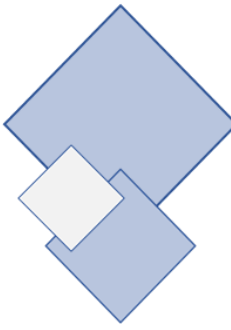




# Pregnancy and Breast Cancer

**Sadaf Alipour**  
**Professor of Surgical Oncology**  
**Tehran University of Medical Sciences**  
**Tehran, Iran**

# In this lecture we will go through:



1) **First:** 5 cases and questions about their management



2) **Second:** the main discussion



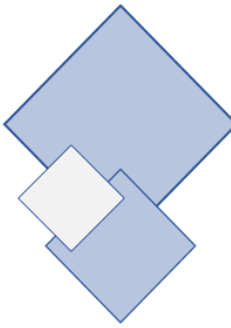
3) **Third:** Answers to the questions



# CASE 1

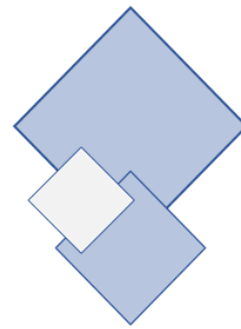
*Dear audience,  
please type your  
answers in the CHAT*

- 42 yr female
  - 32 weeks pregnant
- Felt a lump in right breast
- FH-, PMH-
- Exam:
  - mobile, firm, lobulated mass
  - Plan?
    - Ultrasound (US):
      - circumscribed, bilobed mass, 24 mm, BIRADS II
      - Next plan?

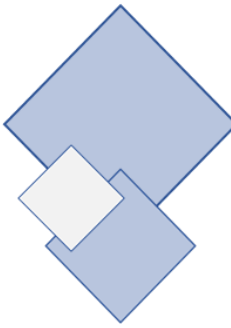


## CASE 2

- 30 yr female, 9 w pregnant
  - Irregular mass in left breast, 2 cm
    - LAP in left axilla
  - FH-
  - History of fibroadenoma excised at 22 years of age
    - Plan?
  - US:
    - Right breast normal, in left breast:
      - Mass with irregular border, 18 mm
      - Reactive LN in left axilla
- Next plan? Any imaging?



# CASE 3

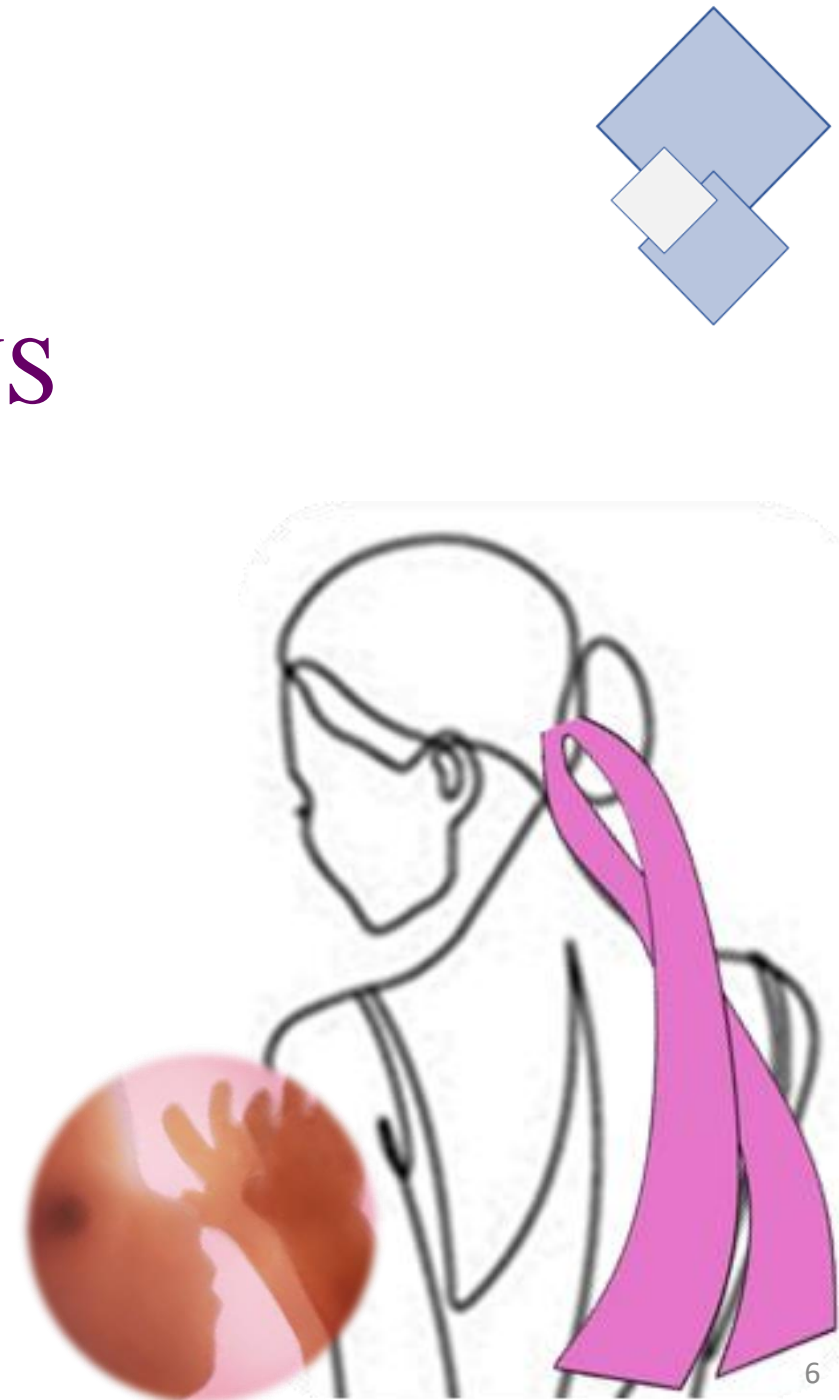


- 30 yr female, NVD 6 months ago, lactating
  - Redness and edema in UOQ and LOQ of left breast
  - No systemic signs
  - No palpable mass
  - Plan?



# Case 4

- 25 yr female
  - Had a mass from 1 year ago in breast US
    - 7 mm, round mass
    - No previous histology
    - Now, 25 w pregnant
    - Plan?
- Follow up US:
  - 17 mm, round mass
  - Next plan?

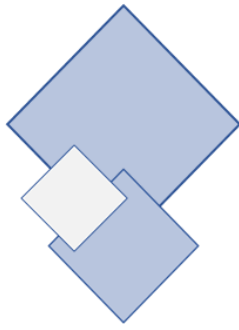


# CASE 5

- 37 yr female, G 0
  - Underwent breast cancer treatment
    - T1N1, ER+, PR+, HER2-
    - Did not undergo fertility preservation
  - Surgery, Chemotherapy, Radiation
    - Ended 21 months ago
      - Now under tamoxifen
      - She wants to get pregnant
        - Your recommendation?



# Now, Three main topics to Discuss



1. Relation of pregnancy/lactation and breast cancer

2. Breast cancer during pregnancy

3. Pregnancy after breast cancer

## *Abbreviations*

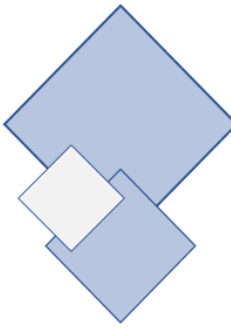
breast cancer = BC

pregnancy = Py

breastfeeding = BF

post-partum = PP

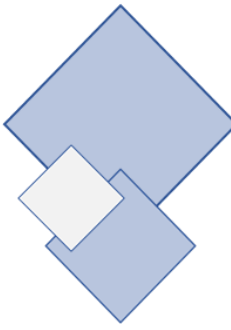




# **1. Relation of pregnancy and breast cancer**



# Py & BF: Risk or Protective Factors for BC?



## A dilemma

∞ Pregnancy and lactation: protective against BC

But

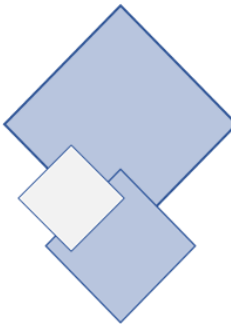
∞ Small increase in incidence of BC up to 2 or 5 yrs after delivery

▶▶ Cumulative effect: favorable

↓ ✓ Overall, reduction in BC risk proportional to

↑ • the number of full-term pregnancies

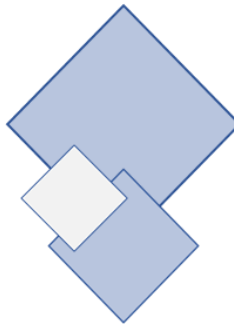
↑ • the total duration of lactation



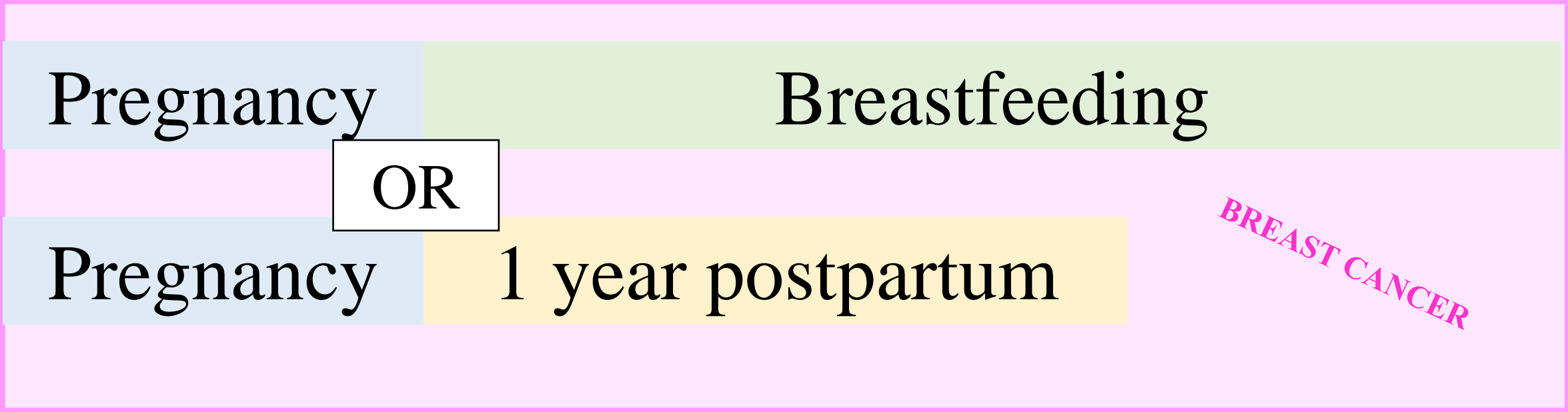
## **2. Breast cancer during pregnancy**

Breast cancer during pregnancy

# Definition of PABC



PABC= Pregnancy Associated BC



# Breast cancer during pregnancy Epidemiology of PABC



## & PABC

∞ Incidence rate: 17 to 40 per 100,000 births

▶▶ But lower in Py (3.0 - 7.7) than in PP (13.8 - 32.2)

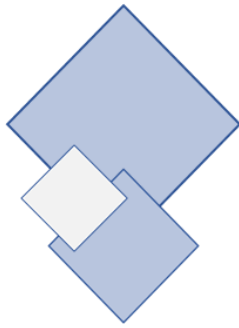
✓ PABC incidence: increasing in many countries

- Maybe due to higher age of Py



Breast cancer during pregnancy

# Prognosis of PABC



∞ Delay in diagnosis

▶▶ Later presentation

✓ Higher stage at presentation

• Treatment delays

*AND*

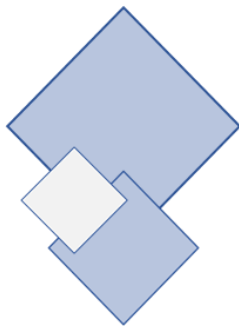
∞ Increased proportion of receptor negative cancers

∞ Therefore, overall

∞ Negative effect on outcome

∞ Decreased overall survival





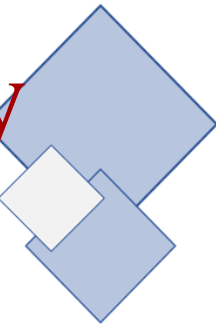
## 🔗 The most common

- 🌀 A persistent, palpable, painless breast mass
  - ▶▶ Increasing in size disproportionately to the surrounding evolving breast tissue
- 🌀 Skin thickening
- 🌀 Asymmetric breast swelling



- Patients *and* physicians may wrongly think these findings are normal physiologic changes!
- Normal physiologic changes can make palpation of a mass more difficult and cause a delay in diagnosis

# Breast cancer during pregnancy **Diagnosis of breast lumps in Py**



## Includes

- ↪ A detailed history
- ↪ Physical exam
- ↪ Diagnostic breast imaging: ultrasound
  - ▶ If suspicious for malignancy
    - ✓ Mammography ←
    - ✓ Core needle biopsy



**Core needle biopsy is completely safe in Py and BF, and should be performed with any level of suspicion**



## *In parentheses*

↳ **Benign** breast lumps can enlarge during Py and BF

↳ Fibroadenoma is the most common benign solid mass in young women

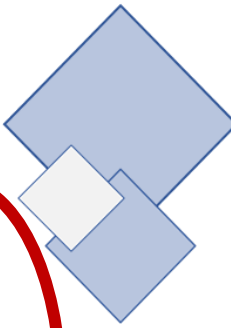
▶▶ Frequently enlarges during Py and BF

✓ May be observed

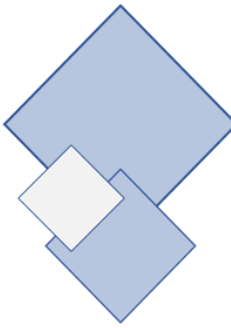
✓ Surgery rarely needed, except for very fast enlargement

✓ *Or* very large size

• But surely needs to be confirmed by histology



# Ultrasonography



## ☞ First-line imaging in Py/BF

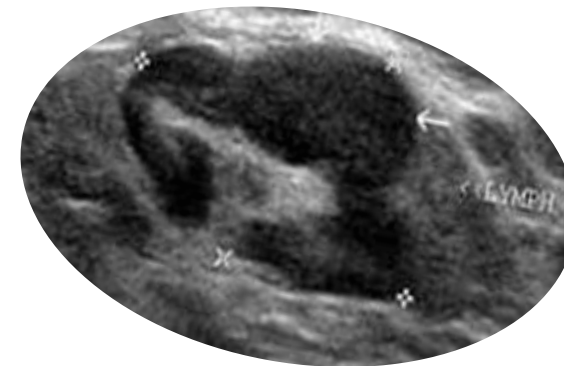
☞ Due to safety, and useful information

- When doctor is uncertain: US can confirm there is no lump, just NL breast tissue

- Diagnoses simple cystic lesions

- Investigates solid and atypical cystic lesions

- Gives precise description and Bi-Rads classification



# Mammography



⌘ Not performed when unnecessary

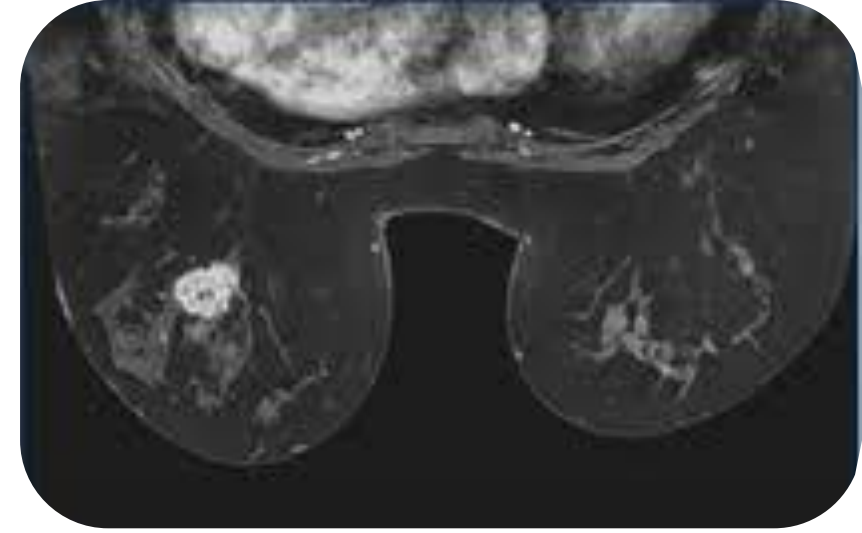
∞ But done if persistent doubt after US

▶▶ often helpful and not dangerous

✓ If BC detected in CNB in Py/BF,  
bilateral mammography is necessary

• With abdominal shield

# MRI in Pregnancy



∞ Prone position

▶▶ difficult for pregnant woman

∞ Gadolinium enters fetal blood

▶▶ Adverse effects seen in animals

∞ Heating

▶▶ can affect cell migration in 1<sup>st</sup> trimester

∞ Noise

▶▶ may harm fetal hearing (~24 w)

∞ MRI without Gadolinium may be OK

∞ But not helpful

✓ New studies on the way

# MRI in breastfeeding

Can be performed during BF

Main indication: diagnosed BC

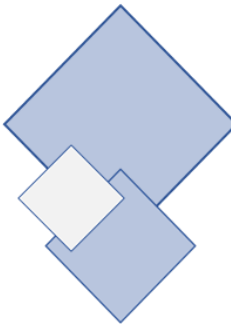
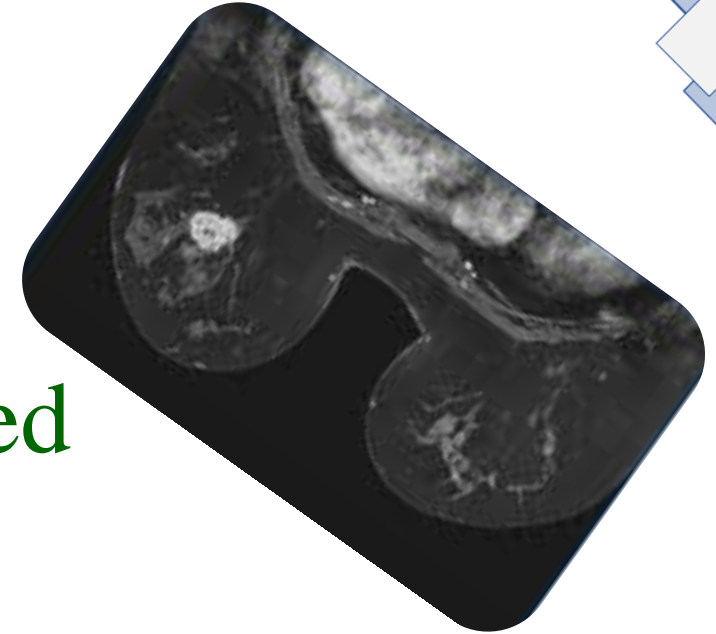
▶▶ BC extension may be underestimated

Little Gad. excreted in milk

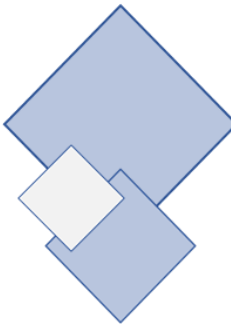
▶▶ Absorbed by infant

✓ no reported cases of direct toxicity

• 12- 24 h BF pause preferable



# Breast cancer during pregnancy Metastasis work up for PABC



Staging in non-PABC		Staging in Py
CT scan of abdomen	PETscan OR	CXR with shield
CT scan of chest		US of liver
bone scan		No bone scan

If suspicious to bone mets:  
may MRI without contrast

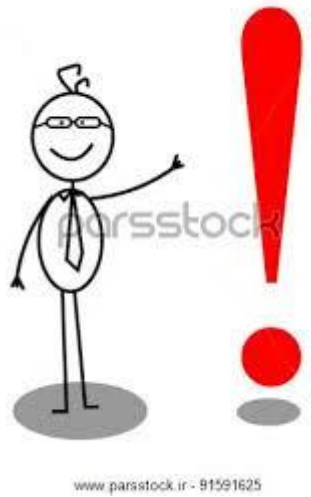
Any suspicion for distant metastasis: needle biopsy  
(because metastases change treatment plans)

# Breast cancer during pregnancy **Diagnosis- Must Do Points:**

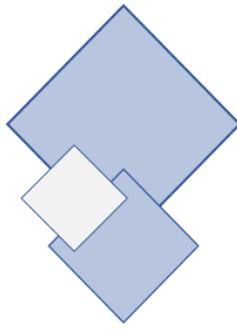
**Any pregnant patient who presents with findings suggestive of BC must be evaluated promptly**



**Physicians should have a low threshold for imaging of a persistent or enlarging breast finding in a pregnant or lactating patient**



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## ↳ Invasive BC

↳ Timing and order of treatment determined by gestational age and BC stage

▶▶ In non-metastatic BC, treatment involves:

TYPE?  
TIMING?

- ✓ surgery
- ✓ ± adjuvant or neoadjuvant chemotherapy
- ✓ ± adjuvant endocrine therapy
- ✓ ± adjuvant radiotherapy

TIMING?

TIMING?

▶▶ In metastatic BC, involves:

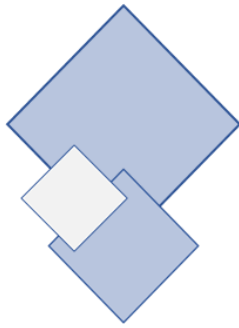
- ✓ Systemic therapy

TIMING!?!



Breast cancer during pregnancy

# Treatment of PABC



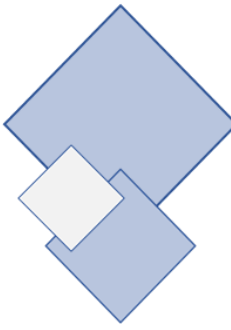
↳ Invasive BC: treated in a multidisciplinary approach

↳ Termination of Py does not improve outcomes  
↳ should not be recommended

▶▶ may safely undergo many local and systemic treatments while maintaining Py

▶▶ Early delivery exceptionally considered if it affects maternal oncologic outcome

✓ E.g. Metastatic BC

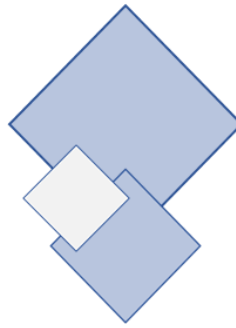


❧ Early Py is a contraindication for breast conserving surgery (BCS)

❧ Mastectomy is preferred in the first trimester

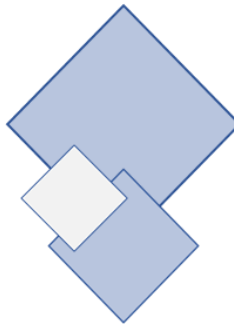
▶▶ To avoid the impact of delaying radiation

# Breast cancer during pregnancy Type of Surgery Based on GA



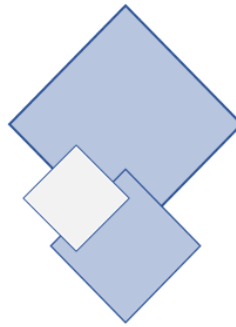
	First trimester	Second trimester	Early third trimester	Late third trimester
Breast surgery	If adjuvant chemotherapy is expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	Total mastectomy
		BCS	BCS	BCS
	If adjuvant chemotherapy is not expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	BCS
Axillary surgery	ALND	ALND	ALND	ALND
	SLND	SLND	SLND	SLND

# Breast cancer during pregnancy Type of Surgery Based on GA



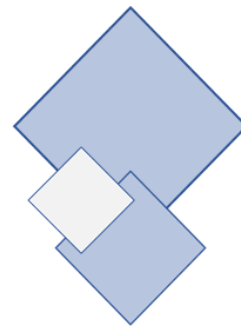
	First trimester	Second trimester	Early third trimester	Late third trimester
Breast surgery	If adjuvant chemotherapy is expected based on tumor characteristics			
	Total mastectomy	Total mastectomy BCS	Total mastectomy BCS	
Breast surgery	If adjuvant chemotherapy is not expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	BCS
Axillary surgery	ALND	ALND	ALND	
	SLND	SLND	SLND	

# Breast cancer during pregnancy **Type of Surgery Based on GA**



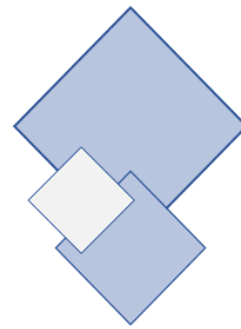
	First trimester	Second trimester	Early third trimester	Late third trimester
<b>Breast surgery</b>	If adjuvant chemotherapy is expected based on tumor characteristics			
	Total mastectomy	Total mastectomy BCS	Total mastectomy BCS	
<b>Breast surgery</b>	If adjuvant chemotherapy is not expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	BCS
<b>Axillary surgery</b>	ALND	ALND	ALND	
	SLND	SLND	SLND	

# Breast cancer during pregnancy Type of Surgery Based on GA



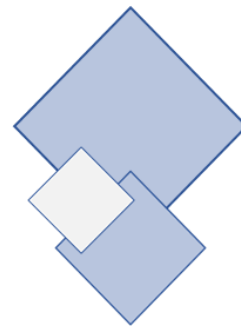
	First trimester	Second trimester	Early third trimester	Late third trimester
Breast surgery	If adjuvant chemotherapy is expected based on tumor characteristics			
	Total mastectomy	Total mastectomy BCS	Total mastectomy BCS	
Breast surgery	If adjuvant chemotherapy is not expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	BCS
Axillary surgery	ALND	ALND	ALND	
	SLND	SLND	SLND	

# Breast cancer during pregnancy **Type of Surgery Based on GA**

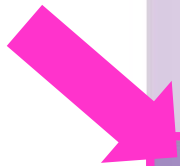


	First trimester	Second trimester	Early third trimester	Late third trimester
Breast surgery	If adjuvant chemotherapy is expected based on tumor characteristics			
	Total mastectomy	Total mastectomy BCS	Total mastectomy BCS	
	If adjuvant chemotherapy is not expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	BCS
Axillary surgery	ALND	ALND	ALND	
	SLND	SLND	SLND	

# Breast cancer during pregnancy **Type of Surgery Based on GA**



	First trimester	Second trimester	Early third trimester	Late third trimester
<b>Breast surgery</b>	If adjuvant chemotherapy is expected based on tumor characteristics			
	Total mastectomy	Total mastectomy BCS	Total mastectomy BCS	
	If adjuvant chemotherapy is not expected based on tumor characteristics			
	Total mastectomy	Total mastectomy	Total mastectomy	BCS
<b>Axillary surgery</b>	ALND	ALND	ALND	
	SLND	SLND	SLND	





# Breast cancer during pregnancy **Axillary Surgery on PABC**

🔗 In the past, only axillary dissection in PABC

🔗 Because axillary involvement > 50%

▶▶ Now increasing number of node– negative

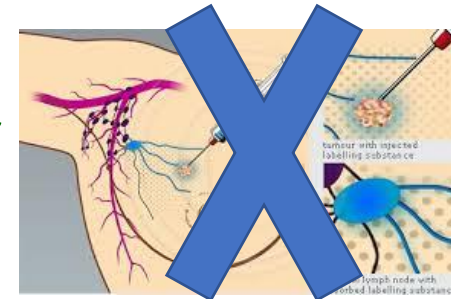
✓ might benefit from SLNB

- Blue dyes are FDA category C during Py

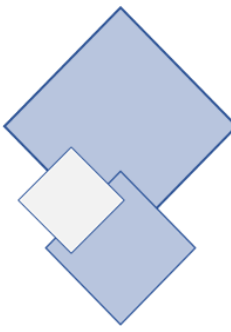
- Radioisotopes are approved in Py

- The one-day protocol is preferred

- To reduce time of isotope exposure



# Breast cancer during pregnancy- Systemic/Adjuvant Treatments in PABC



## ↳ Main ones:

### ↳ Chemotherapy

- ▶▶ Not done in trimester 1

- ▶▶ Performed in trimester 2 and 3

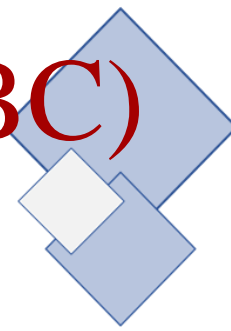
- ✓ Safe interval between last ChT and elective delivery:

- ***3 weeks (or avoidance of ChT after 35w of GA)***

### ↳ Endocrine therapy, Anti-her2 therapy and Radiation

- ▶▶ Not done during Py, postponed to after delivery

Breast cancer during pregnancy **Inflammatory breast cancer (IBC)**



↳ 1% to 5% of all BC

↳ Extremely aggressive

↳ Limited literature about treatment during gestation

↳ Treatment based on current guidelines

▶▶ systemic chemotherapy

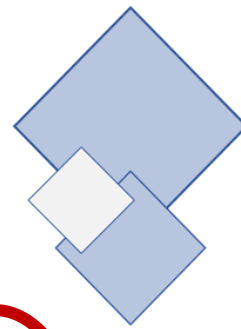
✓ followed by mastectomy with axillary dissection

• Radiation therapy after delivery

↳ *There is no evidence that early termination improves the outcome.*

**However, given the poor prognosis of IBC, patients should be counseled on the risks and benefits of continuing or terminating an early Py**

# *In parentheses*



❧ Mastitis and abscess are differential diagnoses for IBC

❧ Much more common than IBC

▶▶ US might be helpful

✓ If a suspicious mass or distortion is seen

• But US not always helpful

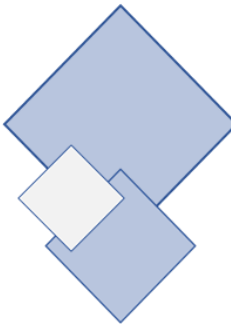
▶▶ *If medical treatment is not effective*

✓ Biopsy is needed

▶▶ *Or if there is an abscess*

✓ Biopsy of the wall needed at time of drainage

Breast cancer during pregnancy **Lactation during and after BC**



Very limited data is available

BF is not allowed during BC treatment including

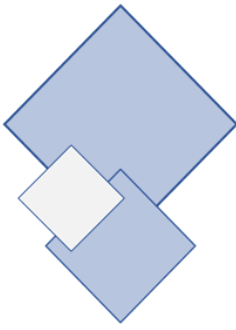
▶▶ Chemotherapy, endocrine therapy, targeted therapy,...

In BC survivors:

▶▶ BF is allowed



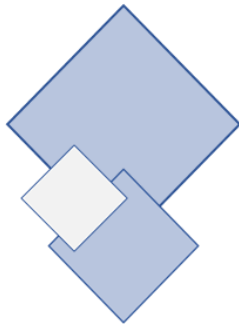
✓ Even if the milk is insufficient in the radiated breast



### **3. Pregnancy after breast cancer**



### 3. Pregnancy after breast cancer



*Q Is pregnancy after breast cancer treatment dangerous for the prognosis of the cancer?*

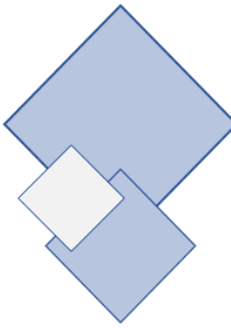
*∞ Is a concern for patients and physicians*

▶▶ Limitations for prospective study

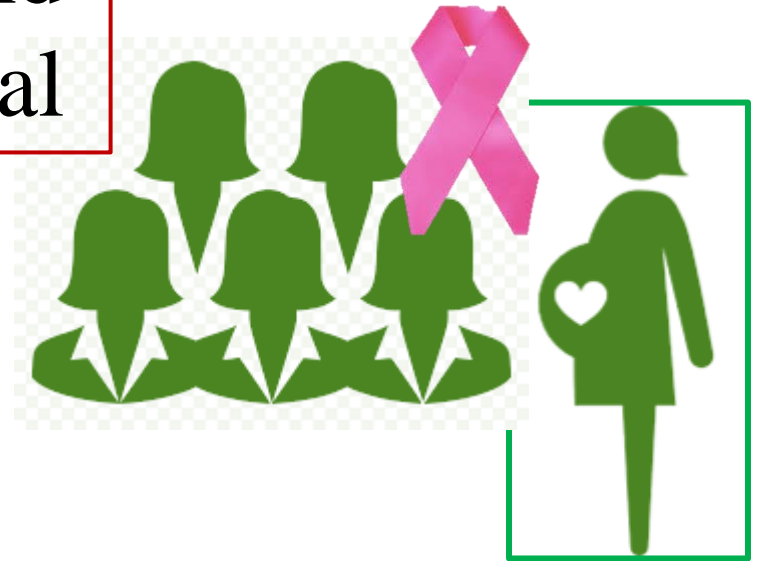
▶▶ One major bias: the “healthy mother effect”

✓ survivors who are in better health or have had favorable pathologies opt for Py

# 3. Pregnancy after breast cancer



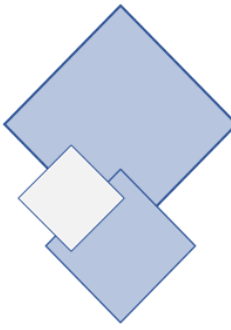
Overall survival and  
disease free survival



Also for ER+ tumors



# Rate of obstetrical outcomes in BC survivors:



↳ Increased incidence of

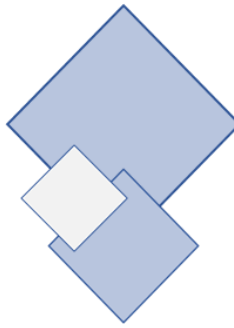
↳ preterm labor

↳ low birth weight

↳ intrauterine fetal anomalies



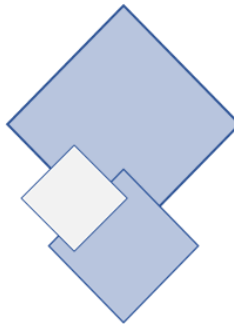
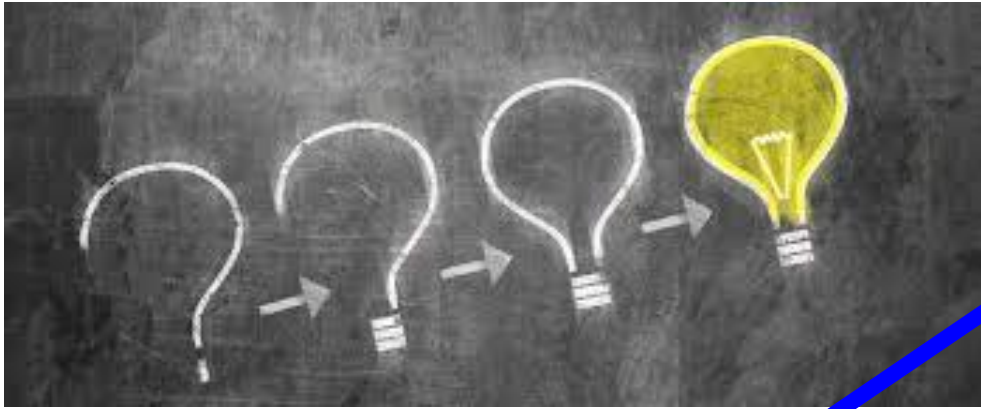
### 3. Safe time interval from BC to Py



Many oncologists prefer to wait 5 years!



Maybe because of highest recurrence in the first 2 years

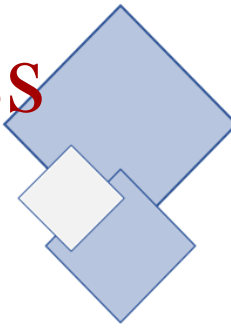


# Answer to cases





# CASE 1: 42 yr, 32 w, circumscribed, bilobed mass



- US:

- circumscribed, bilobed mass, 24 mm, BIRADS II

- Next plan?

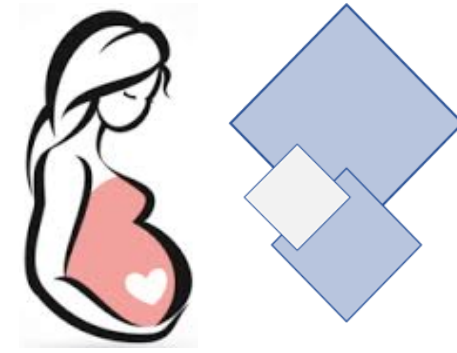
- CNB:

- Fibroadenoma

- Next plan?

- Follow up with US

# CASE 2: 30 yr, 9 w, 18mm irregular mass



- Next plan? Any imaging?

- Mammography:

- Spiculated mass in UOQ of left breast

- Next plan?

- CNB of mass:

- Invasive ductal carcinoma, G2

- ER+, PR+, Her2-

- Next plan?

- Surgery:

- Mastectomy + SLN, then CHT

# CASE 3, 30 yr, lactating, redness and edema



## - Plan?

- US: edema and tissue distortion in UOQ and LOQ, maybe mastitis

- Antibiotics

- No response

- Plan?

- CNB from distortion  $\pm$  skin:

- Invasive ductal cancer, ER-, PR-, HER2-

- Diagnosis?

- Inflammatory breast cancer,

- Metastasis work up: negative

- Treatment?

- Neoadjuvant ChT, Mastectomy, Radiation

Case 4, 25 yr, 25 w, previous 12 mm mass

- Follow up US: 17 mm, round mass

- Next plan?

- CNB:

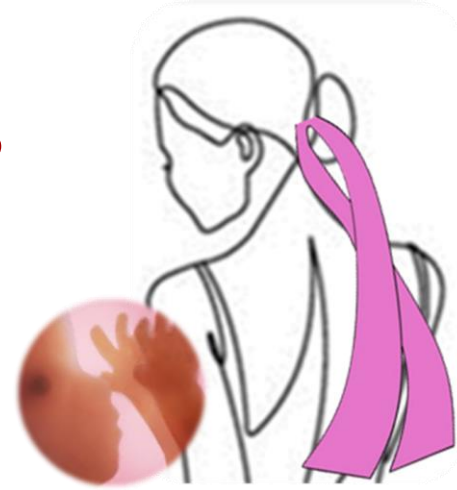
- Invasive lobular cancer, G3, ER+, PR+, Her2-

- Next plan?

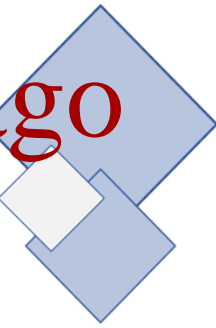
- Surgery

- Breast conserving surgery + SLN

- Then ChT, then radiation after delivery



# CASE 5, 33 yr, G0, BC treatment ended 21 m ago



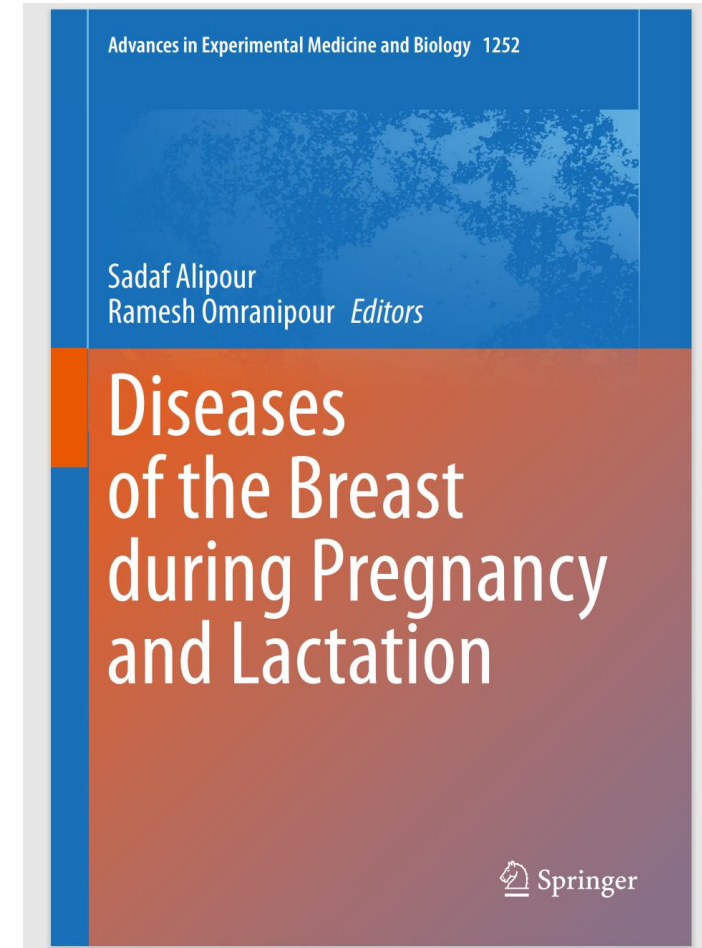
- Now under tamoxifen
  - She wants to get pregnant
    - Your recommendation?
      - If no other problem other than the breast:
        - Hold tamoxifen temporarily after 2 years
          - Begin tamoxifen again after pregnancy





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# Breast cancer during pregnancy

## Prenatal Care during and after BC Treatment

21

### Prevention and Treatment of Maternal Complications

- During and after Breast Cancer Surgery
- During and after Chemotherapy

ings and discussions are needed to evaluate and balance the maternal and fetal risks. In this chapter, we discuss about how to prevent or treat maternal and fetal complications of surgery and chemotherapy in pregnancy-associated breast cancer.

nancy does not seem to modify the maternal prognosis for breast cancers [1, 2]. Interdisciplinary meetings and discussions are needed to evaluate and balance the maternal and fetal risks [3]. (see also Chaps. 3, 4).

Keywords

21.2 Prevention and Treatment

### Prevention and Treatment of Fetal Complications

- During and after Breast Cancer Surgery
- During and after Chemotherapy

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is associated with increases in cardiac output, plasma volume, oxygen consumption, glomerular filtration, and coagulation state as well as decreased gastric motility, anemia, leukocytosis, and aorticaval compression. Therefore, main-

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153

## Physical Breast Examination in Pregnancy and Lactation

2

Abstract

2.1 Overview

Physical exam of the breast is a very important part of breast assessment both for breast cancer screening, and when approaching breast lesions. Examination during pregnancy and breastfeeding follows exactly the same method as non-pregnancy periods. However, physical changes that occur in the breast during these times due to hormonal effects cause alterations that can on one hand conceal some pathologic disorders, and may on the other hand appear as pathologic findings while being purely physiologic. This chapter focuses first on some key points for an accurate breast examination, and then reviews some challenging controversial findings that may be noticed during breast exam in a pregnant or lactating woman.

Keywords

Breast exam · Breast palpation · Breast inspection · Breastfeeding · Pregnancy

Breast examination (BE) is a skill that needs both experience and attention. One should not only put adequate time but also care enough to examine all parts that are involved in breast disease, that is whole breasts, axillary regions, and supra- and infraclavicular areas. BE includes taking related history from the patient, breast inspection (BI), and breast palpation (BP) [1, 2].

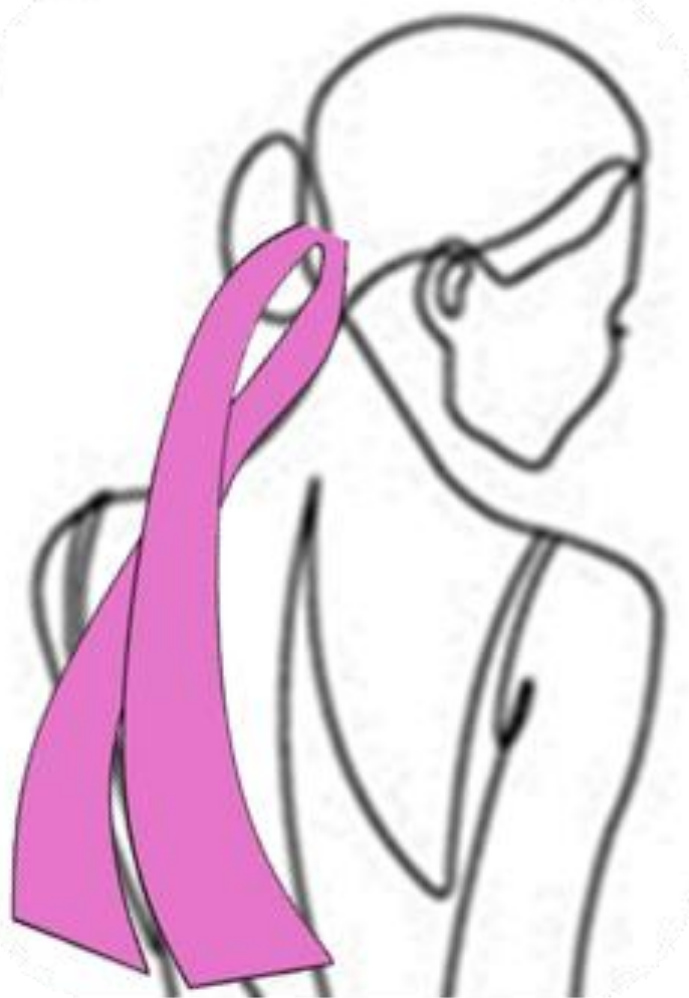
During the interview, in addition to general items such as age and queries about systemic and underlying diseases or medications, questions should be asked about menstrual and reproductive history including consumption of exogenous hormones; past history of irradiation to the chest or recent trauma, any type of breast surgery, previous breast imaging, and breast symptoms including pain, swelling, skin discoloration, recent asymmetry, or enlargement; as well as nipple eczema, itching, desquamation, retraction, or secretions. Furthermore, previous history of benign breast disease and breast, ovarian or other cancer, and a family history of any of these malignancies should be enquired [3, 4].

During BI, the examiner should inspect breasts and lymph node-bearing areas in different positions for various pathologic changes such as breast edema or asymmetry; skin edema, dimpling, ulcer, retraction, or color change; nipple

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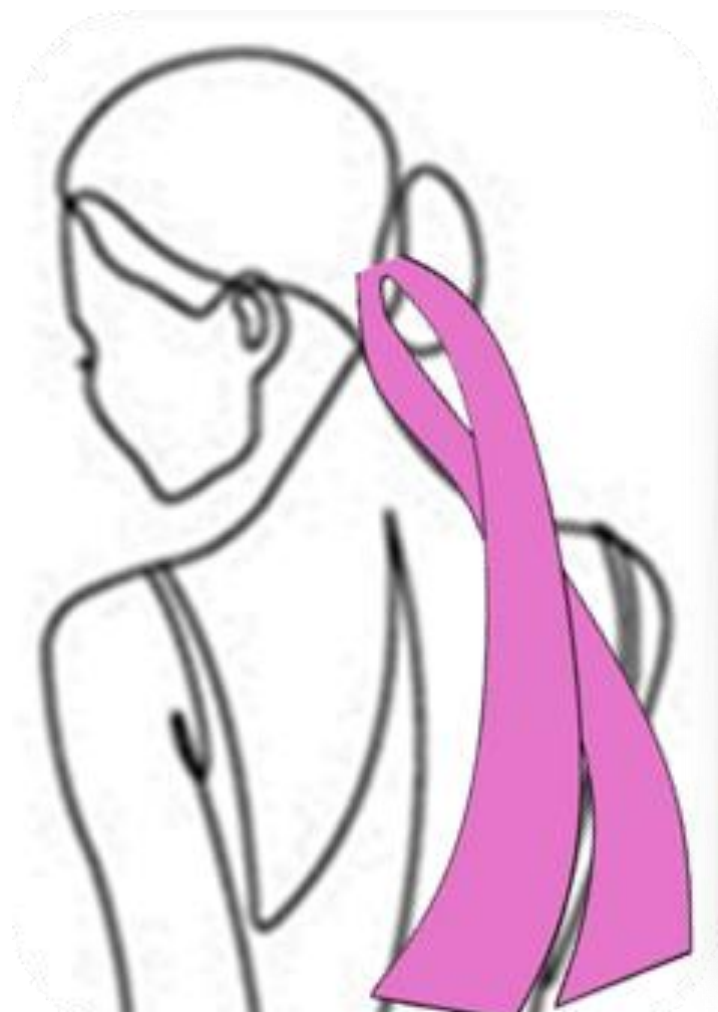
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9



*Thank you*





Questions?