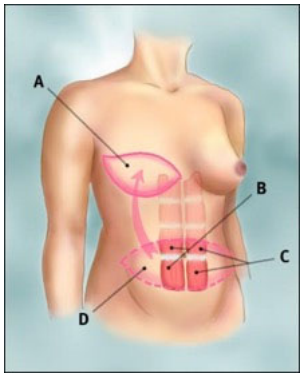
- First used in 1979

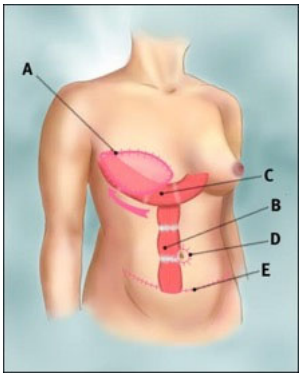


TRAM Flap

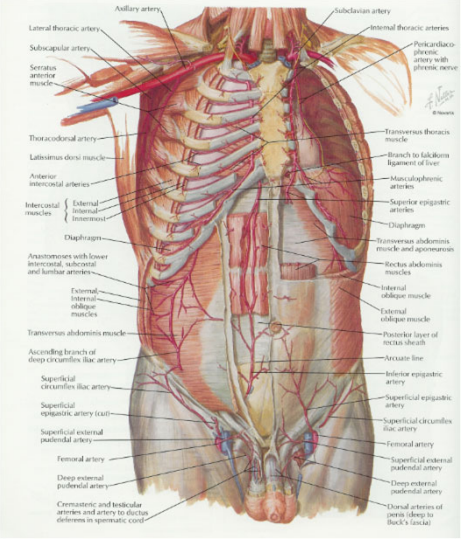
- Copious tissue
- Leave an acceptable donor scar
- Simultaneous abdominoplasty
- Protracted recovery time
- Potential for hernia from weakness of abdominal wall
- Inevitable compromise of muscle function
- Limitations imposed by previous scars

TRAM





TRAM - Blood Supply



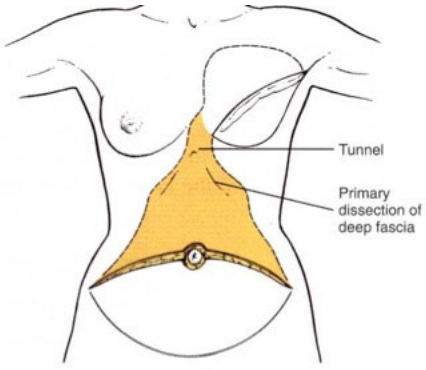
TRAM - Blood Supply

- Deep superior/inferior epigastric arteries supply the rectus muscle
- Superficial inferior epigastric arteries supply additional perforators to the overlying skin

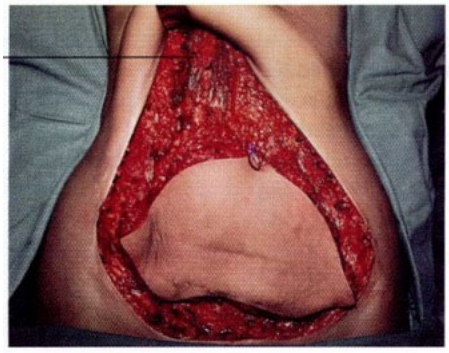
TRAM - Blood Supply

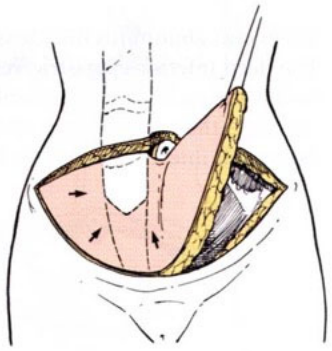
- Zones I,II,III,IV
- Flap may be "supercharged" with microvascular anastomosis to recipient vessels in the axilla
- Most vascular flap complications are actually venous congestion, not arterial insufficiency

TRAM

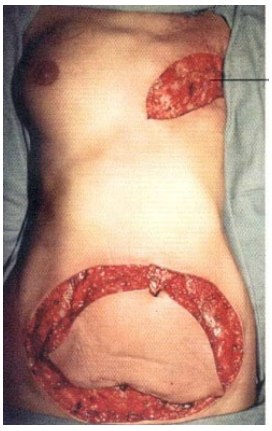


TRAM

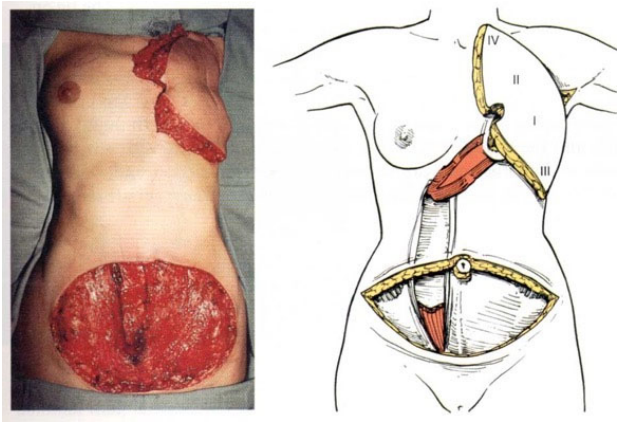




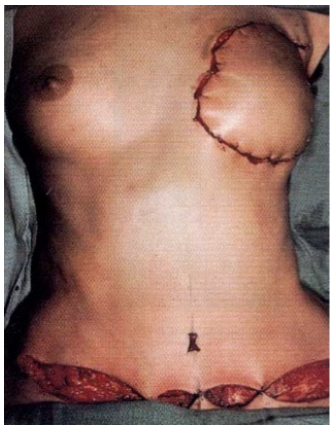
TRAM



TRAM

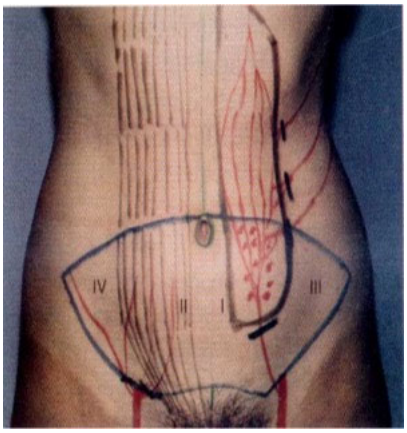


TRAM



Double Pedicled TRAM

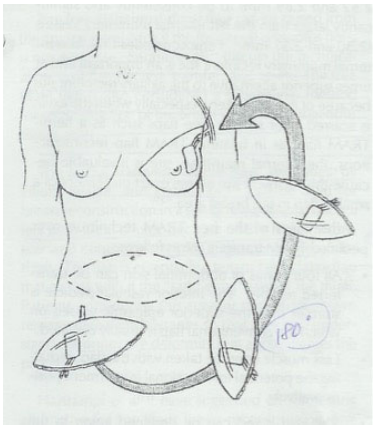
- Based on *both* Deep Superior epigastric arteries
- Provides more soft tissue volume
- Option for high risk patients or midline scar
- Abdominal wall complications
- Split for bilateral reconstructions



Absolute Contraindications to Pedicled TRAM

- COPD
- Severe Cardiovascular disease
- Uncontrolled HTN
- Morbid obesity
- IDDM
- Autoimmune disease
- Previous subcostal incision
- Previous abdominoplasty

Free-tissue Transfer - TRAM

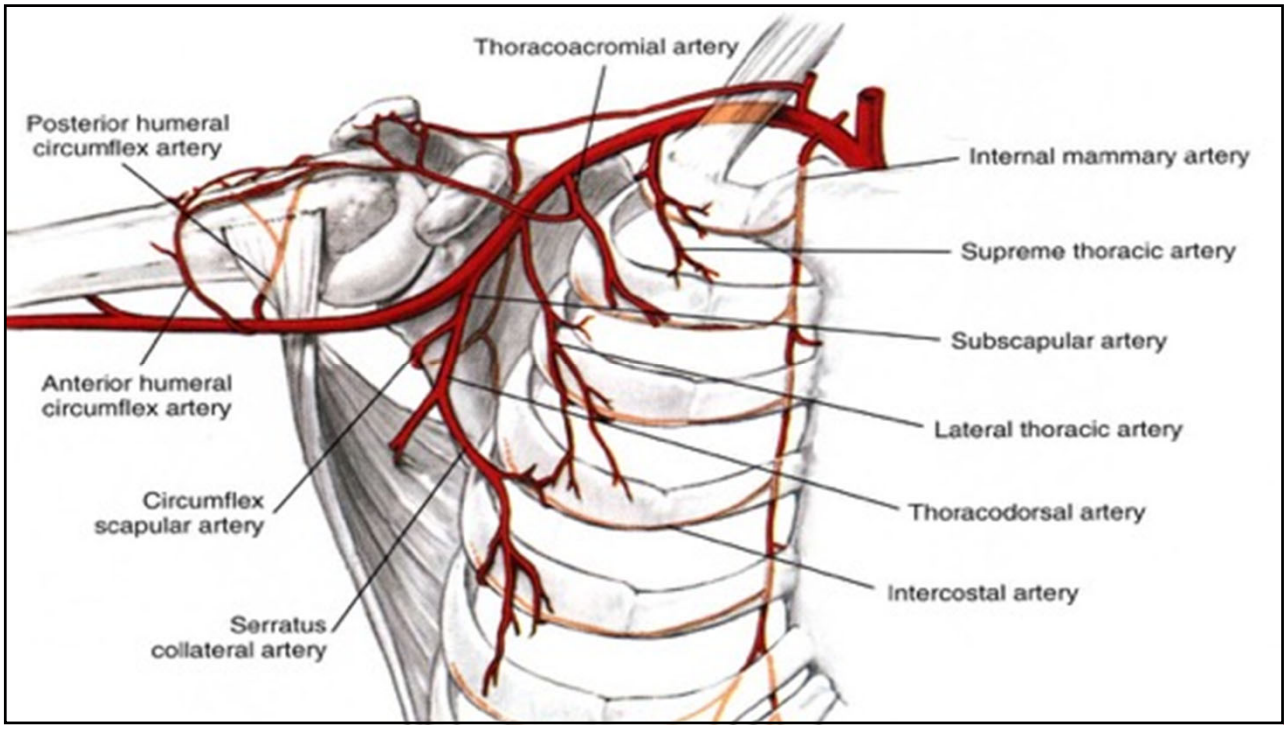


Free-tissue Transfer - TRAM

- Also first used in 1979
- In experienced hands, may be associated with less flap necrosis and flap loss with equibalent operative times and morbidity
- Benefits from a larger artery – Deep inferior epigastric artery
  - Hooked into the thoracodorsal or internal mammary
  - No medial bulge in the upper abdomen.

Free-tissue Transfer - TRAM

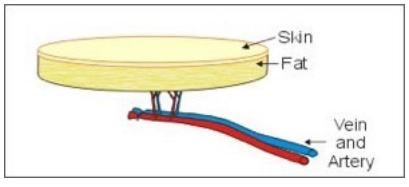
- All four zones can be transferred reliably
- Less muscle needs to be taken, reducing the functional impairment
- Skin island can be designated lower in the abdomen
- Becoming increasingly popular



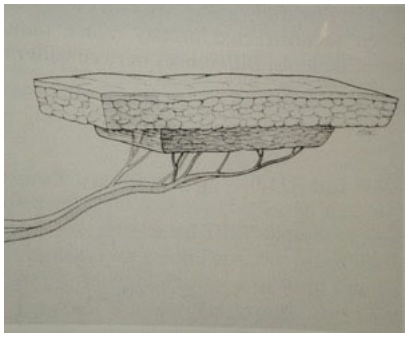
So then, What is a "DIEP" flap?!

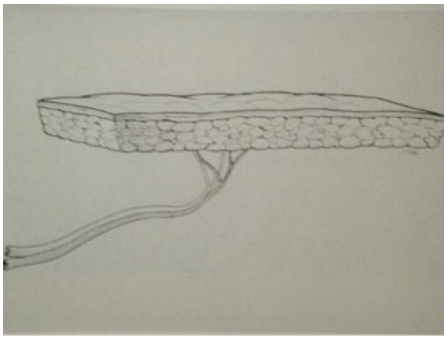
Deep Inferior Epigastric Perforator Flap (DIEP)

- Based on 1 or more DIEA perforators
  - Deep inferior epigastric artery perforators
- **Spares Rectus muscle**
- Less perfusion than a TRAM
- Better aesthetic outcome



TRAM vs. DIEP





TRAM vs. DIEP
Outcomes

	Fat Necrosis	Partial Flap Loss
TRAM	12.9%	2.2%
DIEP	62.5%	37.5%
Selective DIEP*	17.4%	8.7%

*Large perforator with palpable pulse, >1 mm vein, (absence of large SIEV), <70% of flap volume required

TRAM vs. DIEP Outcomes

	TRAM	DIEP
OR Time (hr)	8.9	6.6
Hospital days	7	3
Costs ($)	9,100	17,600

- *Paper published in **2000 ****

TRAM – Delayed Technique

- Some surgeons believe in a "delayed" technique
  - Ligating inferior superficial and deep vessels, and allowing one week to pass to improve flap viability.
- Studies show improved flow, increased vessel diameter, less fluctuation in perfusion levels
- Generally reserved for smokers, obese patients, age >70, and previous radiation (high risk) because of need for second operation

Radiation and TRAM reconstructions

- TRAM reconstructions with pre or post reconstruction radiation vs. no radiation
- Radiation did not stiatistically change overall complication rate

Radiation	Fat Necrosis	Fibrosis
Pre	18%	0%
Post	16%	11%
None	10%	0%

Screening After Reconstruction

- Clinical Exam
- Should be performed by a healthcare provider

The Other Breast

- Augmentation
- Mastopexy
- Reduction
- Prophylactic mastectomy
  - Family History
  - BRCA

Future Directions

Skin and

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al. Br J Plast Surg. 1998

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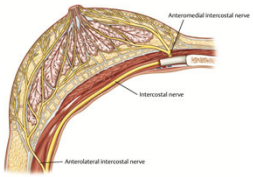
Innervation of the Breast

- Segmental
- Derives from the dermatomes of breast development
- Central breast and nipple areolar complex
  - T3-T5 branches of the *anterolateral and anteromedial* intercostal nerves



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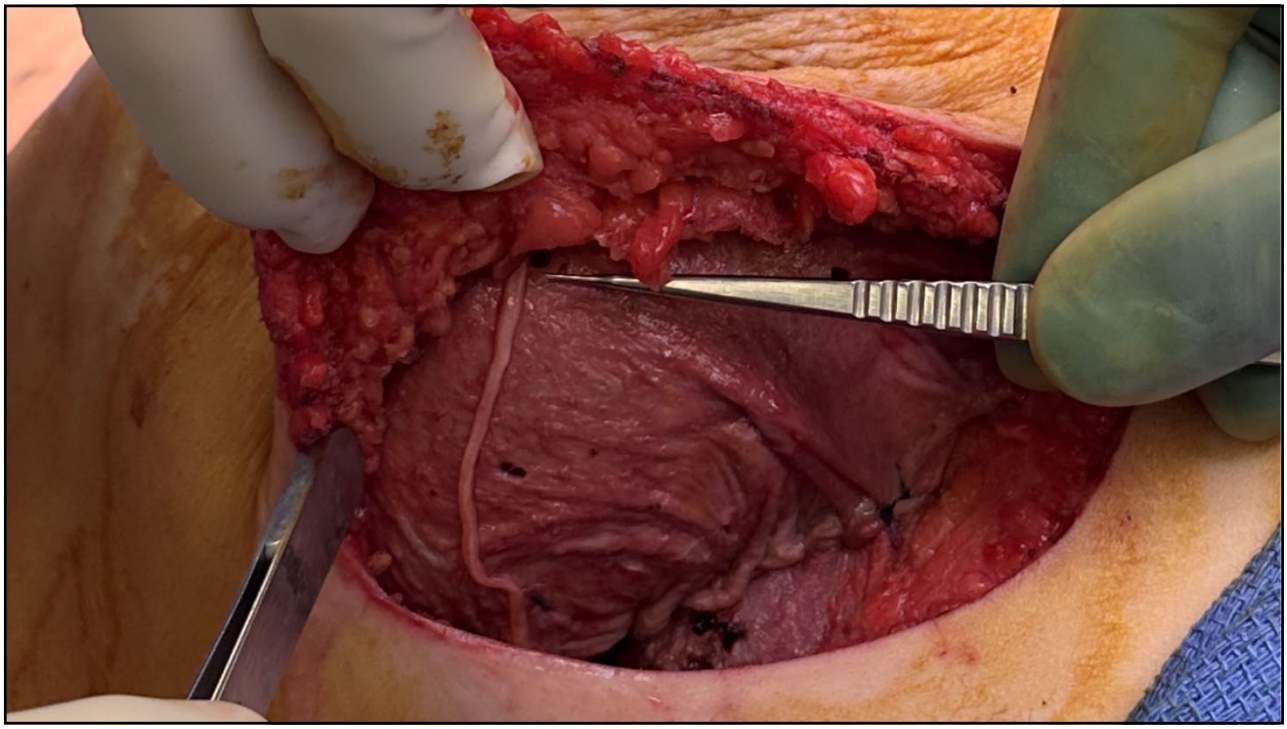
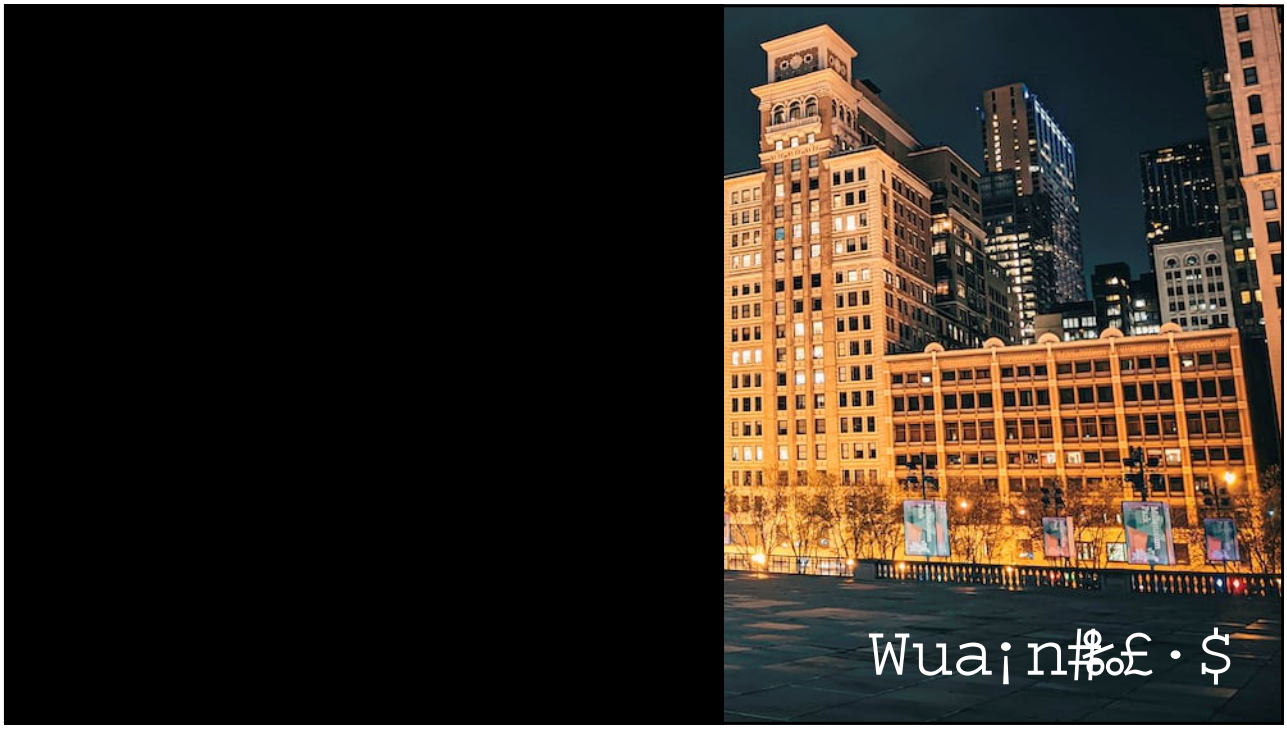


Conclusion

- Multiple options
- Skin Sparing and nipple sparing mastectomy techniques have provided huge advances to achieving current goals of reconstruction
- Future success with nerve preservation/reinnervation to the nipple and skin flap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