



Breast cancer: detection, treatment, and survival

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Cancer Conversations, CoS Staff Advisory Council

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Things I wish I knew about breast cancer before my boob tried to kill me

*Caveat: not
THAT kind
of doctor!*

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Breast cancer myths

- Wearing a(n underwire) bra causes breast cancer
- Not wearing a bra causes breast cancer
- You can only get breast cancer if it runs in the family
- Men don't get breast cancer
- Only post-menopausal women can get breast cancer
- Pregnant women can't get breast cancer
- There is only one type of breast cancer
- If you get breast cancer you have to have a mastectomy





Breast cancer myths

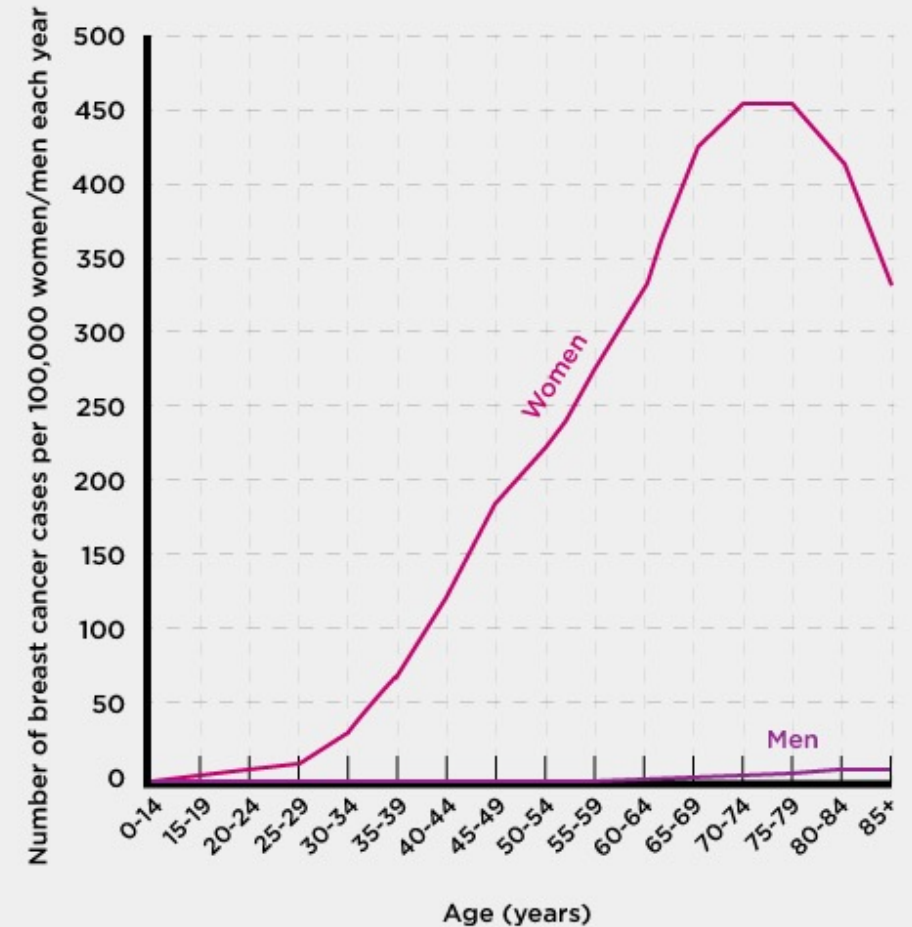
- Wearing a(n underwire) bra causes breast cancer ← FALSE
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- There is only one type of breast cancer ← FALSE
- If you get breast cancer you have to have a mastectomy ← FALSE



Breast cancer facts

- In the US, 1 in 8 women develop breast cancer
 - ~330,000 new cases per year
 - ~12,000 of those are under age 40
 - ~43,000 deaths
- In the US, 1 in 833 men develop breast cancer
 - ~2600 new cases per year
 - ~500 deaths
- Women with no family history of breast cancer make up 85% of all breast cancer diagnoses

Age-Specific Rates of Breast Cancer
in the United States





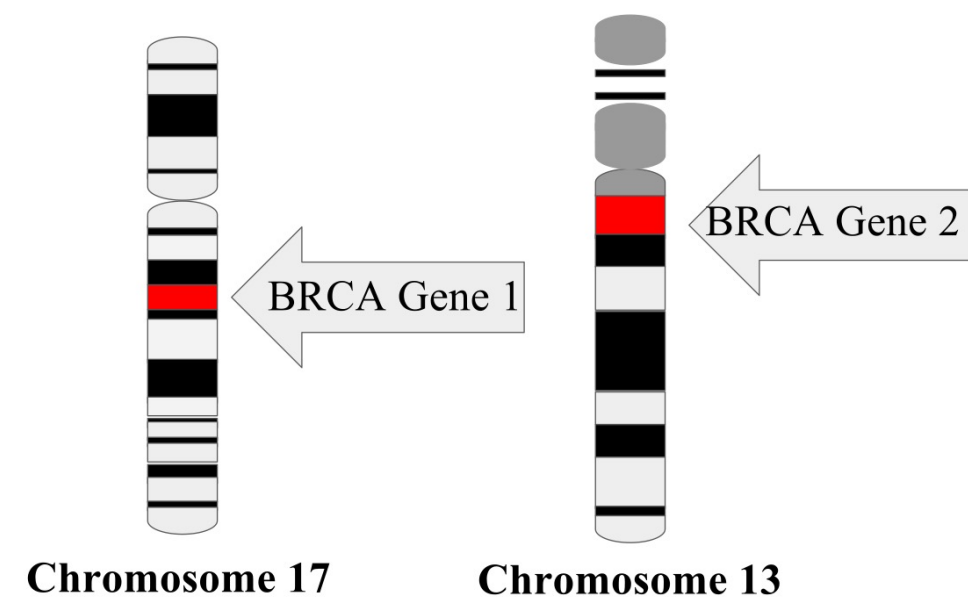
Risk factors

- The obvious: sex, age, family history
 - Women have a higher risk than men
 - Older women have a higher risk than younger women
 - Having a family history of breast cancer increases your risk
- The usual: weight, diet, exercise, alcohol consumption, smoking, stress
- The ones you wouldn't think about:
 - Exposure to estrogen (e.g., HRT, starting period very early, going through menopause very late)
 - Radiation exposure when young (at puberty or before)
 - Pregnancy and breastfeeding (this **reduces** the risk of breast cancer)



BRCA1 and BRCA2

- **BR**east **CA**ncer genes – tumor suppressor genes
 - BRCA1 in Chromosome 17
 - BRCA2 in Chromosome 13
- About 1 in 400 people carry BRCA mutations that cause increased risk of breast and ovarian cancer
 - People of Ashkenazi Jewish descent are more likely to have this mutation
 - 5-10% of women's and up to 40% of men's breast cancer diagnoses
- The "Angelina Effect" (2013) – more genetic testing and patients asking for information about preventative mastectomies after Angelina Jolie's announcement



Boobs are complicated

Lobules

- Glands that produces milk

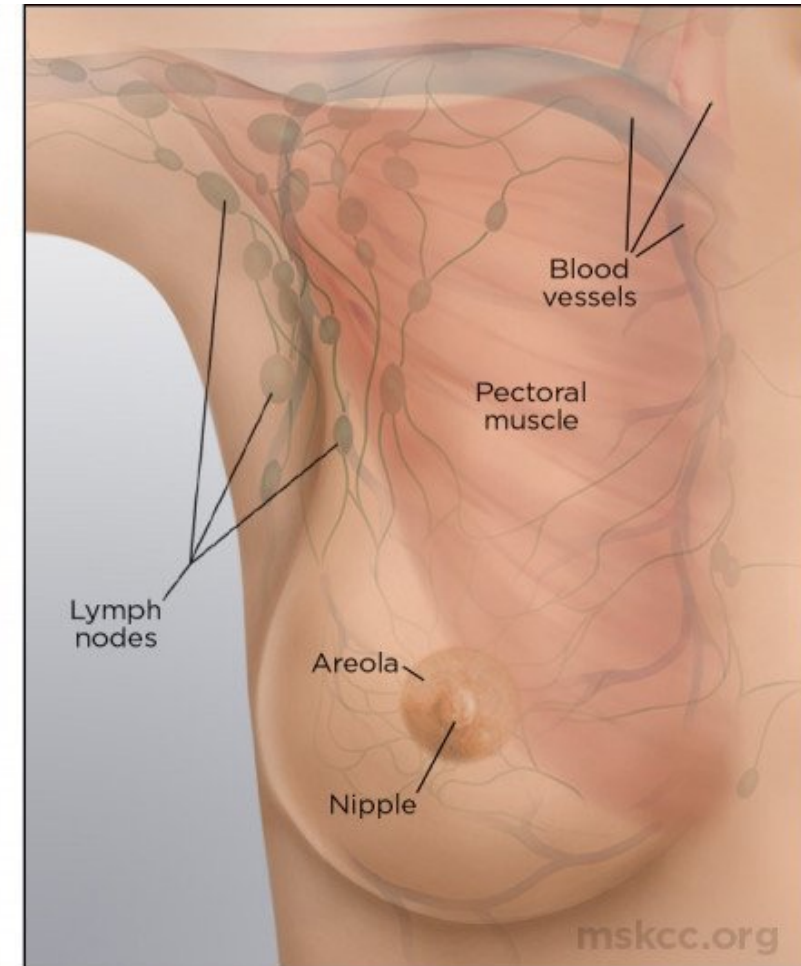
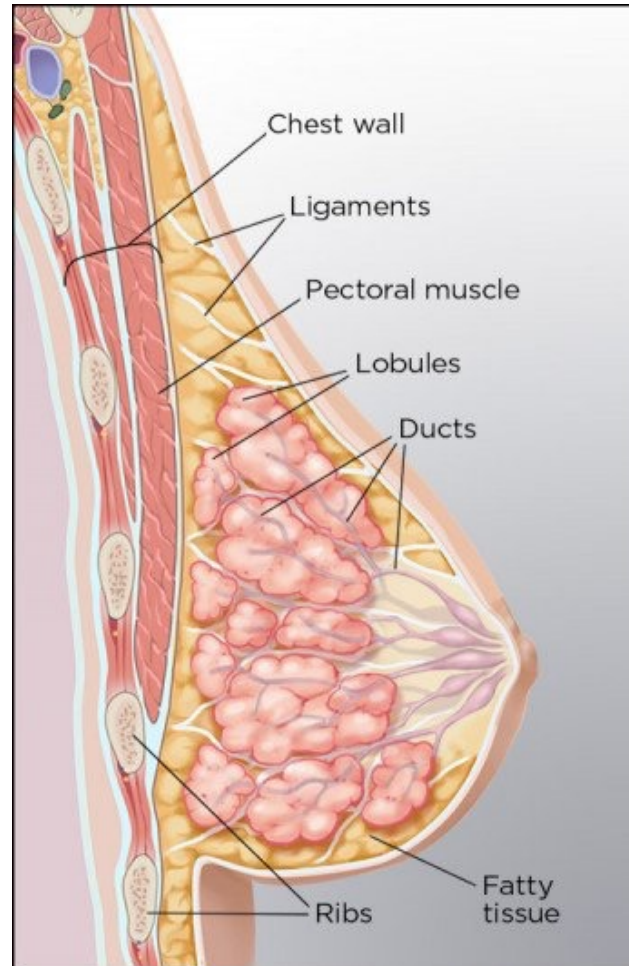
Ducts

- Thin tubes that carry milk

Axillary lymph nodes

- Carry lymphocytes (white blood cells) to the breasts

Non-cancerous things can also appear in the breast (e.g., cysts, fibroadenomas)



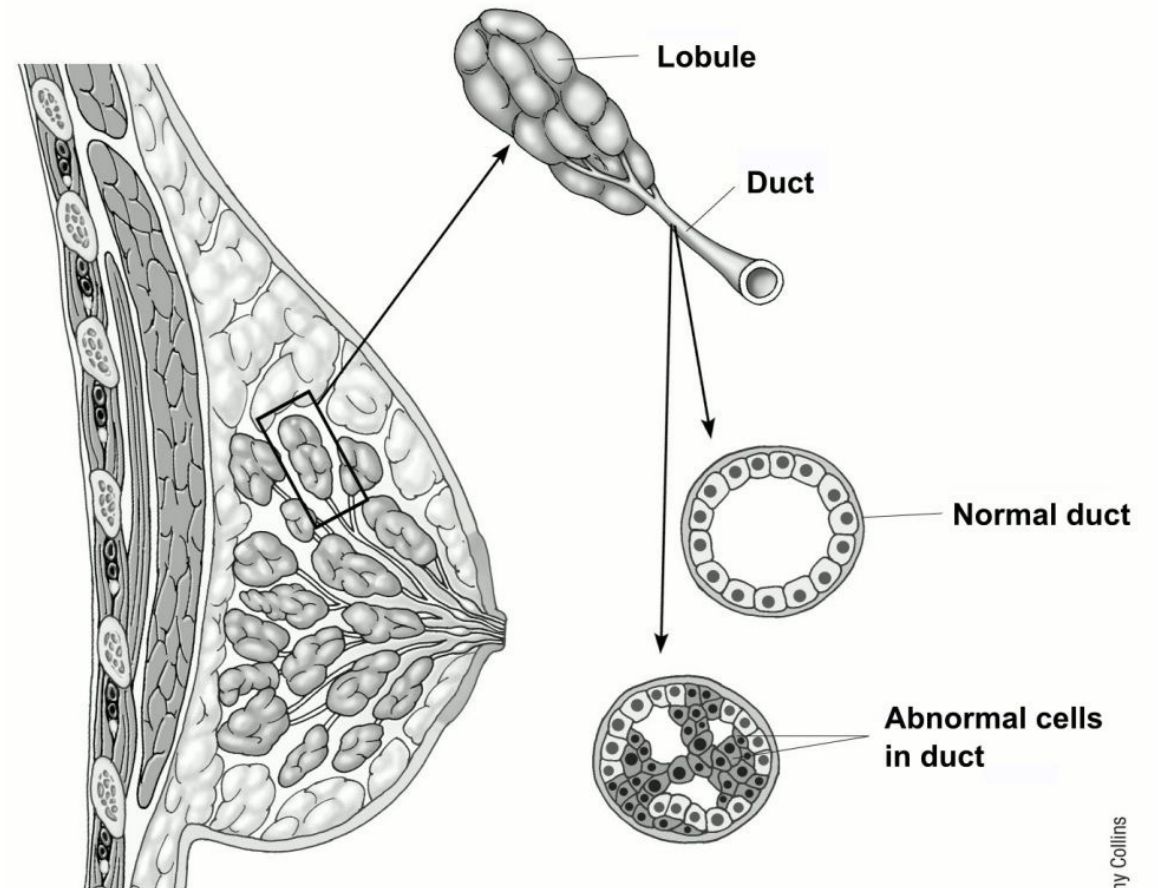
Types of breast cancer

Ductal carcinoma in situ

- Also known as "Stage 0" breast cancer
- About 1 in 5 new diagnoses

Invasive ductal/lobular carcinoma

- IDC is most common type of BC (80%)
- Starts in the ducts, spreads out
- ILC is less common (10%)
- Starts in the lobules, then spreads



Ductal carcinoma in situ





Types of breast cancer

Triple-negative breast cancer

- Can be IDC or ILC (10-15% of all breast cancers) and is very aggressive

Inflammatory breast cancer

- Rare (1-5%), causes swelling and thickening of breast skin, starts at Stage III

Paget disease of the breast

- Very rare; affects skin of nipple and areola

Angiosarcoma of the breast

- Usually happens as complication of previous radiation treatment

<https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/types-of-breast-cancer/triple-negative.html>

<https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/types-of-breast-cancer/inflammatory-breast-cancer.html>

<https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/types-of-breast-cancer/paget-disease-of-the-nipple.html>

<https://www.cancer.org/cancer/breast-cancer/understanding-a-breast-cancer-diagnosis/types-of-breast-cancer/angiosarcoma-of-the-breast.html>



How is breast cancer detected?

- Breast exam (self, doctor)
 - It's important for women to know what their breasts look and feel like, in case any changes happen
- Imaging, including mammograms, ultrasounds, and MRIs
 - Women 45-54 years old should get a screening mammogram every year
 - Women 55 and older can get screening mammogram every two years

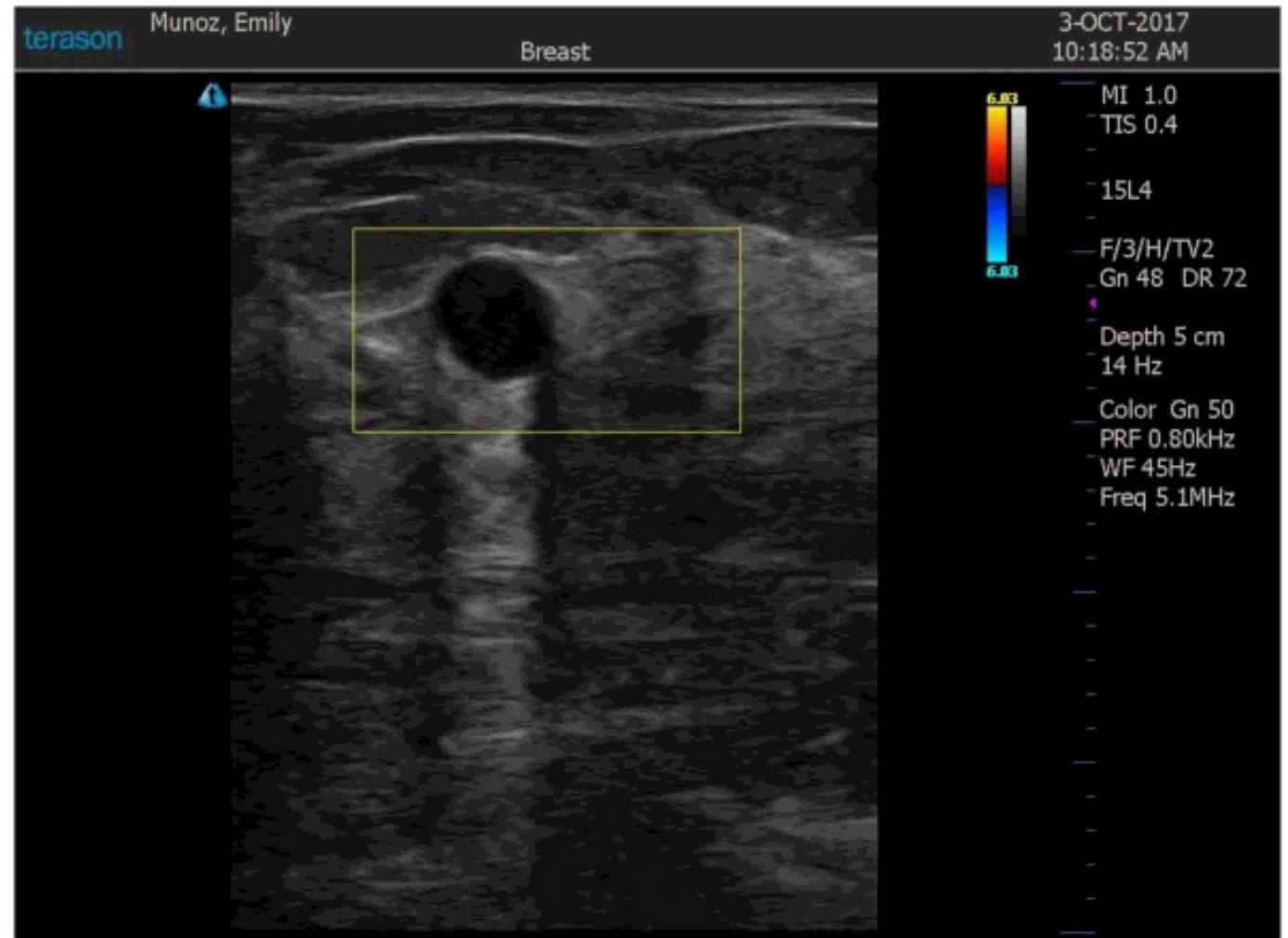


Be aware of boob changes



Ultrasound imaging

- This is how a **cyst** looks in a breast ultrasound image
- Round, dark (liquid-filled), light shadow below
- Cysts are common in younger (pre-menopausal) women, and can vary throughout the menstrual cycle
- Cysts are benign (not cancer); if you have a cyst you can leave it alone without worry



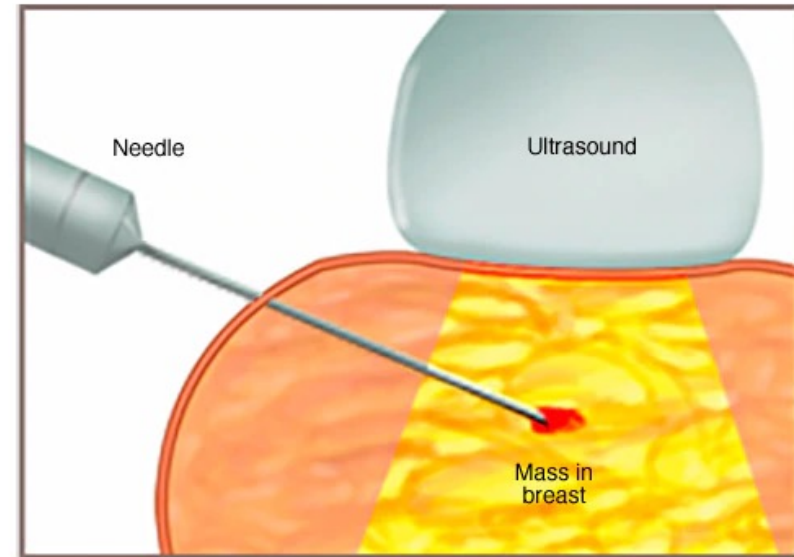
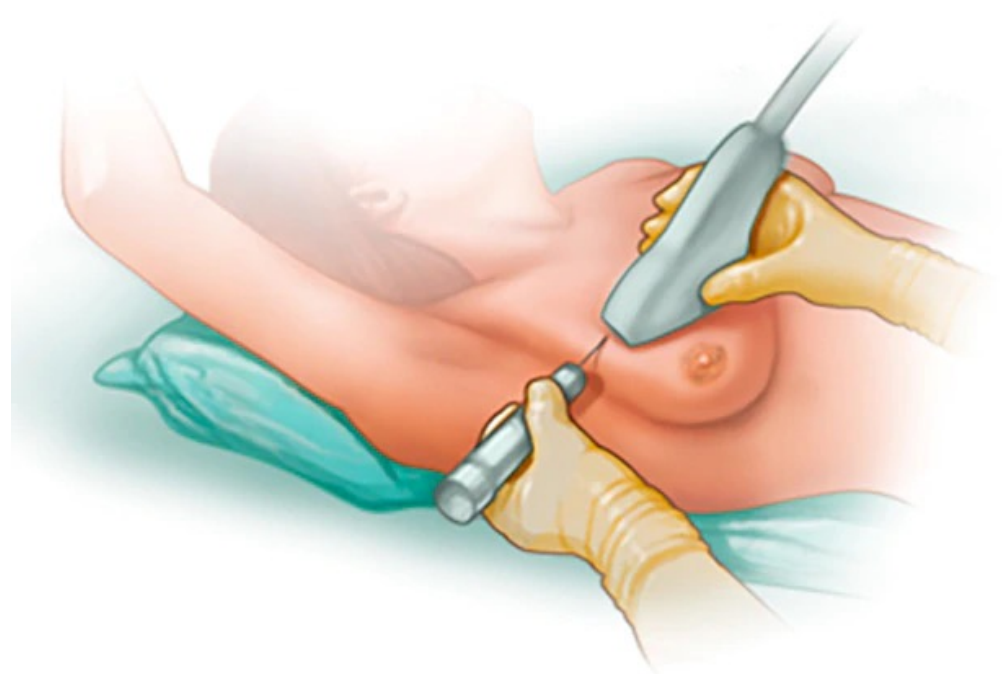
Ultrasound imaging

- This is how a **malignant tumor** (i.e., cancer) looks like in a breast ultrasound
- Irregular shape, spikiness, wider than tall, generally ugly and scary-looking
- This prompts the need for a biopsy



Biopsies

- Also known as “unreasonably aggressive boob acupuncture” *
- A necessary evil because you can’t really diagnose breast cancer from just an image
- First you get local anesthetic, but that’s still a needle to the boob
- Core-needle biopsy uses a thin, long, hollow tube to chomp out a chunk of tissue that will get sent to a lab for pathology



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When you get a diagnosis...

- It may come through a phone call
- You may need to ask the nurse to repeat the details several times, because you won't actually hear anything they're saying the first time around
- You may be thinking "Am I going to die?" over and over and over and over and over and over and...
- You may cry and be angry that this is happening
- They will give you the basic details determined by the pathology report and give you the next steps
- For me, the next steps were: (1) genetic testing, (2) breast MRI, (3) mammogram, (4) surgery (also more biopsies between steps 3 and 4)



When you get a diagnosis...

- Genetic testing is easy – just spit in the little tube and wait for the results
 - My results: no BRCA mutations, yay!

- Mammograms are no fun, but breast MRIs may be even more uncomfortable (and loud, MRIs are very loud)



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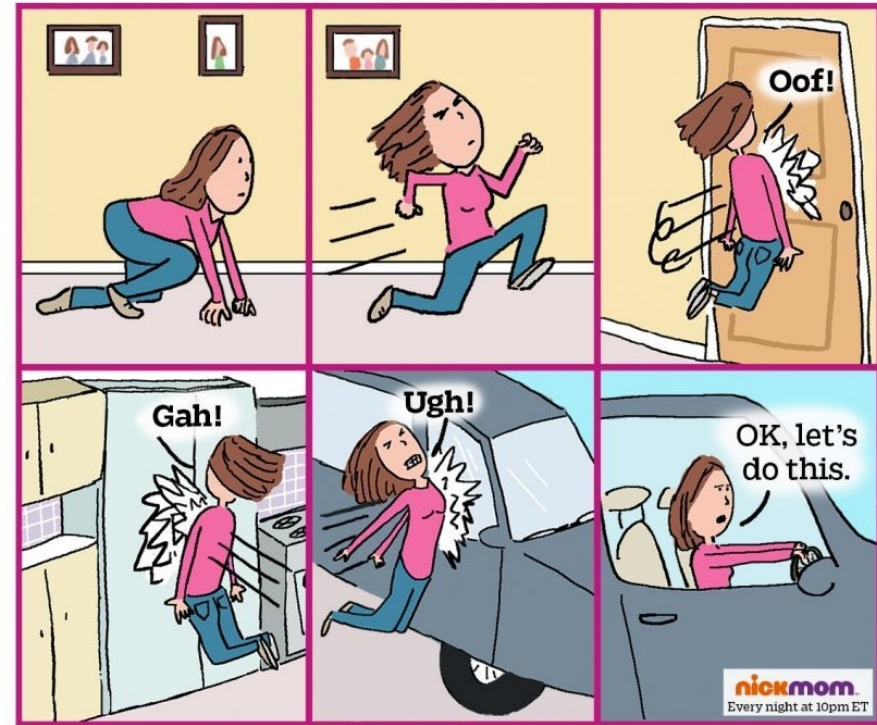
Boob squish

- Things to know when you go for a mammogram:
 - You can't wear deodorant
 - Wear clothes that have a separate top and bottom
 - Anticipate spending 2-3 hours in there
 - Radiologist compares your current images to last year's images to see if there's any changes
 - If suspicious areas show up, they'll do an ultrasound too
 - If the suspicious areas are very suspicious, they'll send you for a biopsy
 - You can have more than one suspicious area in one or both breasts
- **PSA:** Getting multiple biopsies at the same time is no good, bad, awful, horrible, 0/10 do not recommend – ask for general anesthesia or something!



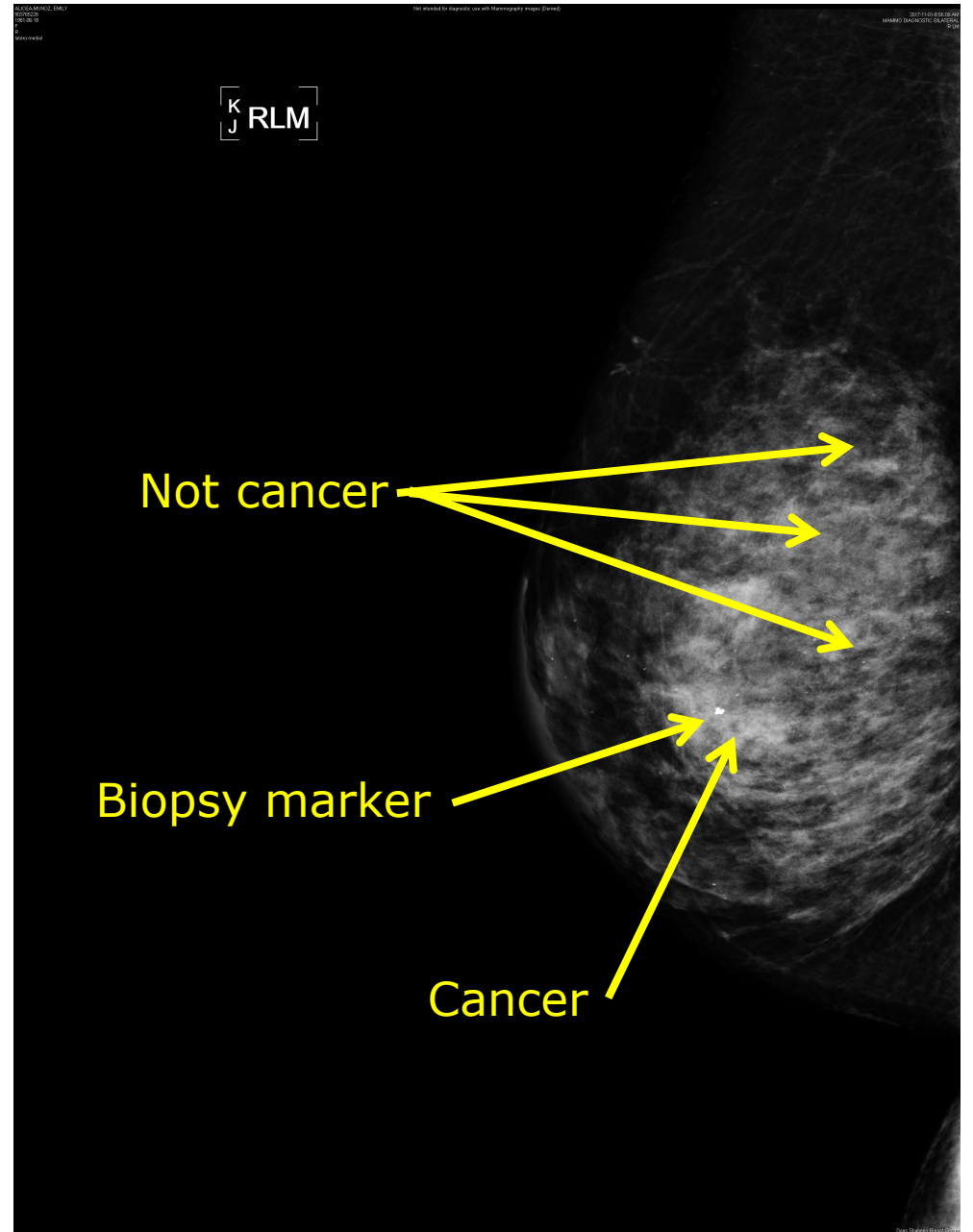
Boob squish

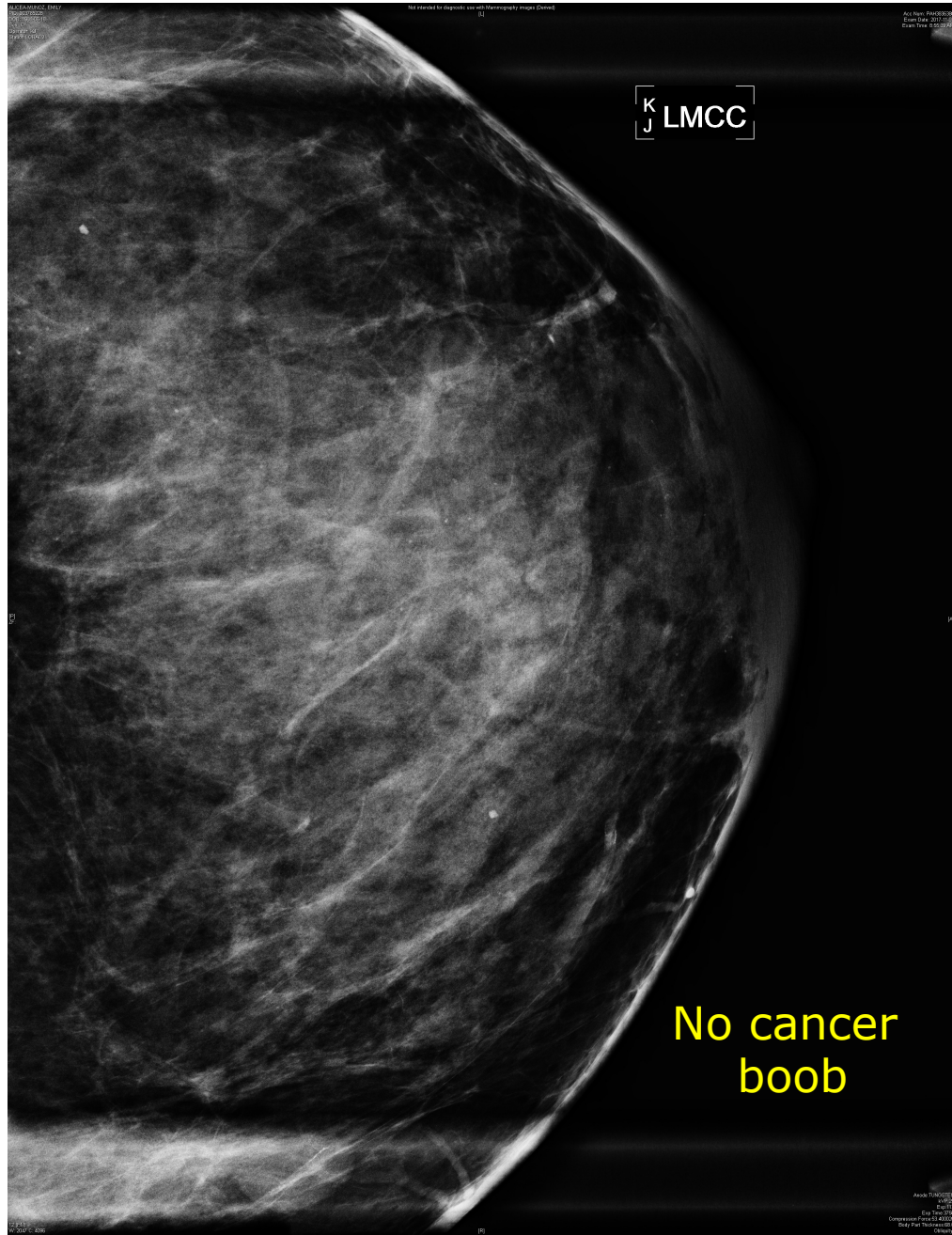
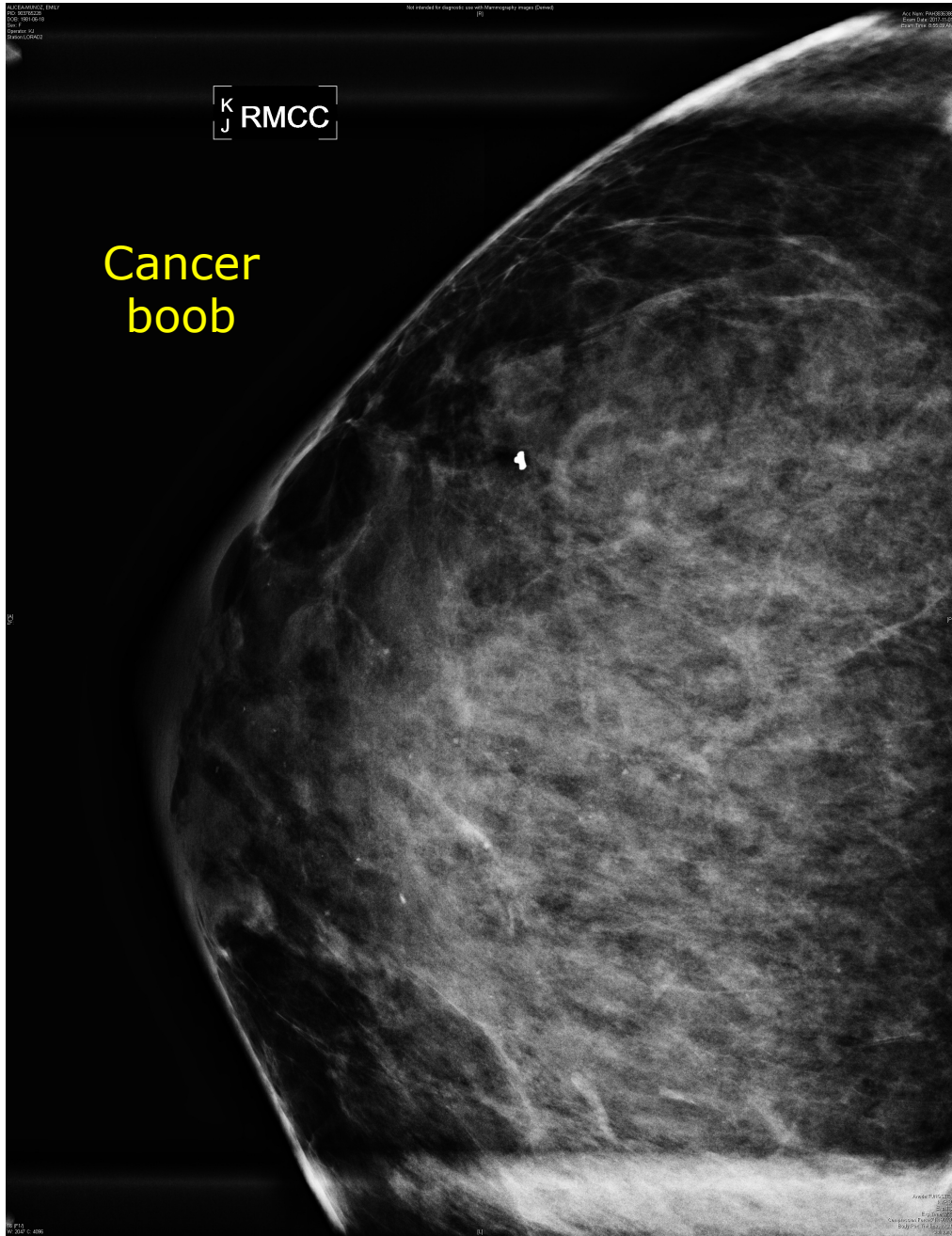
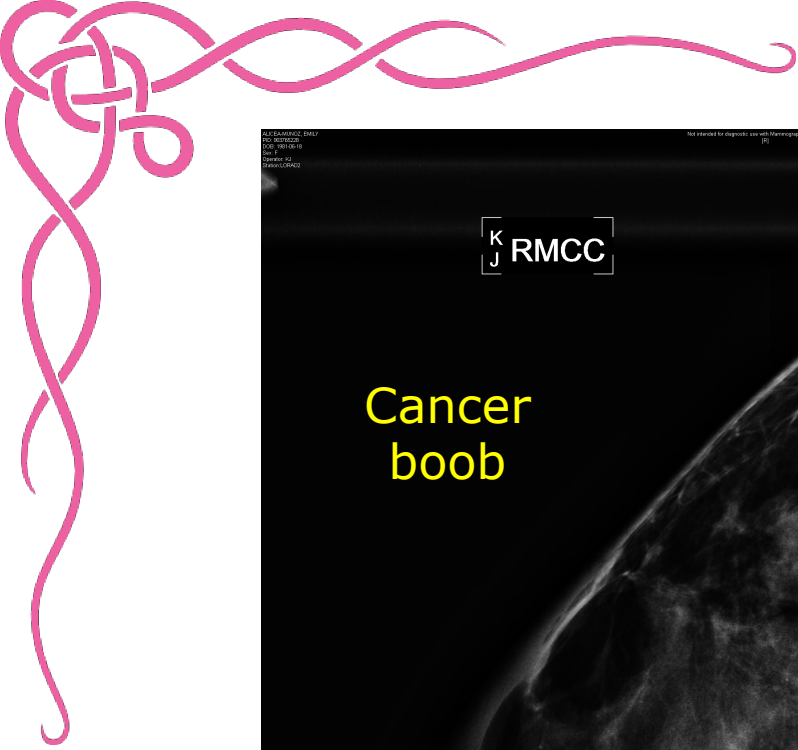
- Types of mammogram:
 - **Screening** – this is what most people get; they take a total of 2-5 pictures
 - **Diagnostic** – this is what you get if you have a history of breast cancer; it's usually 15-20 picture (btw, each picture comes with a squish)
- Things that can show up in a mammogram:
 - Cancer (duh)
 - Deodorant – this will mess up the results
 - Microcalcifications – small calcium deposits, show up as little white spots
 - Cysts (liquid) and fibroadenomas (solid) – these are non-cancerous



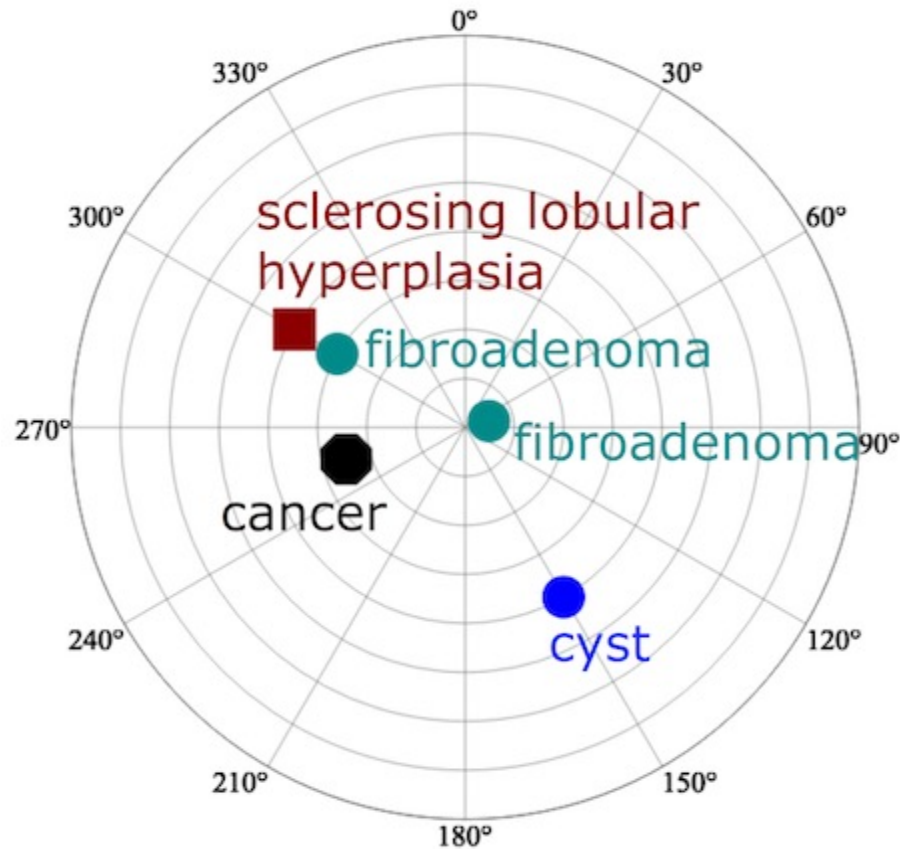
Boob squish

- Every time you get a biopsy done, the doctor will insert a teeny little metal ball (a **biopsy marker**) to indicate that the area has been studied before
- Cancers show up as white areas in a mammogram image
- Dense breast tissue also shows up as white areas in a mammogram image -_-
- Younger (pre-menopausal) women usually have dense breast tissue

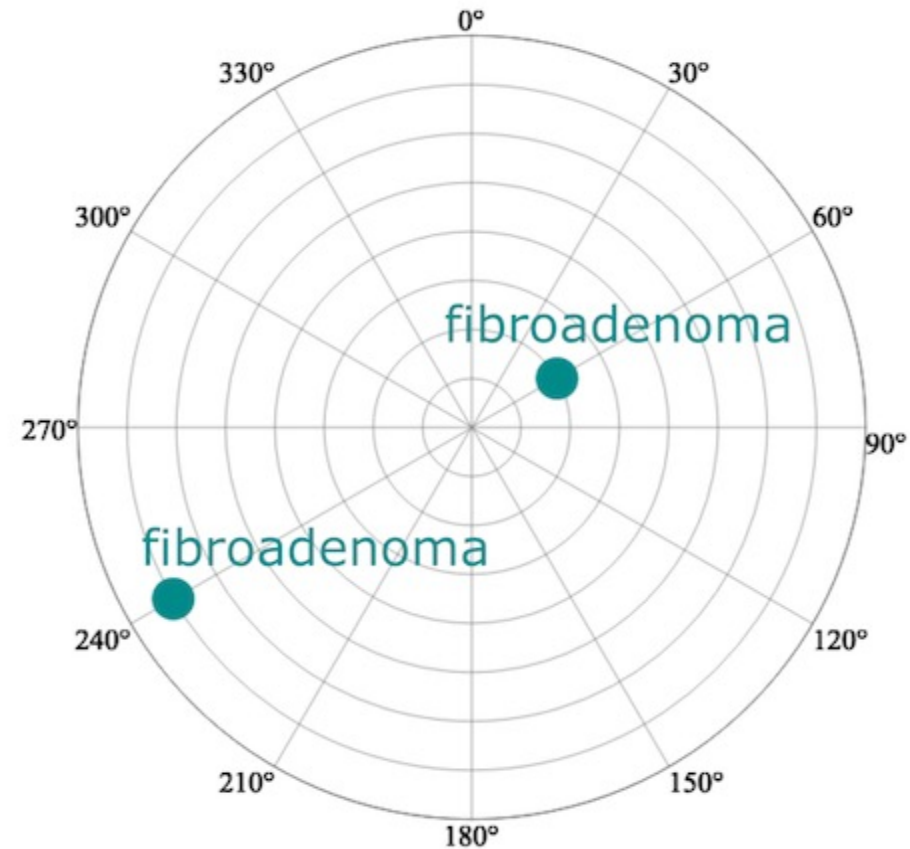




RIGHT



LEFT



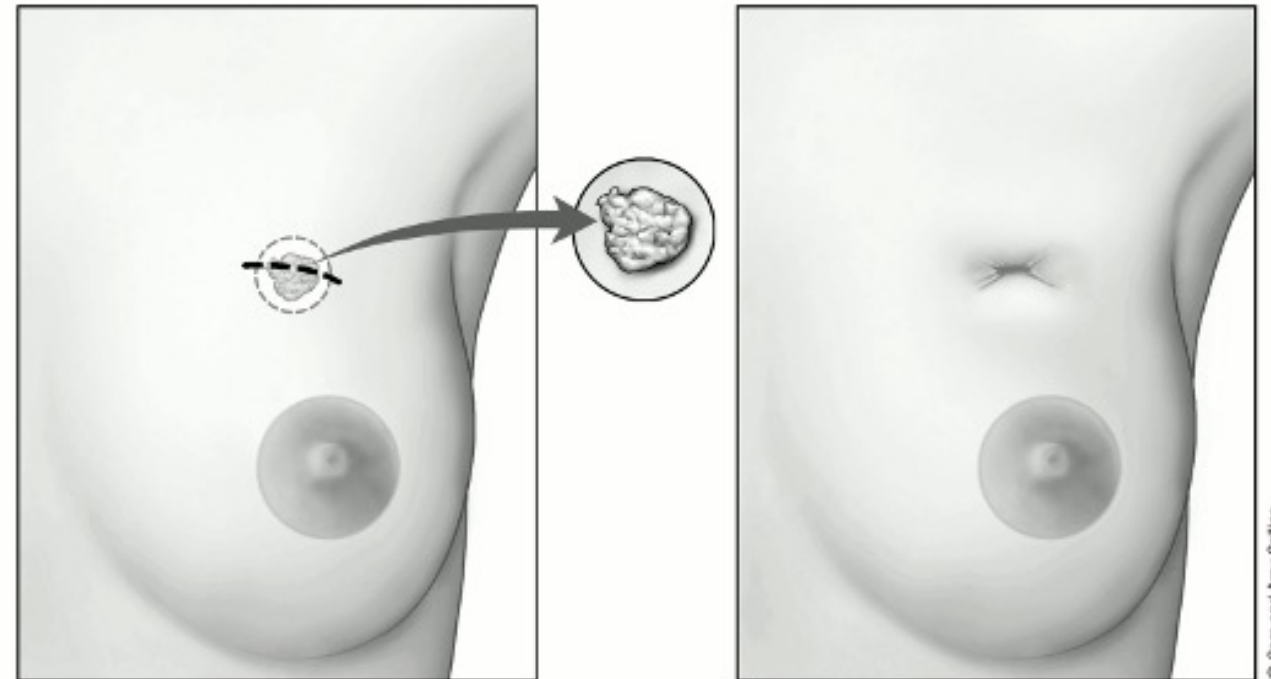
Mammogram and biopsy results give the locations of areas of interest as hours in a clock face, distance from the nipple, and depth, so of course I mapped mine out in polar coordinates



Getting the cancer out of there

Lumpectomy

- Breast-preserving surgery
- Can be done if tumor is small compared to size of breast
- Surgeon removes the tumor and small rim of tissue around it (called "margins")
- Some lymph nodes are usually removed to assess spread of cancer
- I have two scars: the lumpectomy scar and the lymph node removal scar



The tumor is removed with a rim of normal breast tissue.

Postoperative appearance depends on the amount of tissue removed, but there will be a small scar and often an indentation in the breast.

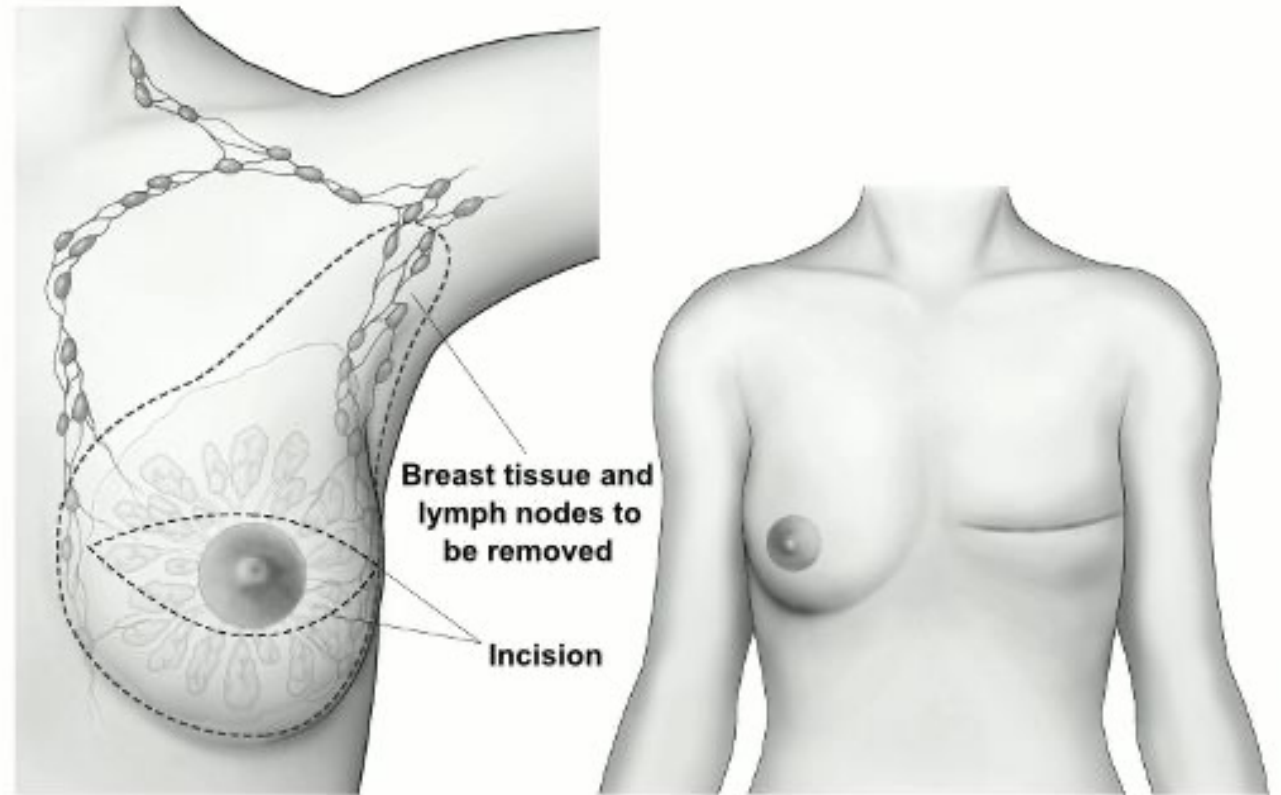
© Sam and Amy Collins



Getting the cancer out of there

Mastectomy

- Removal of all breast tissue, often including nipple and areola
- Recommended if there's numerous tumors, or tumors are too big compared to size of breast
- There's different types (total, skin-sparing, nipple-sparing, radical, modified radical, bilateral)
- Reconstruction often happens after mastectomy, but some women opt for no reconstruction and use prosthetics instead (or nothing at all)





After surgery

- Tumor gets sent to pathology to confirm cancer details
 - My results: Invasive ductal carcinoma, stage 1A, 2cm, clean margins, clear lymph nodes (0/2), estrogen positive (ER+), progesterone positive (PR+), HER2 negative, Ki-67 at 10% (low), oncotype score 6 (low)
- Recovery depends on what kind of surgery you had
 - It takes longer to recover from mastectomy than lumpectomy
- Removing lymph nodes increases risk of lymphedema (build-up of lymph fluid) in the arm on the same side of the body as the surgery
- May have pain and trouble moving the arm at the shoulder (I had 7 months of PT followed by 9 months of OT, and still never recovered full range of motion)
- May develop seroma (fluid buildup) in lumpectomy site



Chemotherapy

- Aside from surgery, the other two treatments to get rid of breast cancer are **chemotherapy** and **radiation**
- I did not have to do chemotherapy (low oncotype score in surgical pathology report) so I don't know much about it
- Chemotherapy can be done before surgery (**neoadjuvant**) to try and shrink the tumor, or after surgery (**adjuvant**) to kill any leftover cancer cells
- Very often used in treatment of stage IV (metastatic) breast cancer
- You may lose your hair going through chemotherapy



Radiation

- Radiation kills any possible leftover cancer cells without killing healthy tissue around it
- This is possible because cancer cells divide faster so they're more likely than healthy cells to be in active mitosis, and the radiation breaks down their DNA
- LINAC (linear accelerator) accelerates beam of electrons to $0.75c$, strong magnet turns beam around 270 degrees to slam into a high-Z material, usually tungsten, thus emitting bremsstrahlung with average spectral energy of 1.8 MeV (with higher energy beams mixed in as well)





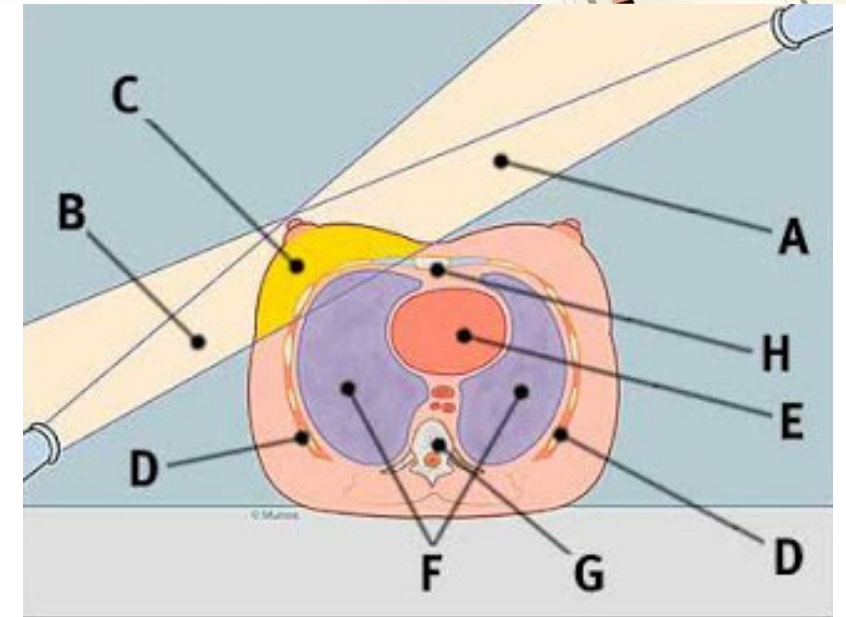
Radiation

- Planning is done with a CT scan; images get put through CAD software to create a 3D model with correct dimensions and tissue densities; radiation oncologist then uses this to plan treatment dosage and schedule
- My treatment:
 - Total dosage: 6040 cGy spread over 33 treatments
 - 28 regular treatments at 180 cGy/session
 - 5 boosts at 200 cGy/session
- Note: 1 Gray (Gy) is the deposit of 1 joule of ionizing radiation per kg of tissue (1 Gy = 1 Sievert = 100 rad = 100 rem)
- For comparison, a dental xray is 0.5 mrem, which is 5 μ Gy, so my total radiation dose was equivalent to about 12 million dental x-rays



Radiation

- Radiation is delivered in tangential beams to avoid internal organs (lungs, heart)
- LINAC apparatus moves around – I got two beams, one from the top left and the other from the bottom right
- Radiation is completely painless (and you don't develop superpowers from it, boo)
- Each beam takes 10-30 seconds to deliver the full dosage (exact time depends on temperature, humidity, etc)



Radiation

- They use lasers to position you
- You get sharpie marks on your skin that need to stay on the entire two months of the treatment (they get covered with tape and re-inked frequently as they fade)
- If ink fades too quickly, you get tattooed dots (I have one in the middle of my chest)

not me →



me →



Radiation side effects

- You know how sunburns (UV, ~ 10 eV) can get really bad?
- Radiation therapy is a million times more energetic, so you can develop a REALLY BAD radiation burn – to this day I still have the radiation field tan lines (3yrs after treatment)
- Managed with prescription steroid creams and raw aloe (which is very slimy and stinky, ew, but feels so good on radiation-burned skin)
- You may blister and peel, which is very painful
- Your skin will redden, then darken (this includes the nipple and areola)
- No hair will ever grow again (or at least within 3yrs) in the radiation field



Summer 2005 in
Puerto Rico





Radiation side effects

Other possible side effects:

- **FATIGUE.** Horrible, awful fatigue that lasts for months and months afterwards
- Thickening of skin within radiation field
- Radiation fibrosis (development of scar tissue in chest/arm muscles)
- The radiated breast may feel firmer and may sag less with age than the breast that was not irradiated
- Radiation can cause damage to nerves in the shoulder/armpit area
- It may be difficult or impossible to breastfeed from a breast that went through radiation therapy





Hormone therapy

- If your breast cancer hormone-receptor positive (estrogen, progesterone), then hormone therapy comes after active treatment (surgery, radiation, chemo)
- This lowers the risk of recurrence and of developing cancer in the other breast
- Two main categories:
 - estrogen blockers (**Tamoxifen**), used for men and pre-menopausal women
 - aromatase inhibitors, used mostly for post-menopausal women
- Hormone therapy is recommended to take 5-10 years (I'm 3yrs in now)
- Possible side effects of Tamoxifen: menopause-like symptoms (hot flashes, night sweats, irregular periods), uterine polyps that can lead to endometrial cancer (yeah...), cataracts, blood clots

<https://www.breastcancer.org/treatment/hormonal>

https://www.breastcancer.org/treatment/hormonal/comp_chart

<https://www.komen.org/breast-cancer/treatment/type/hormone-therapy/>

<https://www.komen.org/breast-cancer/treatment/type/hormone-therapy/tamoxifen/side-effects/>





When treatment is over...

- You had all the biopsies and MRIs and mammograms, then surgery and recovery, and radiation and chemo, and recovery from those, and then... what?
- **The transition from “cancer patient” to “cancer survivor” can be difficult**
- You have scars, physical and emotional, that can take a long time to heal
- You feel tired, your body has gone through a lot in a relatively short time
- You don't see your doctors every day anymore, now it's every 6 months to a year
- You have the ever-present worry of the cancer coming back
- Therapy helps, as does having a strong support network: family, friends, significant others, coworkers, etc
- You could also distract yourself by finishing up a PhD thesis 😊





With thanks to my cancer team



Dr. Adrienne Zertuche



Dr. Bill Barber



Jennifer Munn, RN



Dr. Samantha Shams



Dr. Adam Nowlan



Lauren McDermott, PA-C



Tori Thompson, LCSW



Dr. Perry Ballard

