

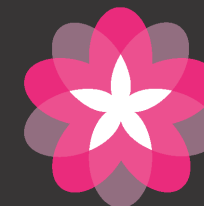


# 2022 Mini-Medical School Series

## Plastic Surgery & Breast Reconstruction



Stephanie A. Caterson, MD



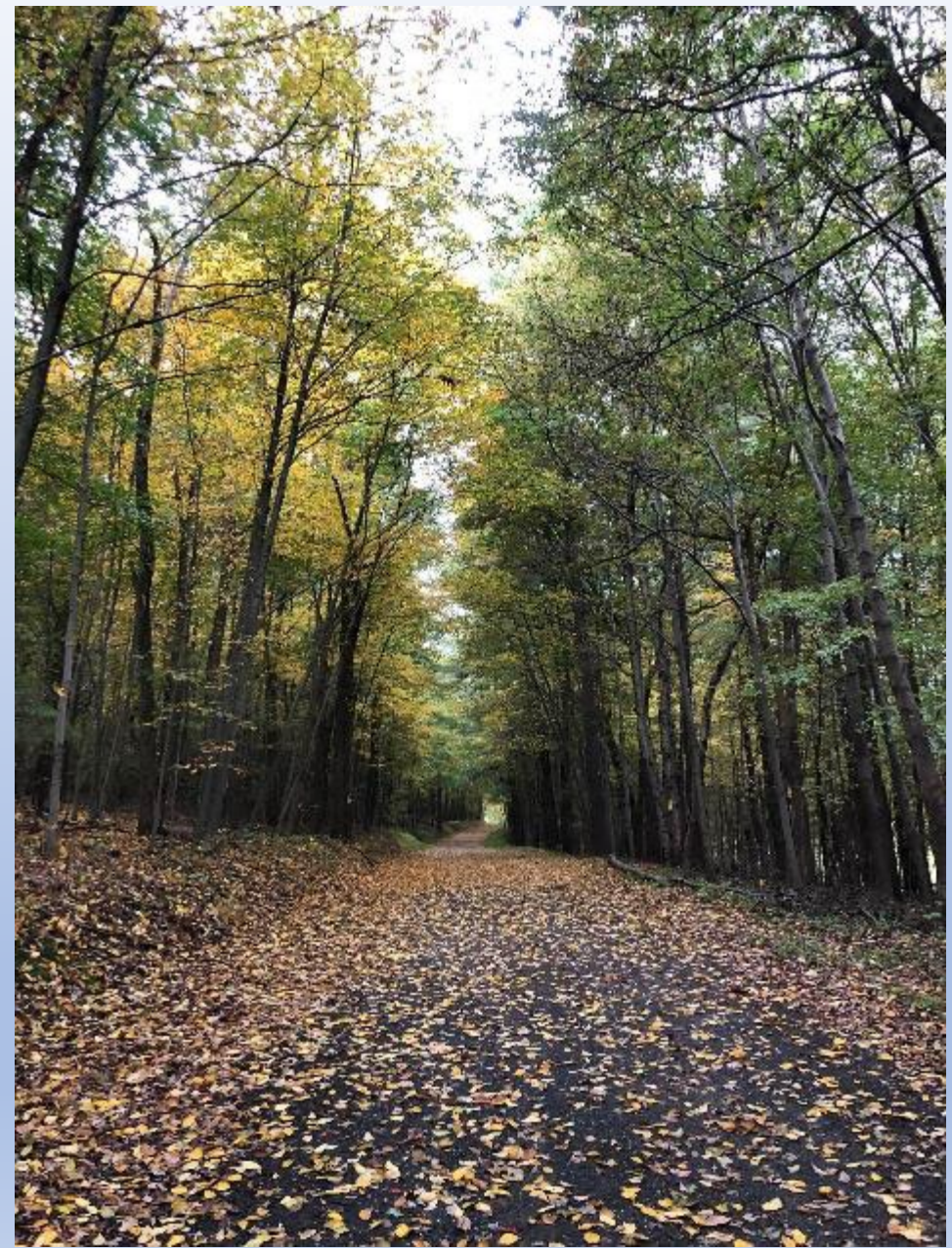
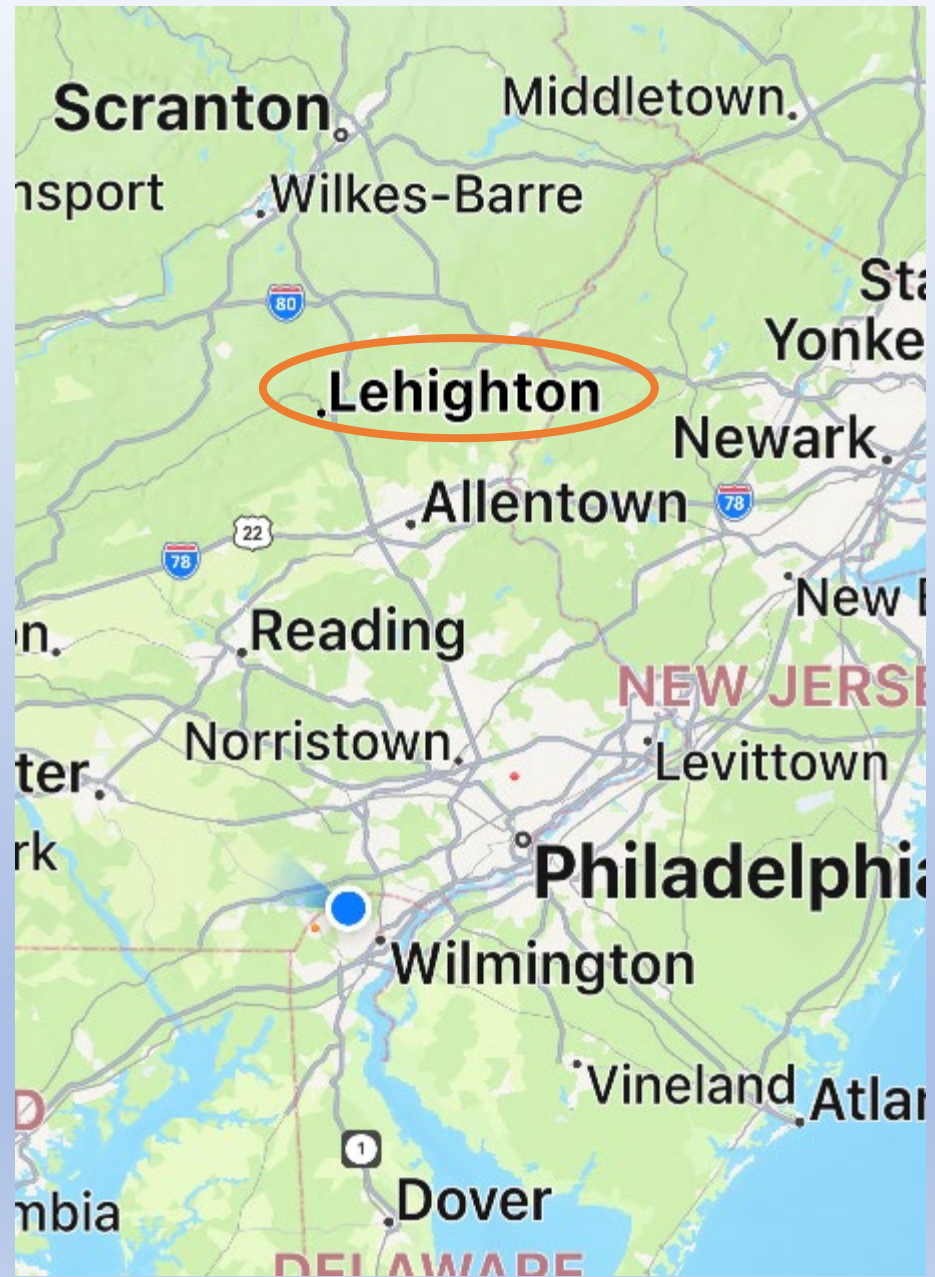
**ChristianaCare**  
CENTER FOR BREAST  
RECONSTRUCTION



# Tonight's Outline

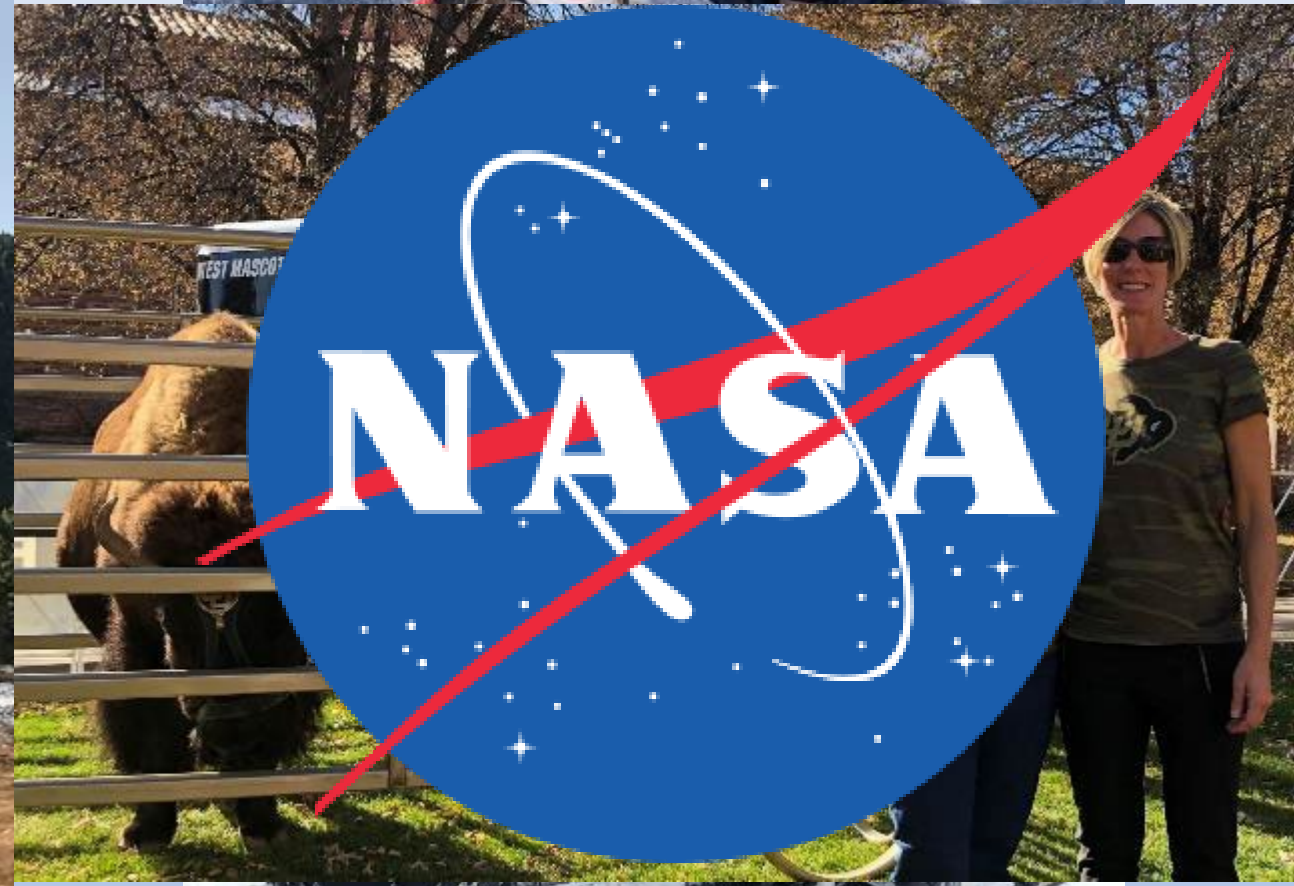
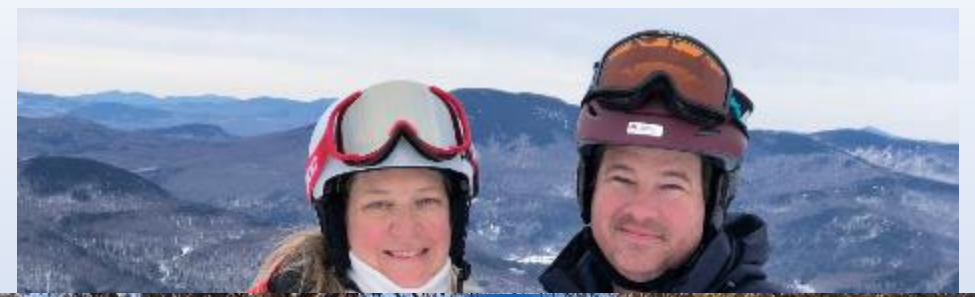
- My path to Plastic Surgery
- The Center for Breast Reconstruction
- What to expect from a breast reconstruction consult?
- What options are available for breast reconstruction?
- How to help patients make the right decision
- General overview of major types of breast reconstructions
- Real life examples
- Highlight state-of-the-art nipple and areola tattoo technique







# University of Colorado, Boulder

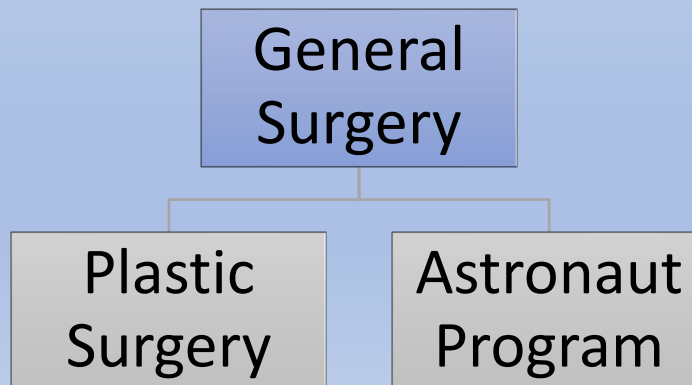




# Jefferson Medical College



- Most MD astronauts did NOT complete residency training
- Most MD astronauts who DID complete a residency trained in ER medicine
- How about Trauma Surgery?



February 1, 2003





# Plastic Surgery Fellowship

## Microsurgery/Breast Reconstruction Fellowship

**Lahey Clinic**

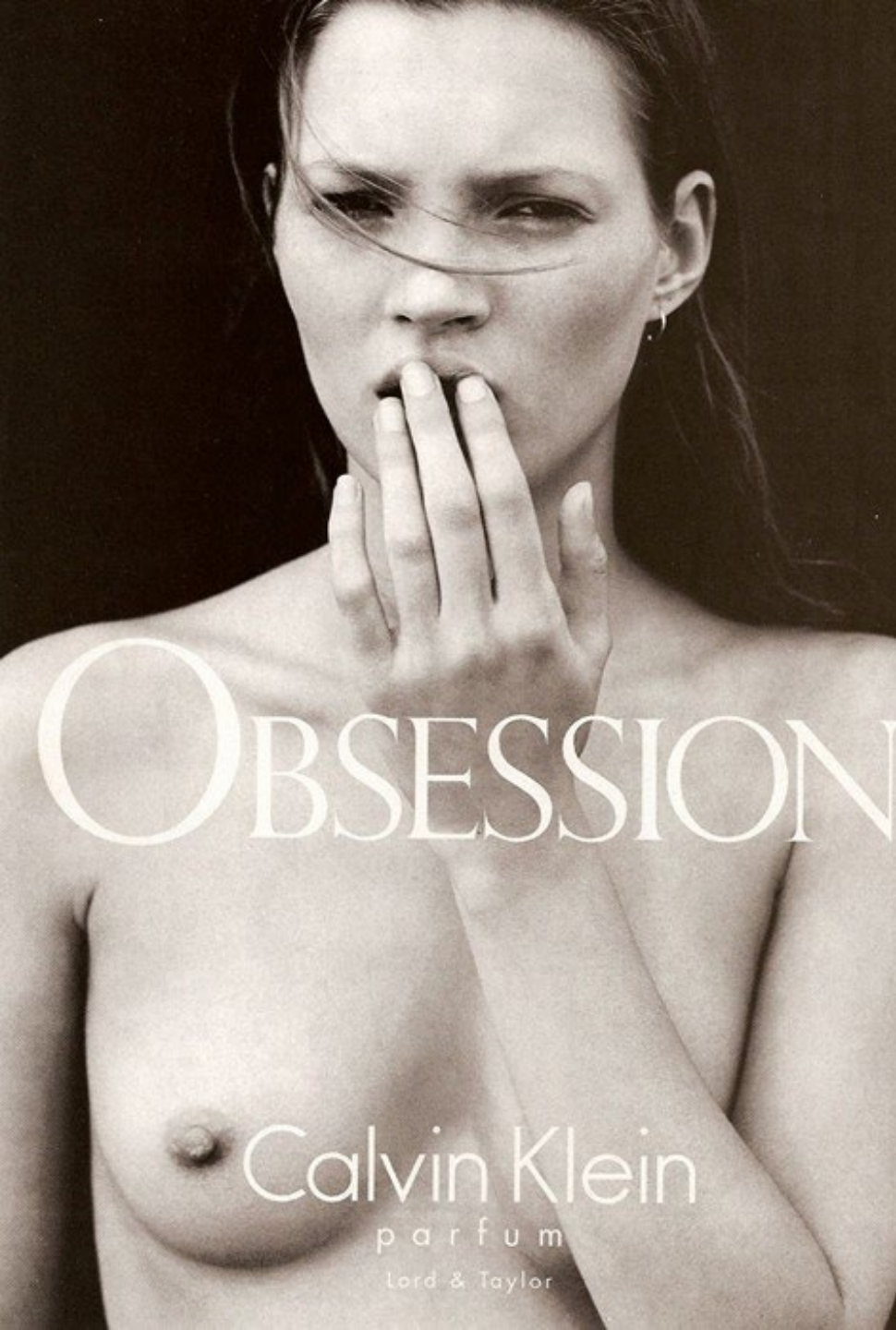


**Harvard Medical School**









# Why is Reconstruction Important?

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- Social
  - Beauty
- Psychological
  - Wholeness / self-esteem
- Emotional
  - Femininity / sexuality
- Functional
  - Healing, scar release
  - Symmetry

# Breast Cancer Awareness

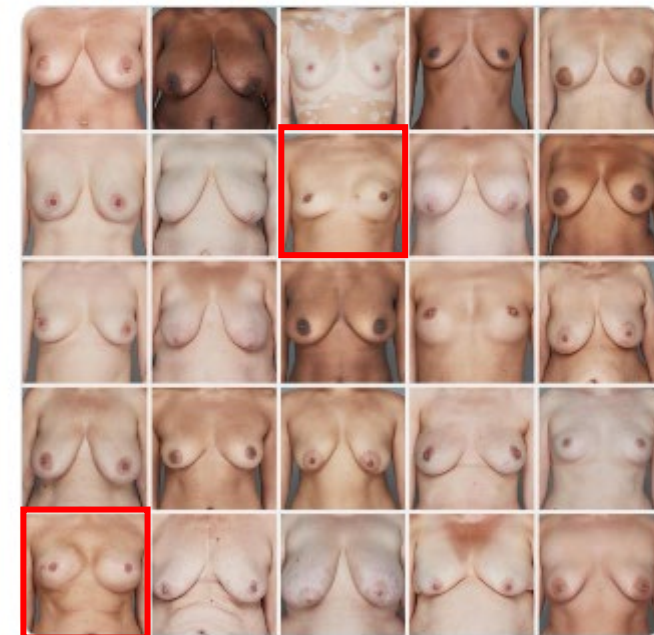


adidas  
@adidas



We believe women's breasts in all shapes and sizes deserve support and comfort. Which is why our new sports bra range contains 43 styles, so everyone can find the right fit for them.

Explore the new adidas sports bra collection at [a.did.as/6010KO0jO](https://a.did.as/6010KO0jO)  
#SupportIsEverything



9:00 AM · Feb 9, 2022



19.5K Reply Share

[Read 7.7K replies](#)







Venus de Milo

# Female Body Image

---

- Ideal breast size/shape is variable
  - Puberty, weight gain/loss, pregnancy, lactation, menopause, gravity
- Nipples pointed forward
- Soft consistency
- Symmetric
- Sensate
- No (minimal) scars



# Breast Reconstruction – The Silver Lining



# Boston (Professional) Experience



- Brigham and Women's Hospital  
2007 - 2019
  - Over 1000 flap patients
  - Over 1500 flaps
- Collaborations:
  - Physician Assistants
  - Nursing: pre-op, OR, ICU, PACU, floor
  - Anesthesia
  - Physical Therapy
  - Radiology
  - Hematology
  - Administration



# Boston (Personal) Experience



Brigham and Women's Hospital Bulletin 2011  
"Face to Face and Side by Side"



Jefferson Alumni Bulletin 2014  
"The New Face of Surgery "

Boston Globe 2012  
"Boston power couples: Hospital edition"



Boston Globe 2016  
"A couple at home and the office? It can work"



# Move to Delaware! 2019

**Christiana Care / Helen F. Graham  
Cancer Institute**



**Nemours Al duPont Children's Hospital**

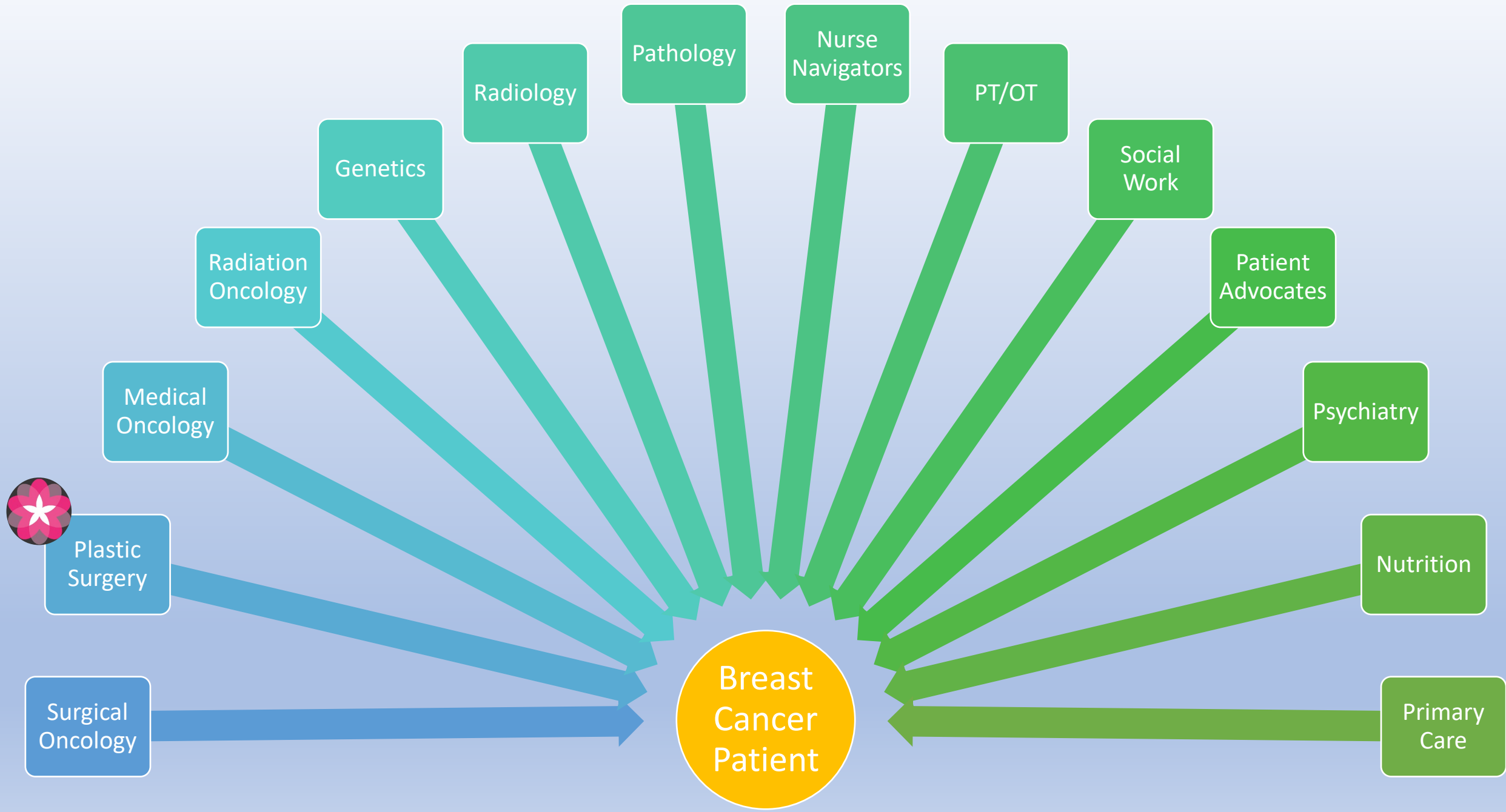




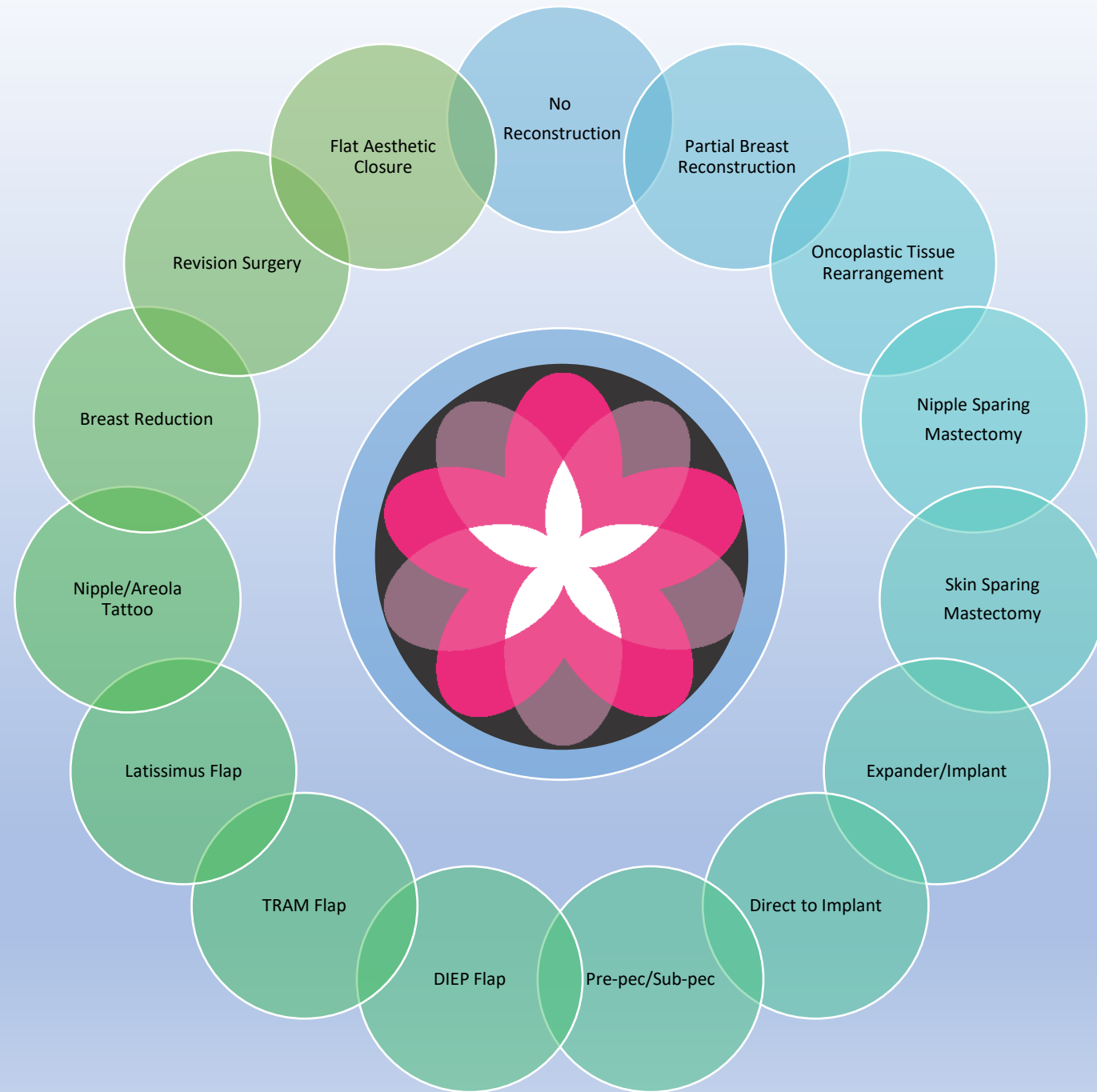


**ChristianaCare**

**CENTER FOR BREAST  
RECONSTRUCTION**







# What Choice for What Patient?

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- Often complex and/or multiple options
- Multi-disciplinary conferences
- Open communication with colleagues
- Consideration of:
  - Patient disease
  - Patient goals, expectations, lifestyle
  - Options for sequence of interventions:
    - Chemotherapy (neoadjuvant/adjuvant)
    - Radiation





A photograph of a waiting room. In the foreground, there are several blue upholstered chairs with wooden armrests. In the background, a framed picture of a sunset over the ocean is mounted on the wall. The scene is lit with warm, ambient lighting.

# Breast Reconstruction Office Consult

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- History & Physical
- Photos
- Discussion of options:
  - Is reconstruction right for you?
  - What is the best timing for reconstruction?
  - What are the different types of reconstruction?
- Schedule pre-op studies
- Schedule procedure

# Mastectomy vs. Breast Conservation

- **Mastectomy**
  - Unilateral or bilateral
  - Nipple sparing or skin sparing
  - Implant-based reconstruction or flap reconstruction
- **Breast Conservation**
  - Oncoplastic tissue rearrangement
  - Symmetry surgery on opposite breast
    - Reduction
    - Lift
  - Consideration for post surgical breast radiation



# BREAST RECONSTRUCTION

Is it worth the risk?

# Recon vs. No Recon

- Breast reconstruction is an option, NOT a requirement
  - **42%** of breast cancer patients who have a mastectomy undergo reconstruction
- If you choose no reconstruction:
  - Consider revision / contralateral surgery for better fit of prosthetic
- If you choose reconstruction:
  - All forms of breast reconstruction have very high reported patient satisfaction (>90%)



**The New York Times**

“‘Going Flat’ After Breast Cancer” by Roni Caryn Rabin  
Oct. 31, 2016



# BREAST RECONSTRUCTION

Can/should we preserve your nipples?

- Nipple sparing considerations
  - **Oncologic clearance**
  - Breast shape, nipple location
    - Ideal: nipple located forward on breast, min. extra skin
    - Difficult to move nipple later
  - Nipple symmetry
  - Breast volume
    - Ideal: A-B cup breast, possible C cup
  - Smoking status
  - History of radiation
  - Skin quality







Who's the Great Candidate  
for Nipple Sparing?

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# Types of Reconstruction

What are the options and what is the best choice for the patient?



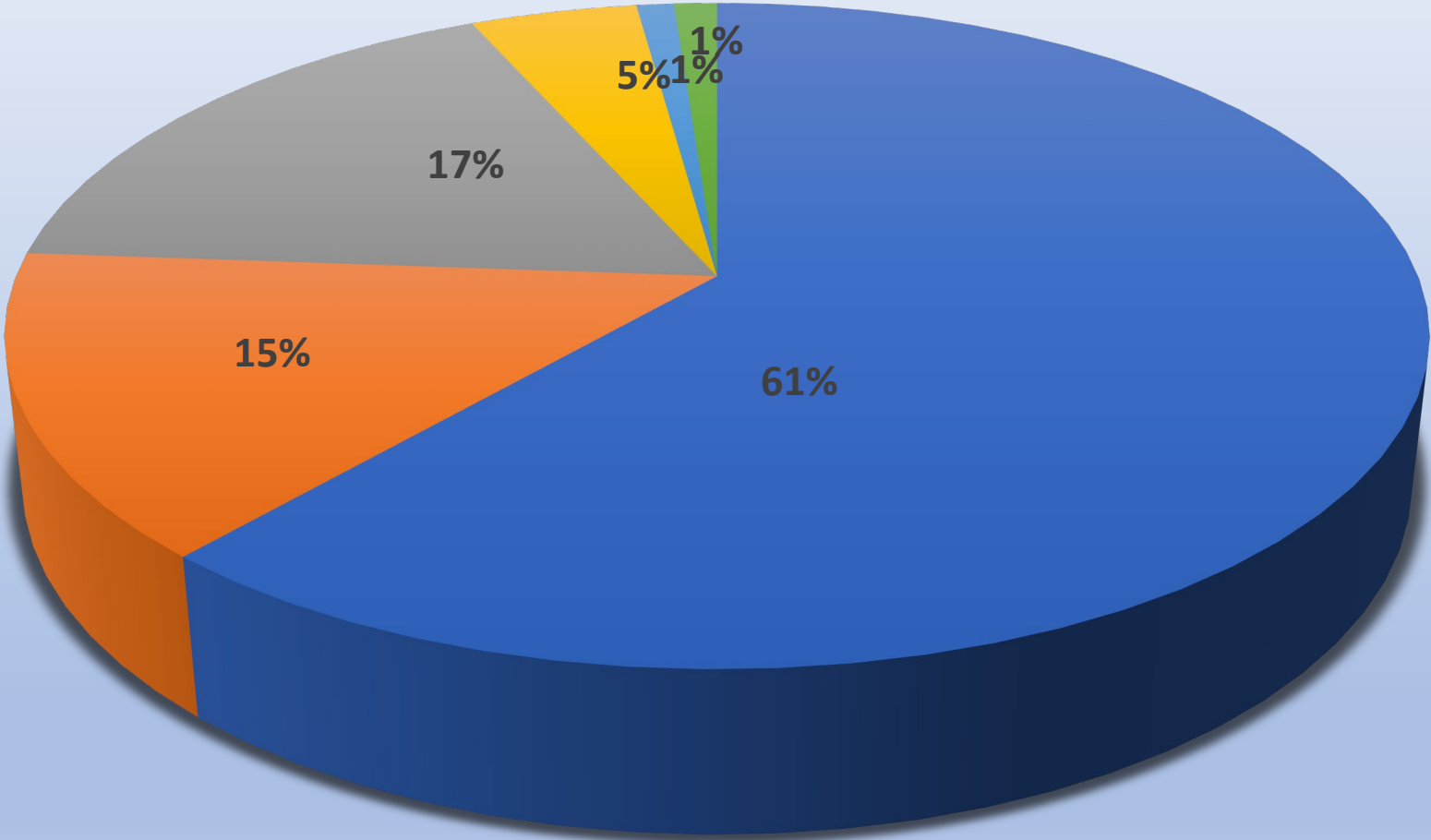
# Breast Reconstruction Options

- **Implant Based Reconstruction**
  - Expander vs. Direct to Implant
  - Pre-pectoral vs. Sub-pectoral
  - +/- Acellular dermal matrix (Alloderm®<sup>®</sup>, Allomax®<sup>®</sup>, etc)
  - +/- Latissimus muscle flap
- **Tissue (Autologous) Flap Reconstruction**
  - Pedicle TRAM (transverse rectus abdominus myocutaneous) flap
  - Free TRAM (transverse rectus abdominus myocutaneous) flap
  - DIEP (deep inferior epigastric perforator) flap
  - SIEA (superficial inferior epigastric artery) flap
  - SGAP (superficial gluteal artery perforator) flap
  - TUG (transverse upper gracilis) flap
  - DUG (diagonal upper gracilis) flap
  - PAP (profunda artery perforator) flap



# Breast Reconstruction 2020

## ASPS Case Statistics



■ Expander -> Implant   ■ DTI   ■ DIEP   ■ Latissimus   ■ pTRAM   ■ Other flaps



# IMPLANT RECONSTRUCTION

What are the benefits?

# Risks/Benefits of Implant Reconstruction

## **PROs:**

- Two short operations
- Shorter recovery time
- No loss of other tissues
- No scars on rest of body

## **CONs:**

- Implant leak/rupture
- Scar tissue development around the implant (capsular contracture)
- Visible rippling / wrinkling
- Hard to match natural breast

# IMPLANT RECONSTRUCTION

Can we do it all in one surgery?



Single Stage  
vs.  
Two Stage

Implant  
Reconstruction

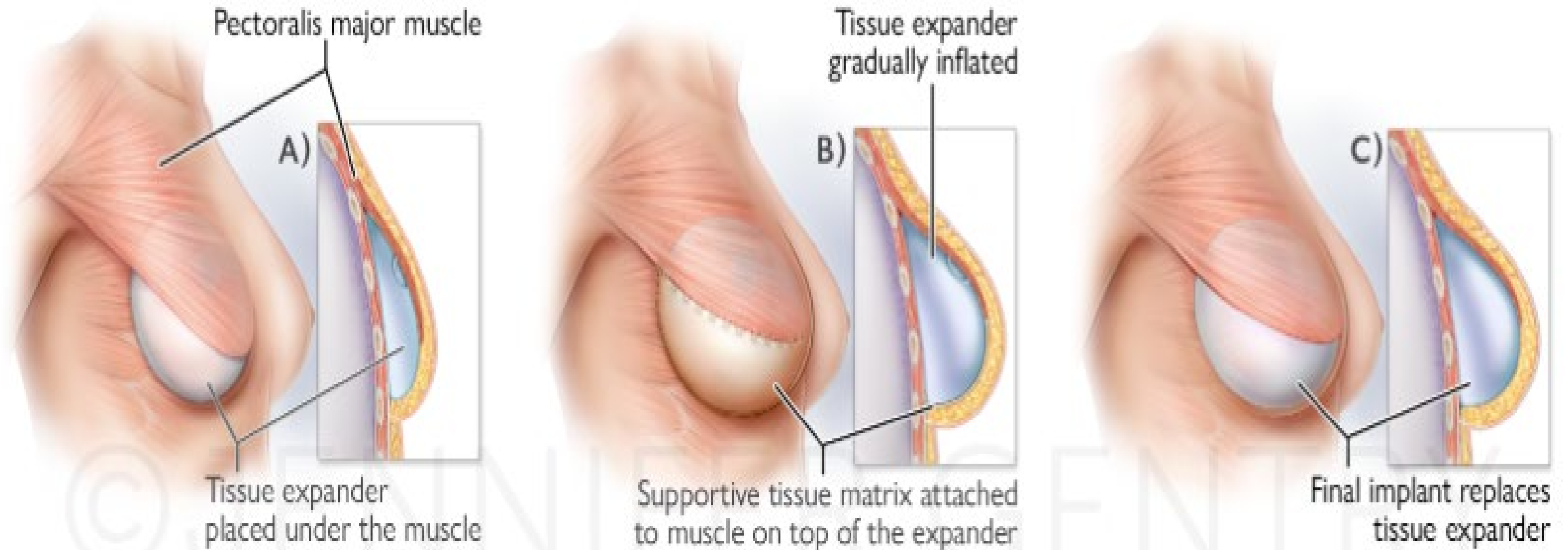
- “Ideal” candidate for single stage (DTI)
  - Healthy skin (no: smoking, stretch marks, radiation, diabetes)
  - Small to moderate breast size
    - Implant sizes limited
  - Nipple sparing mastectomy:
    - match current breast volume, or slightly smaller
  - Skin sparing mastectomy:
    - smaller than current breast volume

# IMPLANT RECONSTRUCTION

Does the implant need to go above or below the pectoralis muscle?

# Sub-Pectoral Implant Reconstruction: Acellular Dermal Matrix Sling

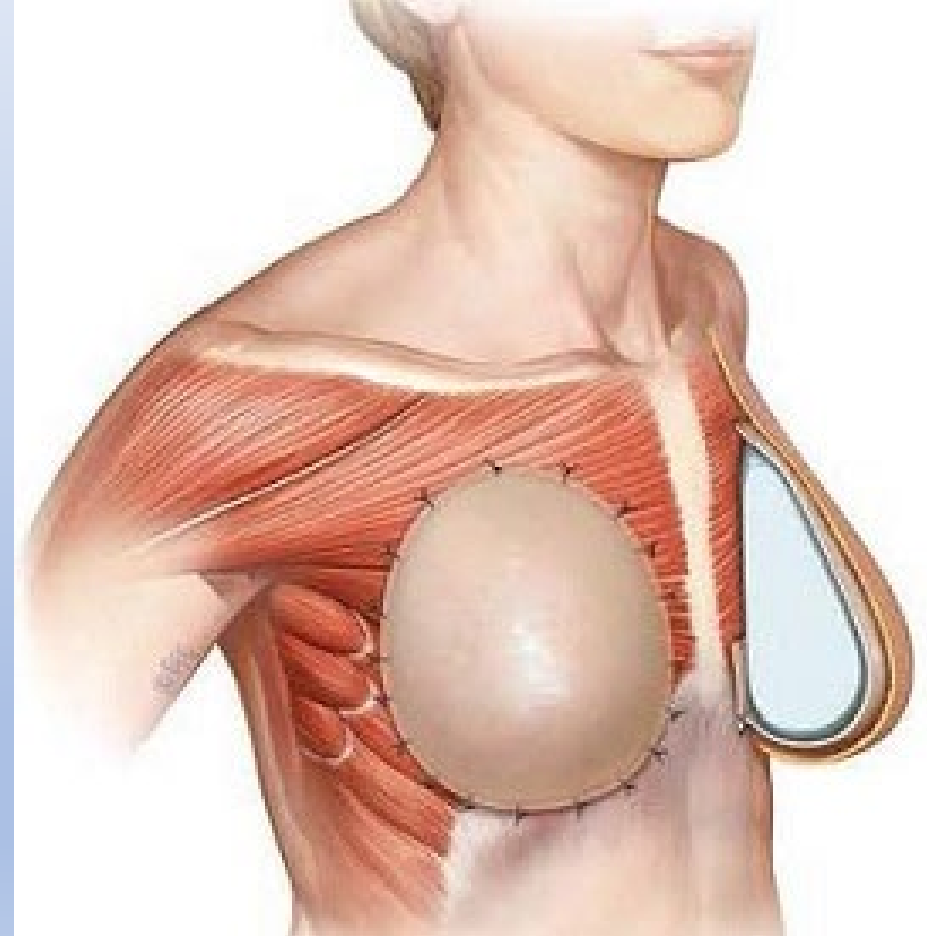
## Subpectoral Implant Breast Reconstruction



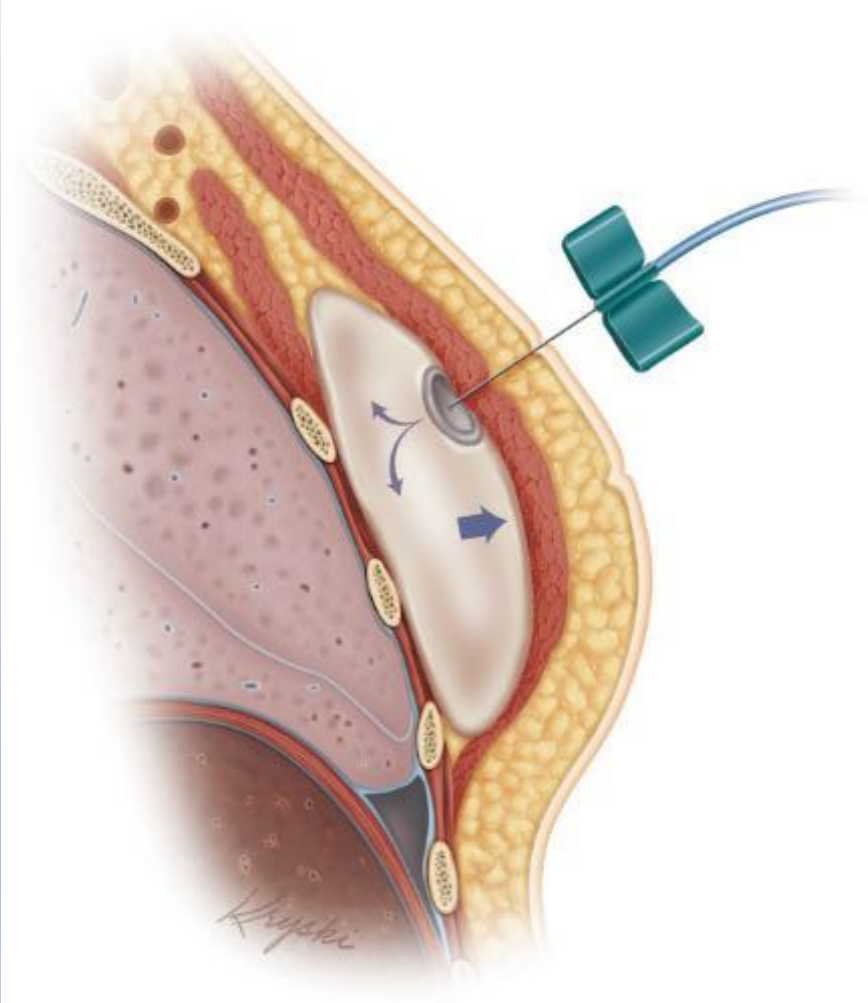


# Pre-Pectoral Implant Reconstruction: Full Acellular Dermal Matrix Coverage

- Major benefit:
  - NO animation deformity
- Secondary benefits:
  - Less pain
  - Faster surgery
- Risks:
  - Visible implant shape
    - Superior shelving
    - Rippling
  - Implant exposure with thin mastectomy skin



# Tissue Expander Device



# Implant Choices

## Saline Implants



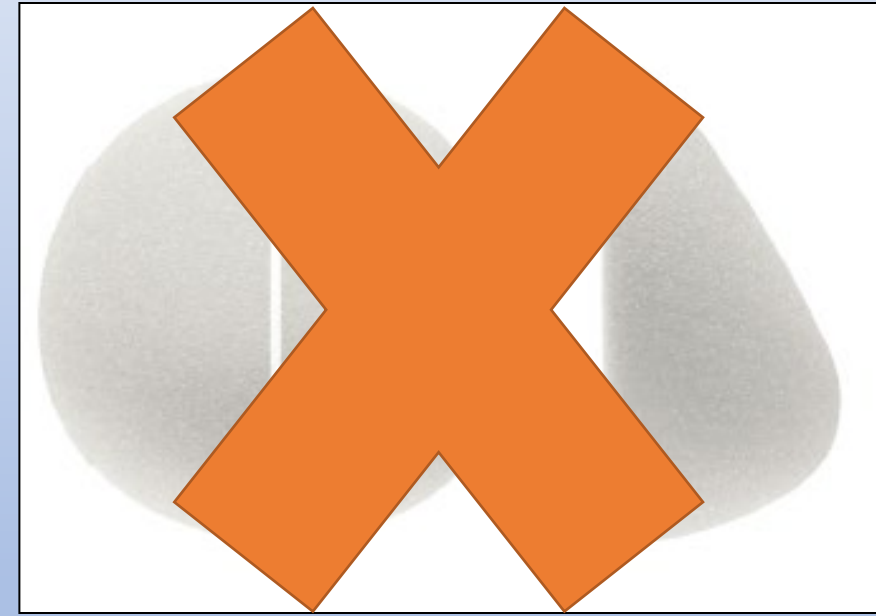
More firm  
Most rippling  
More mobile  
More upper pole fullness

## Smooth Round Gels



Softer  
Less rippling (in bra)  
More mobile  
More upper pole fullness

## Anatomic Textured Implants



More firm  
More rippling (in bra)  
Less mobile  
More natural shape



# Nipple Sparing Implant Reconstruction



BRCA +



Bilateral nipple sparing mastectomies  
Tissue expander / ADM reconstruction  
Round silicone implant placement

# Skin Sparing Direct-to-Implant Pre-Pectoral Reconstruction



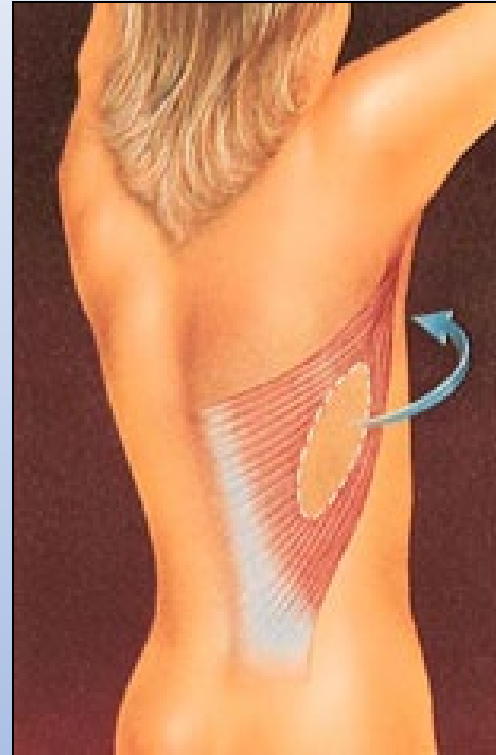
Left breast cancer



Bilateral skin sparing mastectomies  
Immediate implant / ADM reconstruction  
Anatomic silicone implants

# Latissimus Flap with Implant

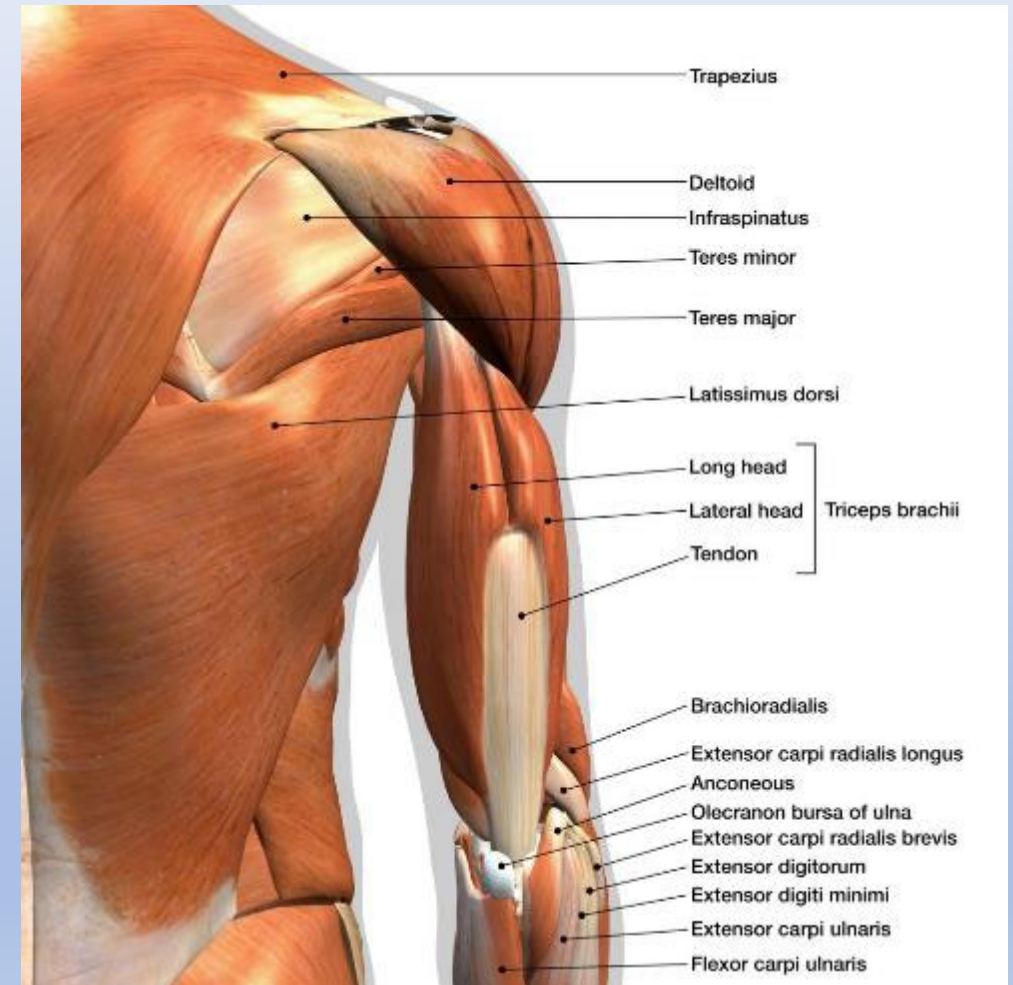
- Good option for patients with **history of chest wall radiation** but still want an implant
  - decreases risks associated with implant and radiation
- Brings in healthy, non-radiated tissue to support the implant
- Very reliable flap
- Longer initial surgery





# Latissimus Flap with Implant

- Lose muscle function
  - Initial shoulder weakness 15-20%
- Synergistic muscle compensation
  - Teres major
  - Subscapularis
  - Pectoralis major
- Residual weakness and tightness
  - Dominant arm
  - Sports – tennis, golf, skiing



# Latissimus Flap with Implant



Pre Op



Post Op 1 year

# Latissimus Flap with Implant



Pre Op



Post Op 1 year



# FLAP RECONSTRUCTION

What are the benefits?

# Risks/Benefits of Tissue (Autologous) Flap Reconstruction

## **Benefits**

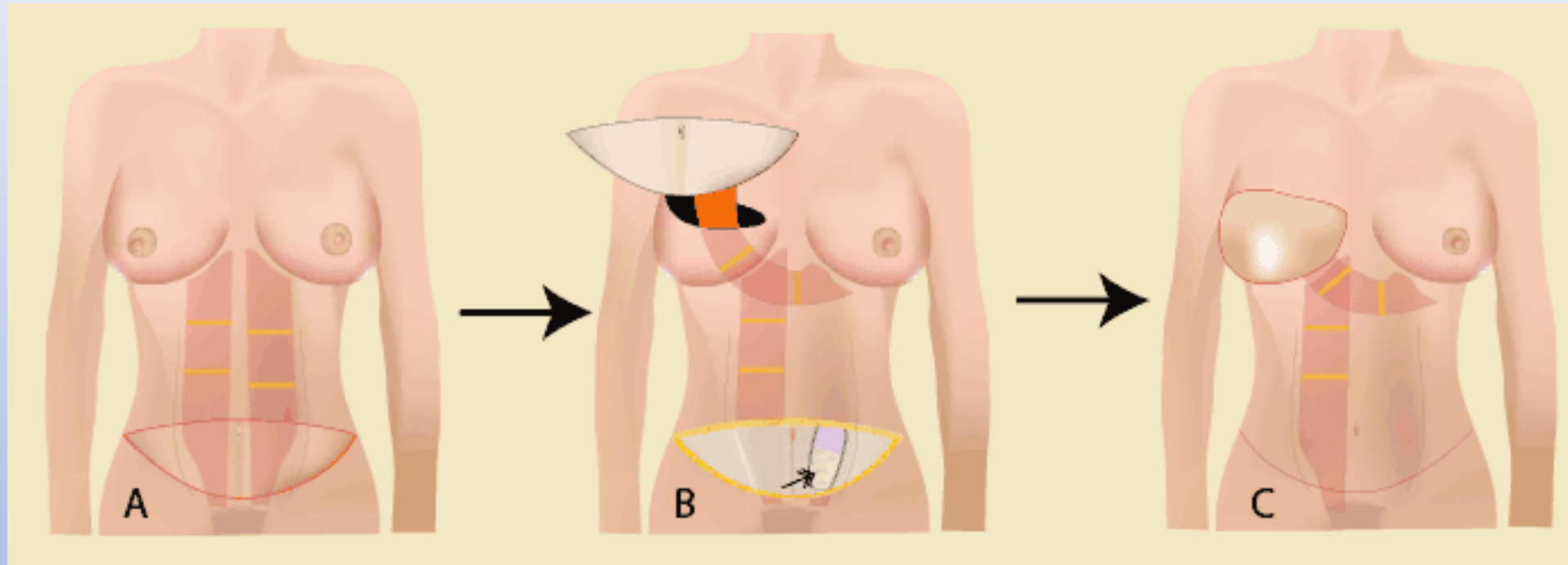
- Breast reconstructed completely out of tissue
  - No implant
  - Most natural result
  - Ages well
- With TRAMs and DIEPS
  - “Improved” abdominal contour

## **Risks**

- Longer operations
- More scars on body
- Longer recovery
- ?Possible muscle loss

# Pedicled TRAM Flaps

# Pedicated TRAM Flap



## Benefits

- All of your own tissue – no implant
- Very natural looking results
- Ages with the patient

## Risks

- Sacrifice entire rectus muscle
- Abdominal weakness
- Abdominal hernia
- Fat necrosis



# Pedicled TRAM Flap



# Intermediate Phases



# Pedicled TRAM Flap



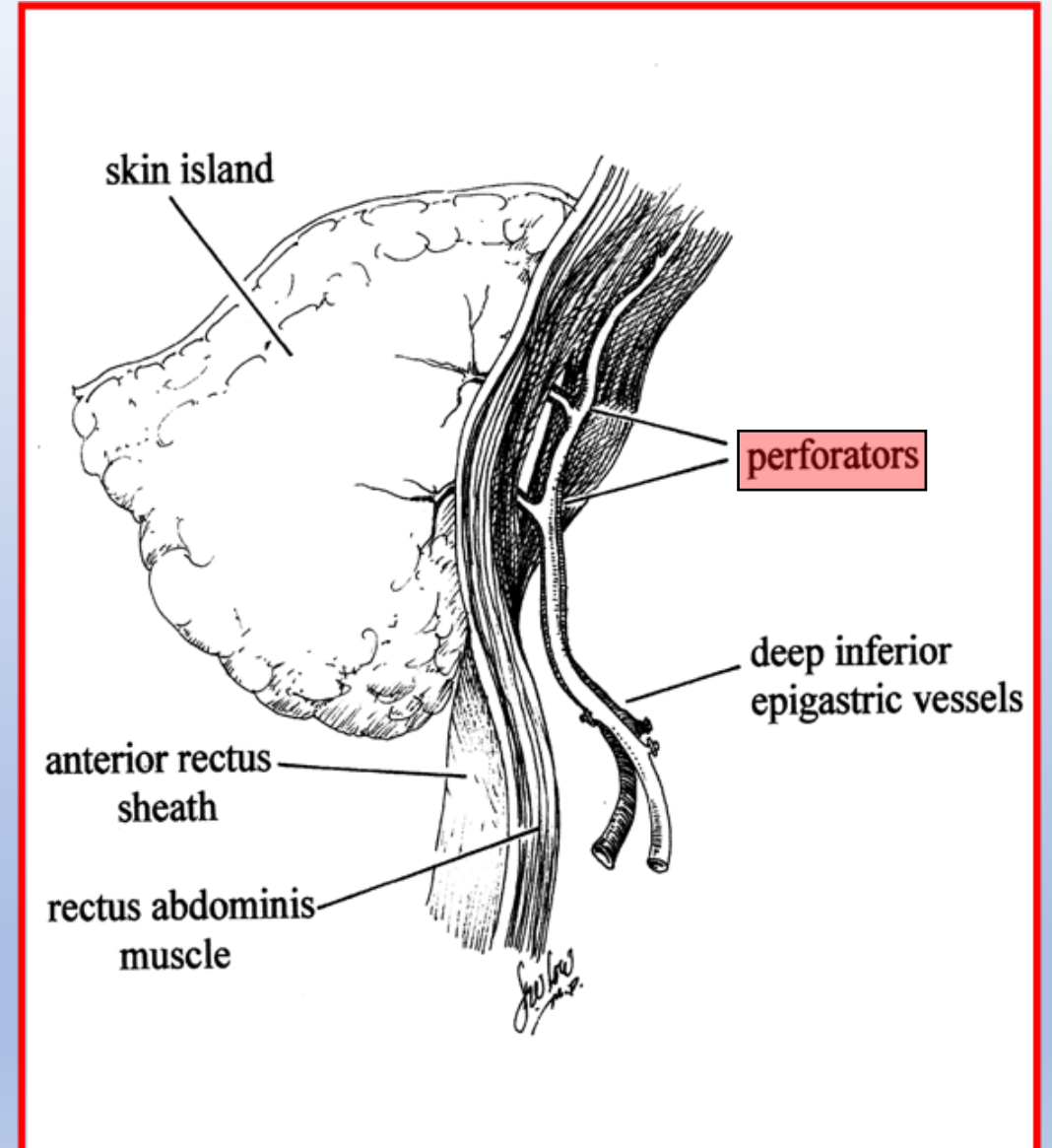
# The “Perforator” Concept

Definition: Flap reconstruction technique that moves skin/fat attached to a “perforator” blood vessel, leaving muscles in place

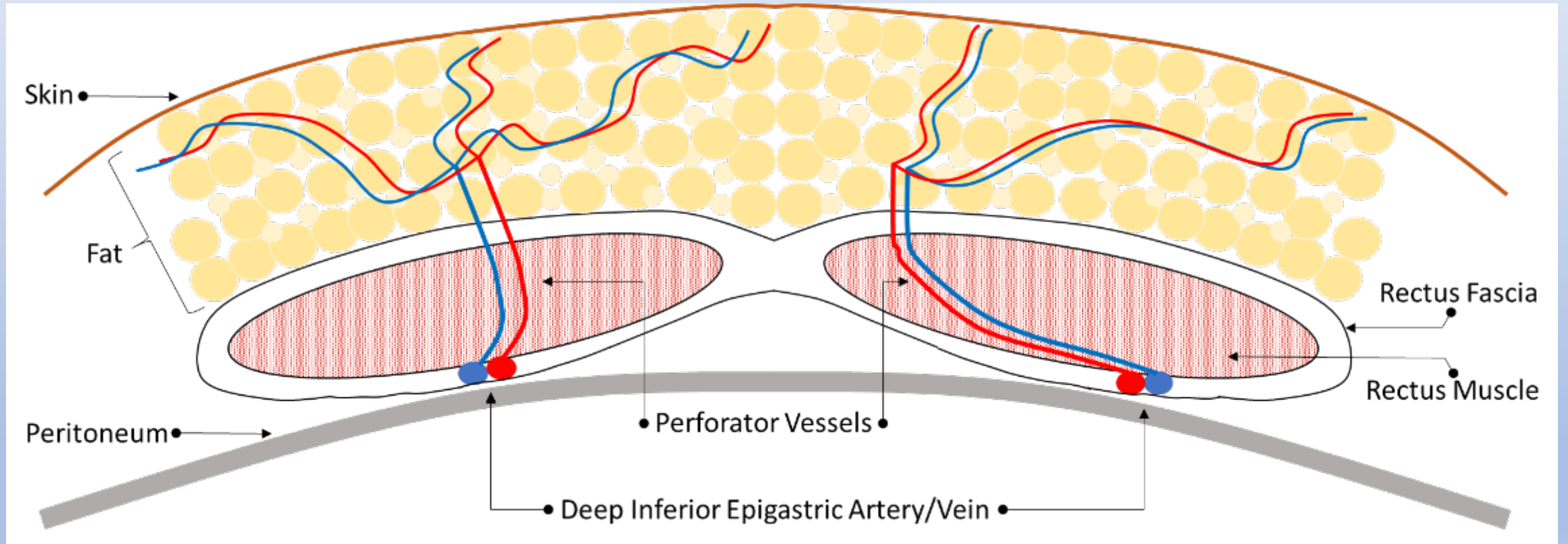


# Perforator Flap Concept

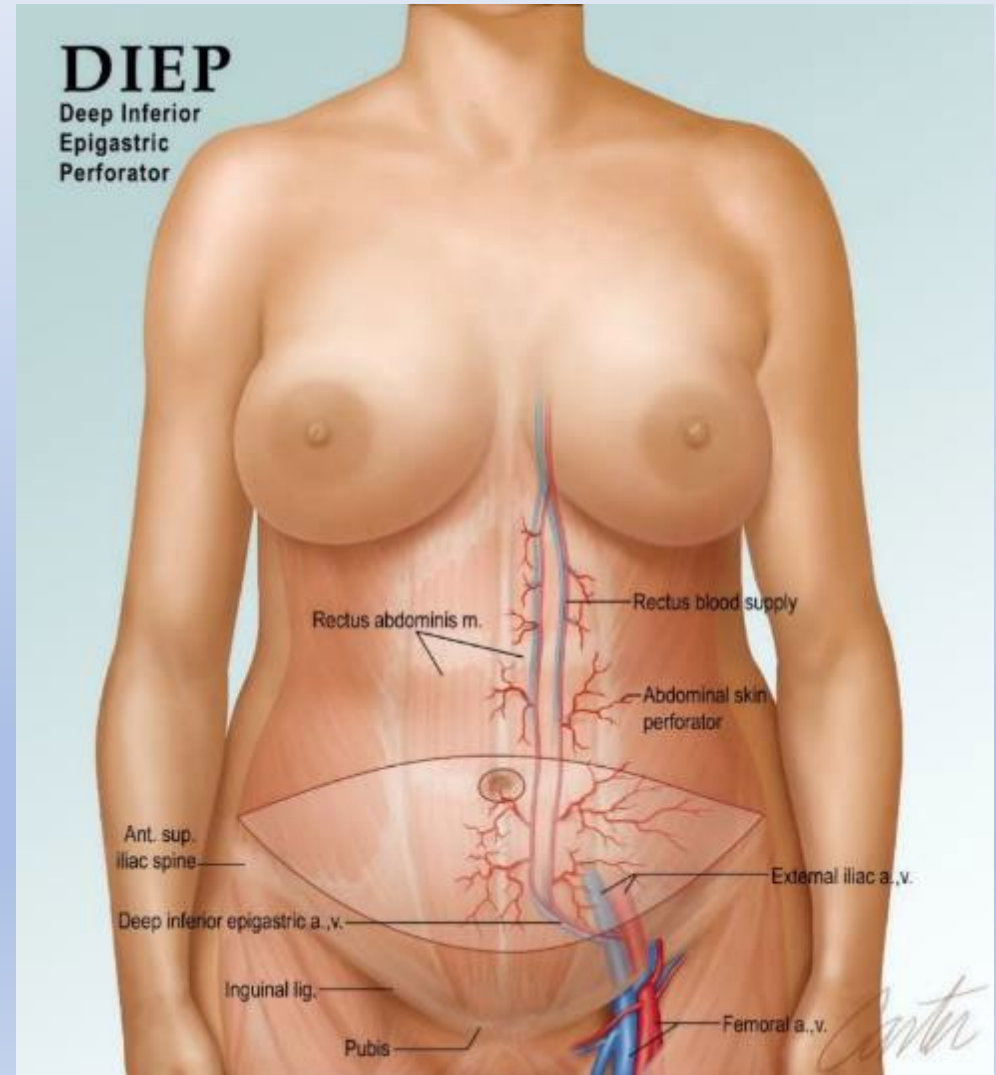
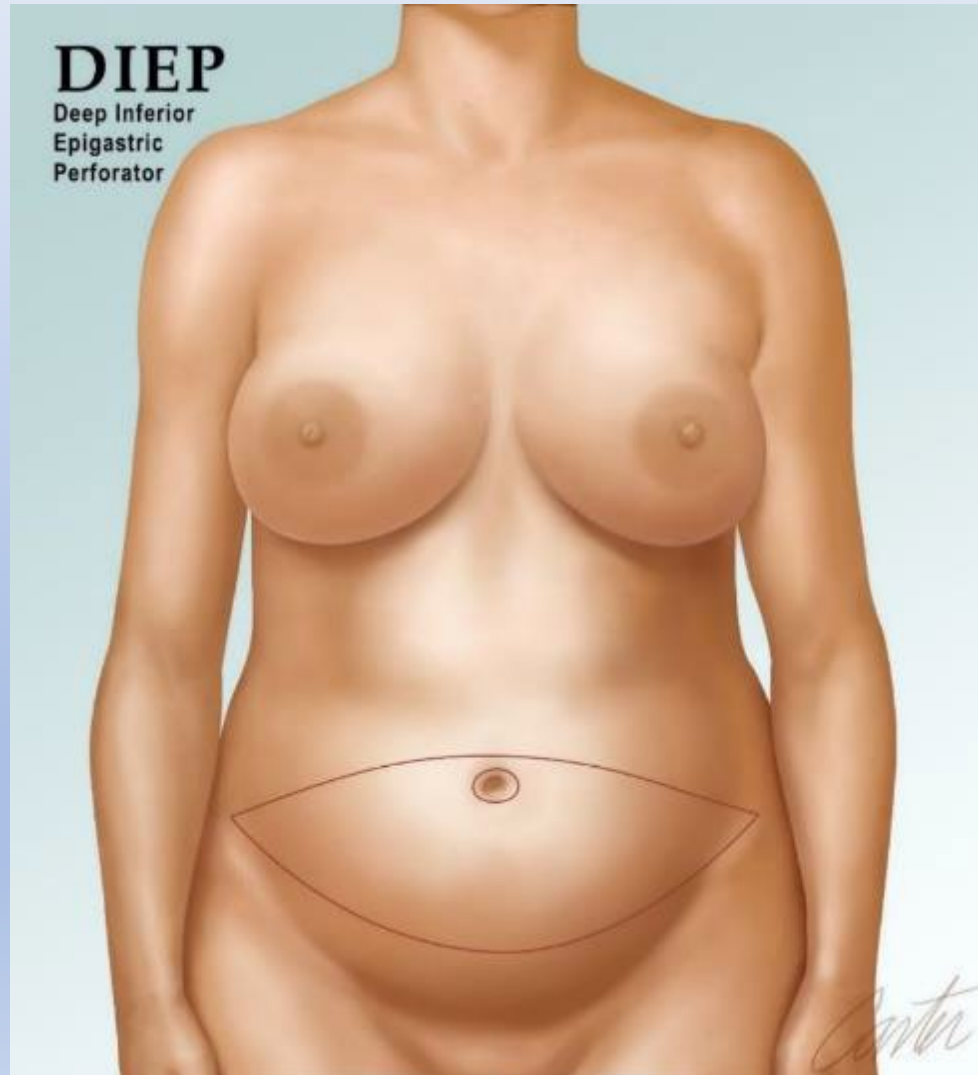
- Previously muscle considered essential carrier for blood supply
- Perforating blood vessels are dissected out from the muscle
- Muscle remains in place to continue to perform necessary functions
- **Minimizes donor site morbidity**
- DIEP flaps are the most popular perforator flaps



# Abdominal Wall Anatomy

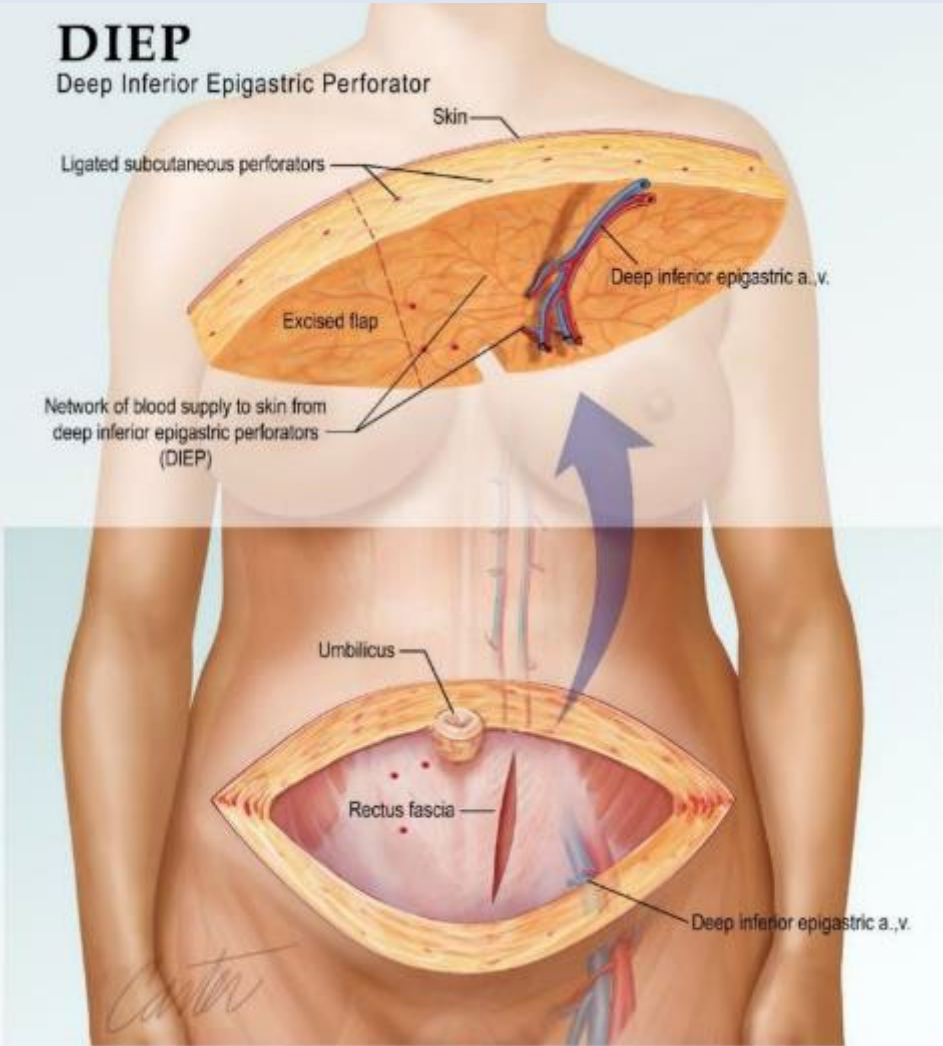


# DIEP Anatomy

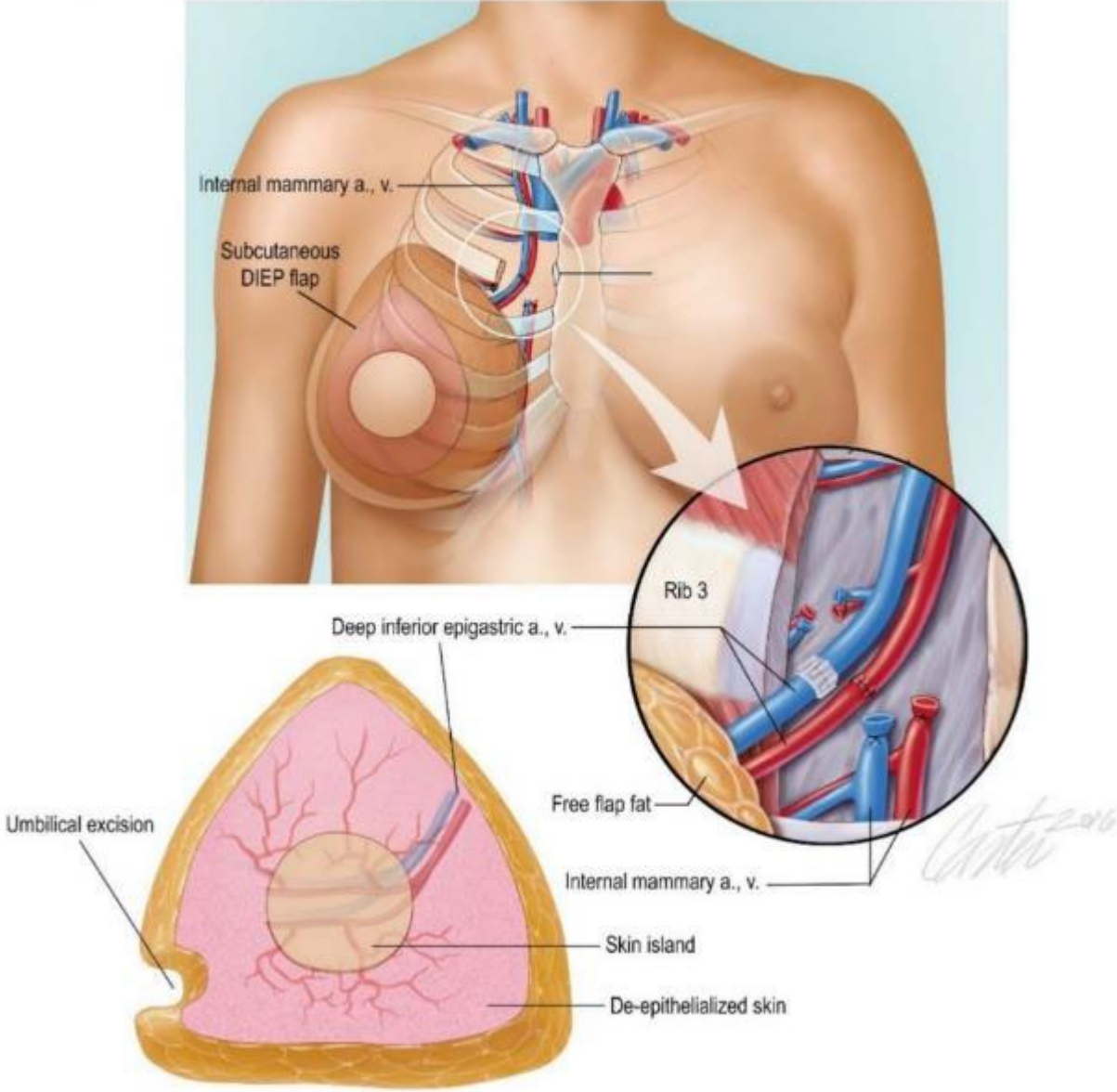




# DIEP Anatomy

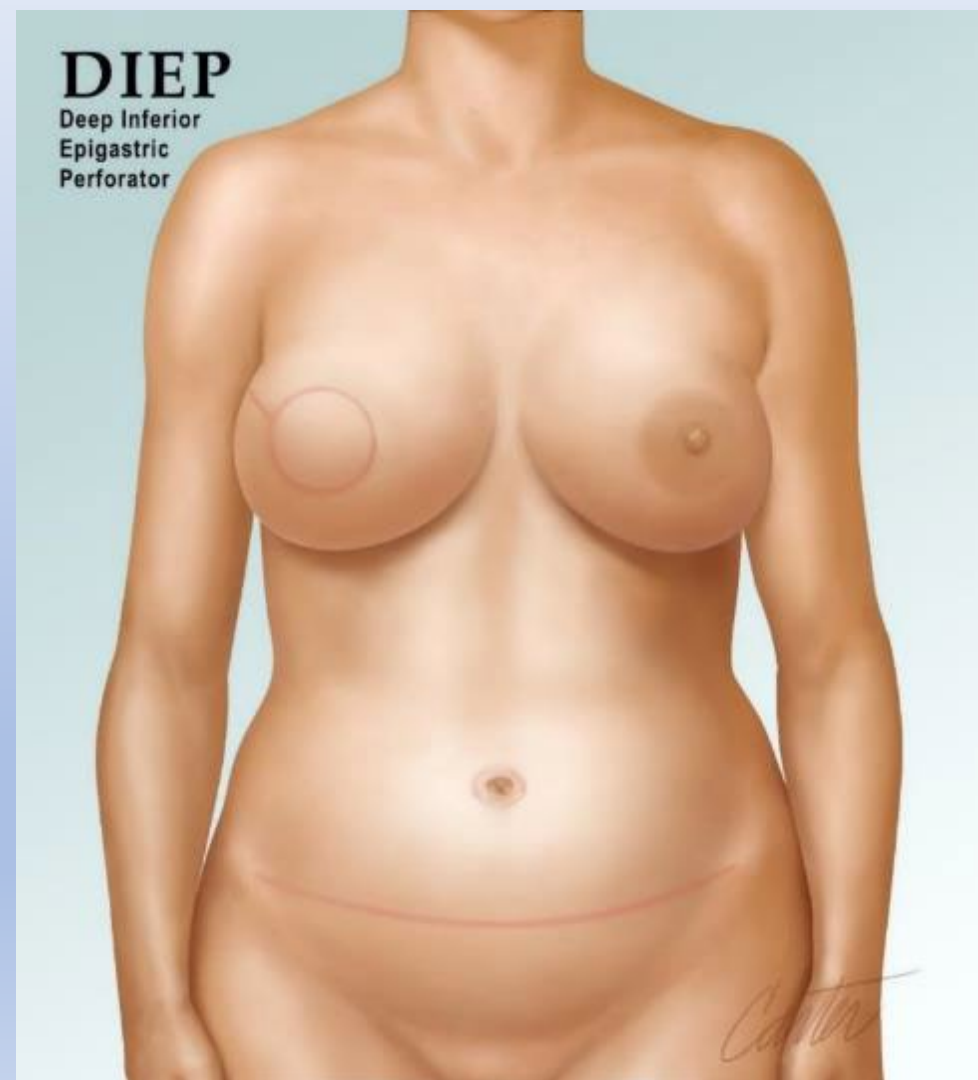
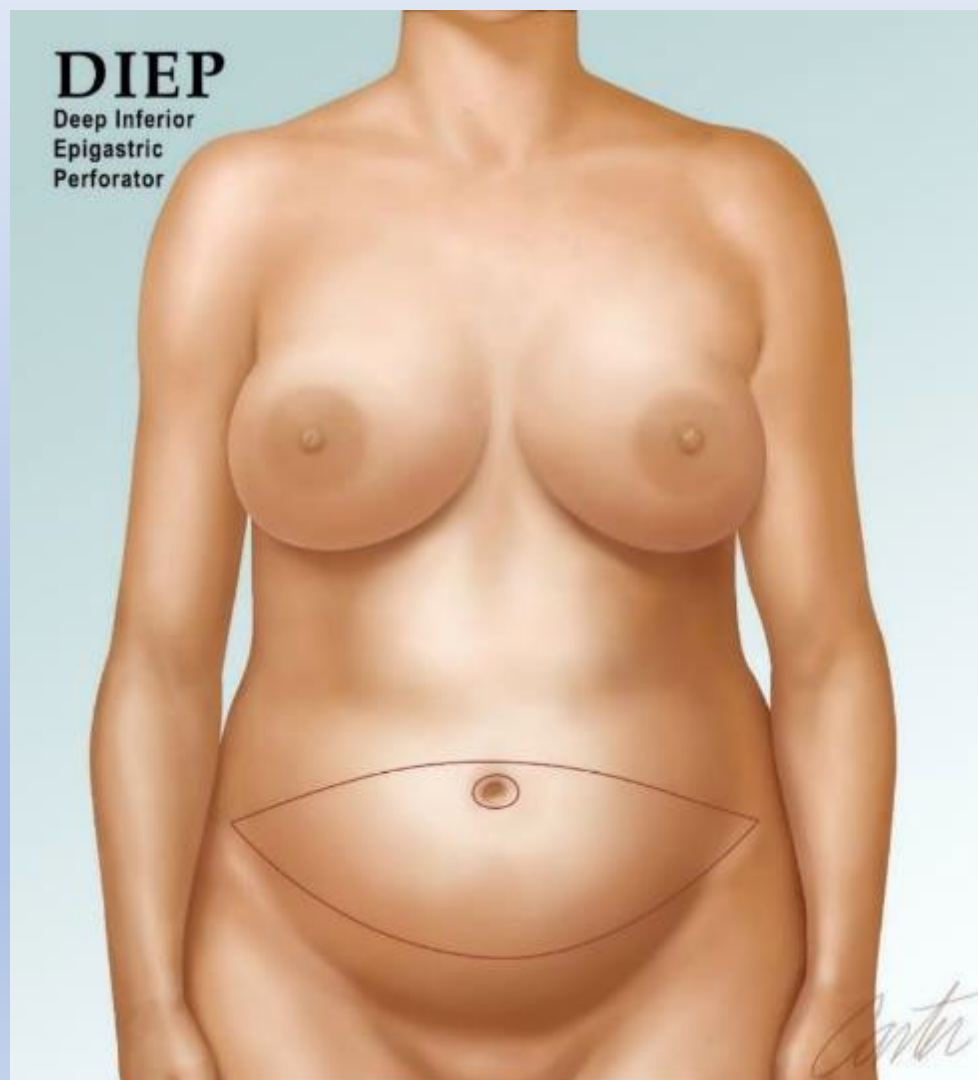


# DIEP Deep Inferior Epigastric Artery





# Ideal Results





# DIEP Flap Benefits

- Preservation of abdominal strength
- Markedly lower abdominal hernia rate
  - <1% verses 1-15% in TRAMs
- Improvement of abdominal contour
- Decreased post-operative pain
- Faster recovery
- Decreased care costs

# The Ideal DIEP Flap Patient

- Young
  - Flap ages with you, no lifelong implant risks
- Active
  - Perforator flaps preserve natural function of muscles
- Healthy
  - Able to tolerate a longer procedure
- Bilateral reconstruction needed
  - Genetic mutation populations (BRCA 1/2, etc.)
- Body habitus with ample tissue in the lower abdomen



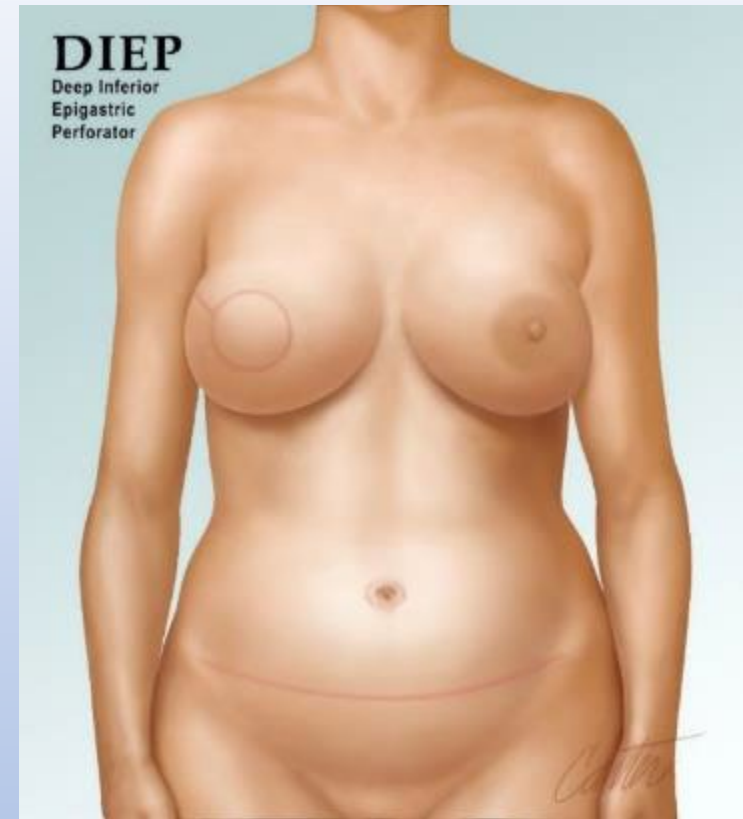
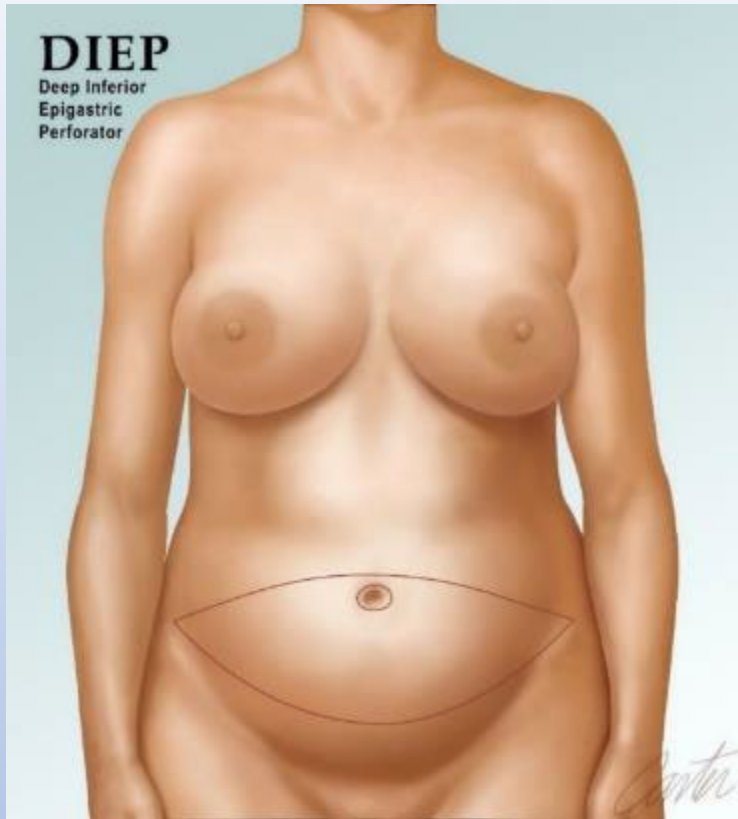
# Who should NOT have a DIEP Flap?

- Active smoker
- Spontaneous DVT/PE history
- Hypercoagulable state
- Definite need for PMRT
- Allergy to anti-coagulants (ASA, heparin)
- Inability to manage post-operative care
- Inability to understand scope of the operation
- Active cardiac disease, or significant risk factors
- Active steroid use
- Current drug or alcohol abuse
- BMI > 35
- Metastatic disease
- Poor anatomy



# DIEP Flap “Risky” Populations

- Diabetes
- Autoimmune disease
- Prior chest wall radiation
  - Wait 4-6 months after completion of treatment
- Prior procedures to donor area
  - Liposuction or scars
- Recent Smoker
  - Must abstain 6 weeks pre-op and post-op
- Caffeine
  - Wean off before surgery and hold for 6 weeks post-op



### Benefits

- Minimal abdominal weakness
- Minimal risk of abdominal hernia
- No implant
- Very natural looking results
- Ages with the patient

### Risks

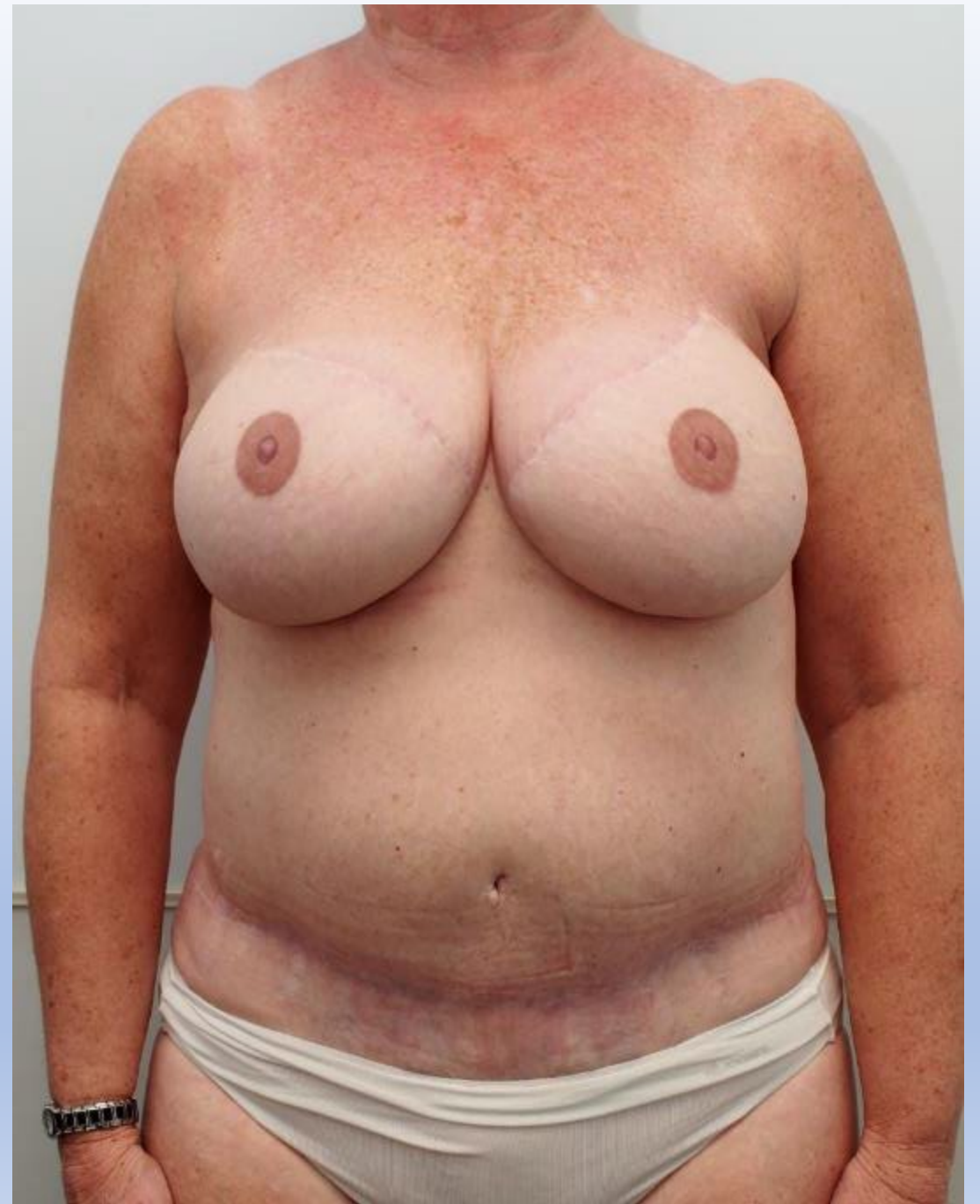
- Microsurgery
  - 2 % flap loss rate
- Longer operation?









































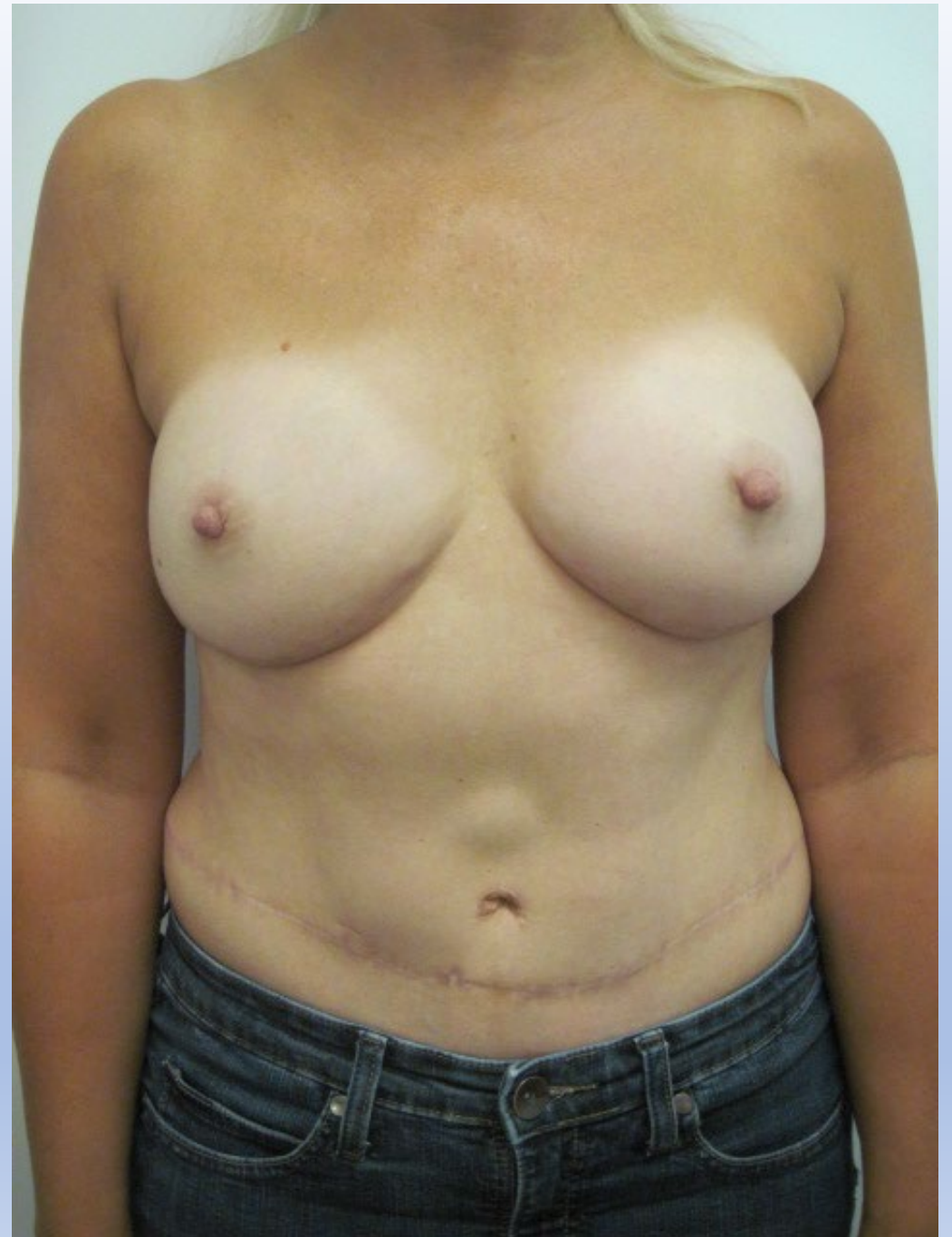








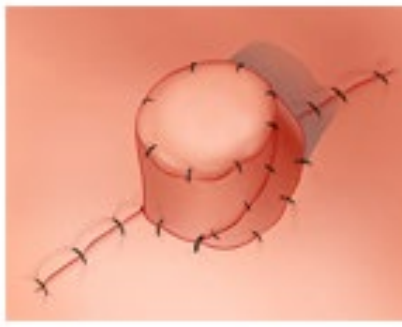
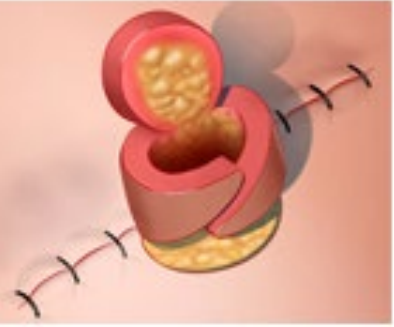






# Nipple and Areola Reconstruction / Tattoo

## Nipple Reconstruction: CV Flap



# Nipple Creation & Tattoo

# 3D Tattoo



# 3D Tattoo





# Tattoo Process Overview



- Multidisciplinary Clinic
- Consent
- Photos
- Nipple Placement
- Color Selection
- Photos
- Dressing/Instructions



# Tattoo Set Up

- Pre-Procedure Photos
  - Nipple Placement
  - Color Selection
- 
- It is often helpful to have an additional set of eyes to help with decision making – if the patient feels comfortable.
- 
- This patient brought her beautiful granddaughter with her!





# Tattoo in progress!





# Final Result







Beginning to end...one patient's experience

# Beginning to end...one patient's experience





## Life-like tattoos and 4D nipple reconstruction help breast cancer survivors feel whole again after surgery

After her mastectomy and breast reconstruction surgery, Teri Diaz, 40, was on her way to recovery, but she didn't feel quite finished yet.

For many women like Diaz, who undergo surgery for breast cancer, nipple-sparing mastectomy is not an option, and this part of the breast must be removed.

Having their nipples reconstructed or tattooed can be an important final step to complete the breast reconstruction process.

Nipple reconstruction and tattooing made a world of difference to me," Diaz said. "I look at myself in the mirror now, and it feels good. I have my breasts back."

The Center for Breast Reconstruction, under the direction of Stephanie Caterson, M.D., offers women who have had breast cancer surgery a full range of options, including the latest microsurgical flap reconstruction procedures to restore the natural appearance of their breasts.

After reconstruction, once the breast tissue has healed, women may choose either 3D tattooing of the nipple and areola (the dark area around the nipple) or 4D nipple reconstruction with tattoos to complete their look.

About three months after microsurgical reconstruction of her right breast, Diaz returned as an outpatient for her 4D nipple reconstruction. It took about 30 minutes for Dr. Caterson to create a new, life-like nipple in the front of the breast by folding over and sewing a small bit of skin.

A few months later, Diaz sat down with Physician Assistant Kerry Gregory, PA-C, at the Center for Breast Reconstruction, to complete the finishing touches.

Gregory is certified to perform nipple and areola tattooing, having trained in the most advanced techniques available to medical professionals with some of the world's most renowned tattoo artists. She uses her color pallet and perspective to help women feel whole again after breast reconstruction surgery.

She applies the tattoos the traditional way using needles to insert pigment into the skin. Newly reconstructed breasts have little sensation, so the procedure is virtually painless.

Women who do not choose nipple reconstruction can have 3D nipple tattoos that lie flat but with color and definition that looks like a natural nipple.

"We spend a lot of time choosing just the right pigments to create a natural looking tattoo that matches the patient's skin tones and characteristics," Gregory said.

**"When our patients look in the mirror, they no longer see the scars of their experience. They see something that makes them happy. They feel complete."**



Teri Diaz and Kerry Gregory, PA-C





# Thank You!

Stephanie A. Caterson, MD



DELAWARE  
ACADEMY of  
MEDICINE

**DPHA**  
DELAWARE PUBLIC HEALTH ASSOCIATION



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