Bone Health and Nutrition

Kristin Cuculovski, MS, RDN, CSO, LD/N
Oncology Nutrition Coordinator




BUILT TO BEAT CANCER | NORTHSIDE HOSPITAL CANCER INSTITUTE

Bones

- The role of bones:
  - Provide structure
  - Protect vital organs
  - Anchor muscles
  - Store calcium and other minerals
- When the body needs calcium, it breaks down and rebuilds bone
- This is called remodeling – supplies the body with calcium and keeps bones strong

Bone Health

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Bones are continuously changing – made of living, growing tissue
  - New bone is made and old bone is broken down
- Younger = your body makes new bone faster than it breaks down old bone which increases your bone mass
- Around 30-35 years of age our bone mass peaks
- Bone continues to remodel but you lose slightly more bone mass than you gain
- The higher your peak bone mass, the less likely you are to develop osteoporosis as you age.

Osteoporosis

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Osteoporosis means “porous bone”
- It is a disease that weakens bones and increases your risk for sudden and unexpected bone fractures
- Osteoporosis often develops without symptoms and is usually discovered once a painful fracture occurs – usually the hip, wrist or spine
- The National Osteoporosis Foundation reports that 54 million people in the US have osteoporosis
- After age 50, 1 in 2 women and 1 in 4 men will have an osteoporosis-related fracture in their lifetime

Osteoporosis

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- The inside of a healthy bone looks like a sponge
- A hard outer shell of dense bone wraps the spongy inside bone
- With osteoporosis the “holes” in the “sponge” grow larger and more numerous which weakens the inside of the bone.
- Symptoms (usually no symptoms):
  - Loss of height (getting shorter by an inch of more)
  - Change in posture (bending forward or stooping)
  - Shortness of breath (compressed disks)
  - Bone fractures
  - Pain in the lower back

Factors that Affect Bone Health

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- The amount of calcium in your diet
  - A diet low in calcium contributes to diminished bone density, early bone loss, and an increased risk of fractures
- Physical Activity
  - Being physically inactive leads to higher risk of osteoporosis compared to those who are more-active
- Tobacco and Alcohol use:
  - Research suggests that tobacco contributes to weak bones
  - Regularly having more than 1 alcoholic drink/day for women or 2 alcoholic drinks/day for men may increase osteoporosis risk
- Women are at greater risk for osteoporosis than men due to having less bone tissue than men do

Factors that Affect Bone Health

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Size
  - Having a BMI of 19 or less or a small body frame increases risk because you may have less bone mass to draw from as you age
- Age
  - Bones become thinner and weaker as you age
- Family history
  - Having a parent or sibling who has osteoporosis puts you at greater risk
- Hormone levels
  - Too much thyroid hormone can lead to bone loss
  - For women, bone loss increases significantly at menopause due to dropping estrogen levels
  - For men, low testosterone levels can also cause loss of bone mass

Factors that Affect Bone Health

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Eating disorders and other conditions
  - Severely restricting food intake and being underweight weakens bone in both men and women
  - Weight-loss surgery and conditions like celiac disease can affect your body's ability to absorb calcium
- Certain medications
  - Long-term use of corticosteroid medications (dexamethasone, prednisone, cortisone, prednisolone) is damaging to bone
  - Aromatase inhibitors to treat breast cancer also increases the risk of osteoporosis along with selective serotonin reuptake inhibitors, methotrexate, some anti-seizure medications (Dilantin and phenobarbital) and proton pump inhibitors

Cancer Survivors – Bone Health

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Survivors are at higher risk for bone loss and osteoporosis than the general public – often due to cancer therapies
- Breast and prostate cancer treatments may cause low estrogen or androgen levels – two hormones important for strong bones
- It is estimated that 75% of multiple myeloma patients have osteopenia or osteoporosis
- Bone disease (osteoporosis) is a recognized complication of Hematopoietic Cell Transplantation – prevalence is as high as 50% as early as 1 year after transplantation.
- The duodenum is the primary absorption site for calcium – any surgical interventions bypassing or removing can increase bone loss and bone density should be monitored.

Bone Health Testing / Screening

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Bone Mineral Density (BMD) tests also known as dual-energy X-ray absorptiometry (DEXA or DXA) scans
- These X-rays that use very small amounts of radiation to determine how solid the bones of the spine, hip or wrist are
- Regular X-rays only show osteoporosis when the disease is very far progressed
- All women over the age of 65 should have a bone density test – may be done earlier if you have risk factors
- Men over age 70 should also consider getting a bone density test or younger if you have risk factors

Osteopenia vs. Osteoporosis

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Osteopenia is the thinning of bone and characterized by low bone density.
- Results from a Bone Mineral Density test define bone health

Bone Density	T-Score
Normal bone density	+1.0 to -1.0
Low bone density	-1.0 to -2.5
At high risk for osteoporosis	-2.5 or higher

How to Keep Your Bones Healthy

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

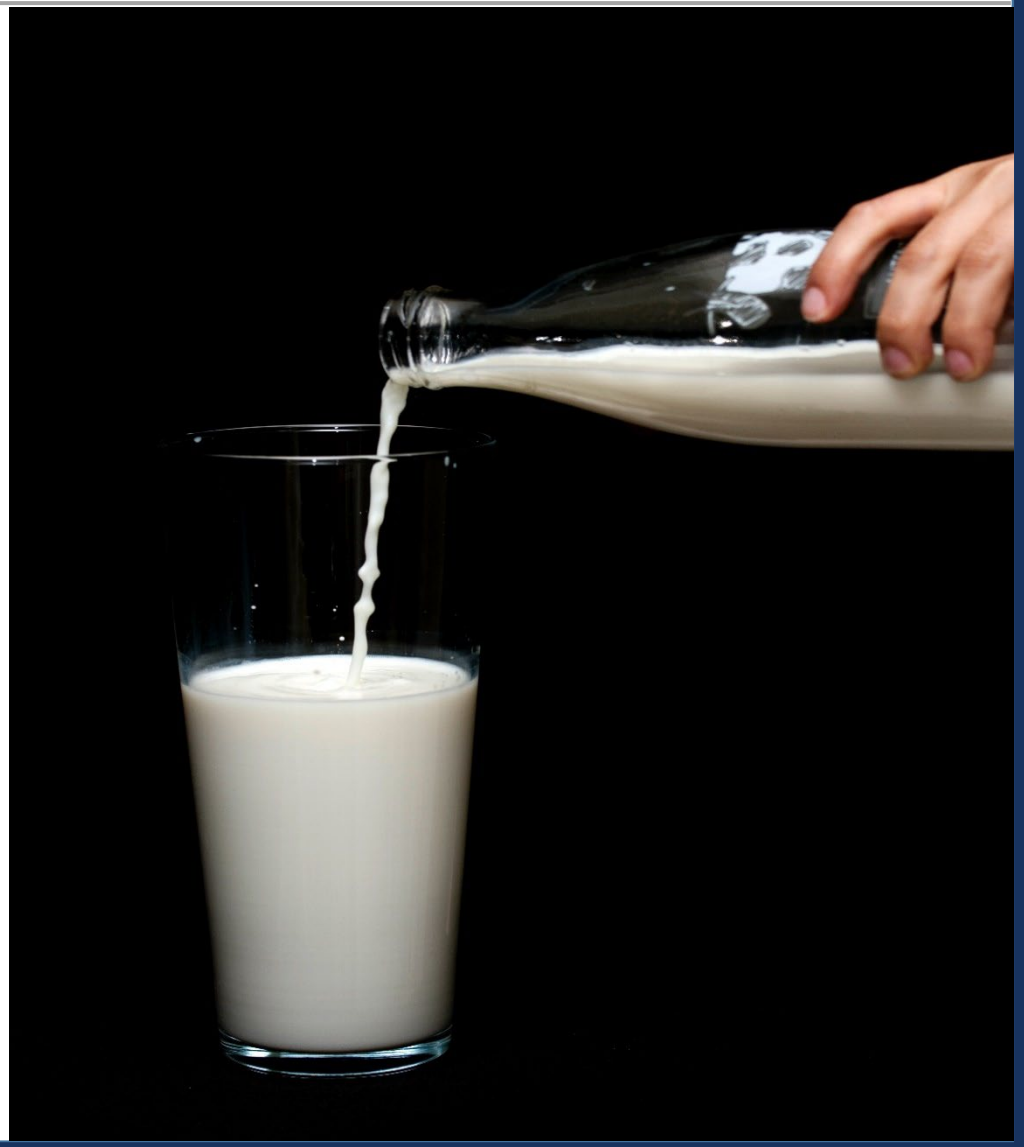
- Include **calcium** and **vitamin D** in your diet
- Include physical activity in your daily routine
  - Weight bearing exercises = walking, jogging and climbing stairs
  - Resistance and balance exercises
- Avoid substance abuse
  - Don’t smoke
  - Women should avoid drinking more than 1 alcoholic beverage each day
  - Men should avoid drinking more than 2 alcoholic beverages each day

How Much Calcium Do You Need?

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

Recommended Dietary Allowance (RDA)

- Adults 19-50 years: 1,000mg/day
- Men 51-70 years: 1,000mg/day
- Women 51 and older: 1,200mg/day
- Men 71 and older: 1,200mg/day



Calcium - Food Sources

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

Calcium per Serving	Food Source
300 mg / serving	1 cup milk 1 cup fat-free/low-fat yogurt 1 cup calcium-fortified soy or rice milk 1 cup calcium-fortified orange juice 1.5 oz. low-fat cheese (cheddar, mozzarella, or Swiss)
200 mg / serving	3 oz. canned salmon (with soft bones) 3 oz. sardines (with soft bones) 1 cup calcium-fortified cereal
150 mg / serving	1 cup cottage cheese ½ cup tofu (made with calcium) 1 slice calcium-fortified bread
100 mg / serving	½ cup frozen yogurt ¼ cup almonds ½ cup cooked greens (kale, collards, spinach, turnip greens)
50 mg / serving	1 medium orange ½ cup cooked broccoli

Calcium Supplements

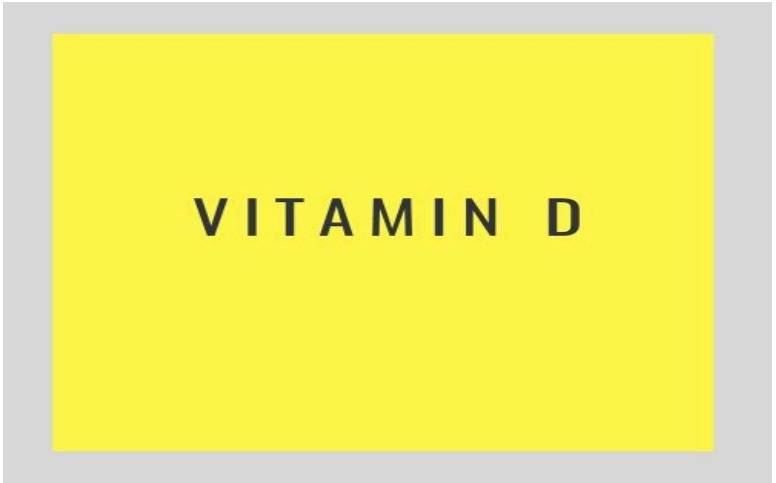
NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Two most common forms of calcium used in calcium supplements:
  - Calcium Carbonate – take with food
  - Calcium Citrate – take with or without food
- Calcium supplements are better absorbed in smaller doses (500mg) at a time
- Available in a variety of forms like tablets, chews, liquids, etc.
- Not regulated by the FDA
- More IS NOT always better – excessive calcium doesn't provide extra bone protection
- Always tell your healthcare provider what supplements you are taking – calcium supplements can interact with certain medications.

What is Vitamin D?

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- A nutrient we eat and a hormone our bodies make
- A fat-soluble vitamin
- Helps your body absorb calcium and phosphorus
  - Best known for **bone health**
- Vitamin D exists in two forms:
  - D_2 (ergocalciferol) – produced in plants
  - D_3 (cholecalciferol) – produced in animals
- Vitamin D production in the skin is the primary natural source of vitamin D



How Much Vitamin D Do You Need?

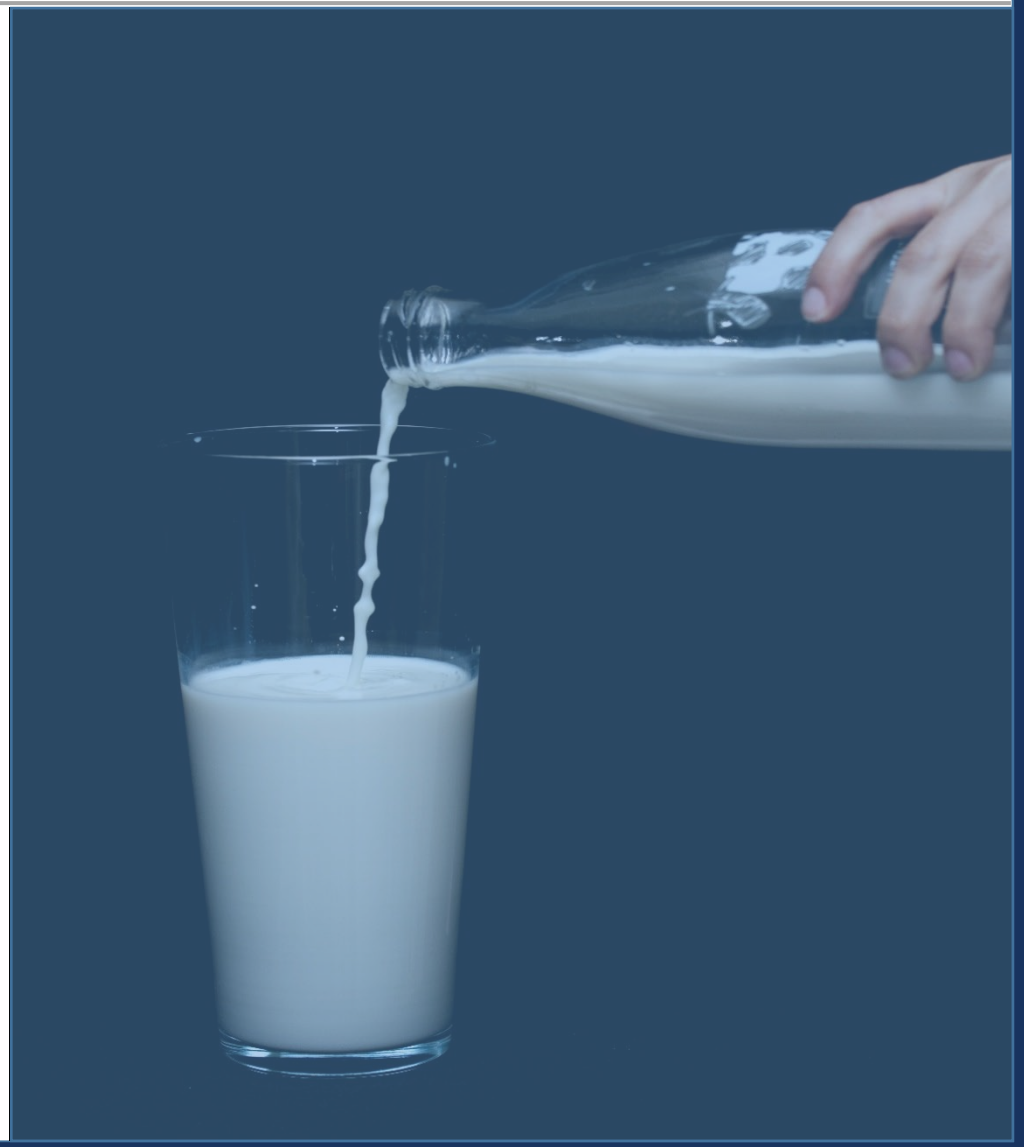
NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

Institute of Medicine recommendations:

- 0-12 months: 400 IU (or 10 mcg)
- 1-70 years: 600 IU (or 15 mcg)
- 70+ years: 800 IU (or 20 mcg)
- 4000 IU (or 100 mcg) upper limit

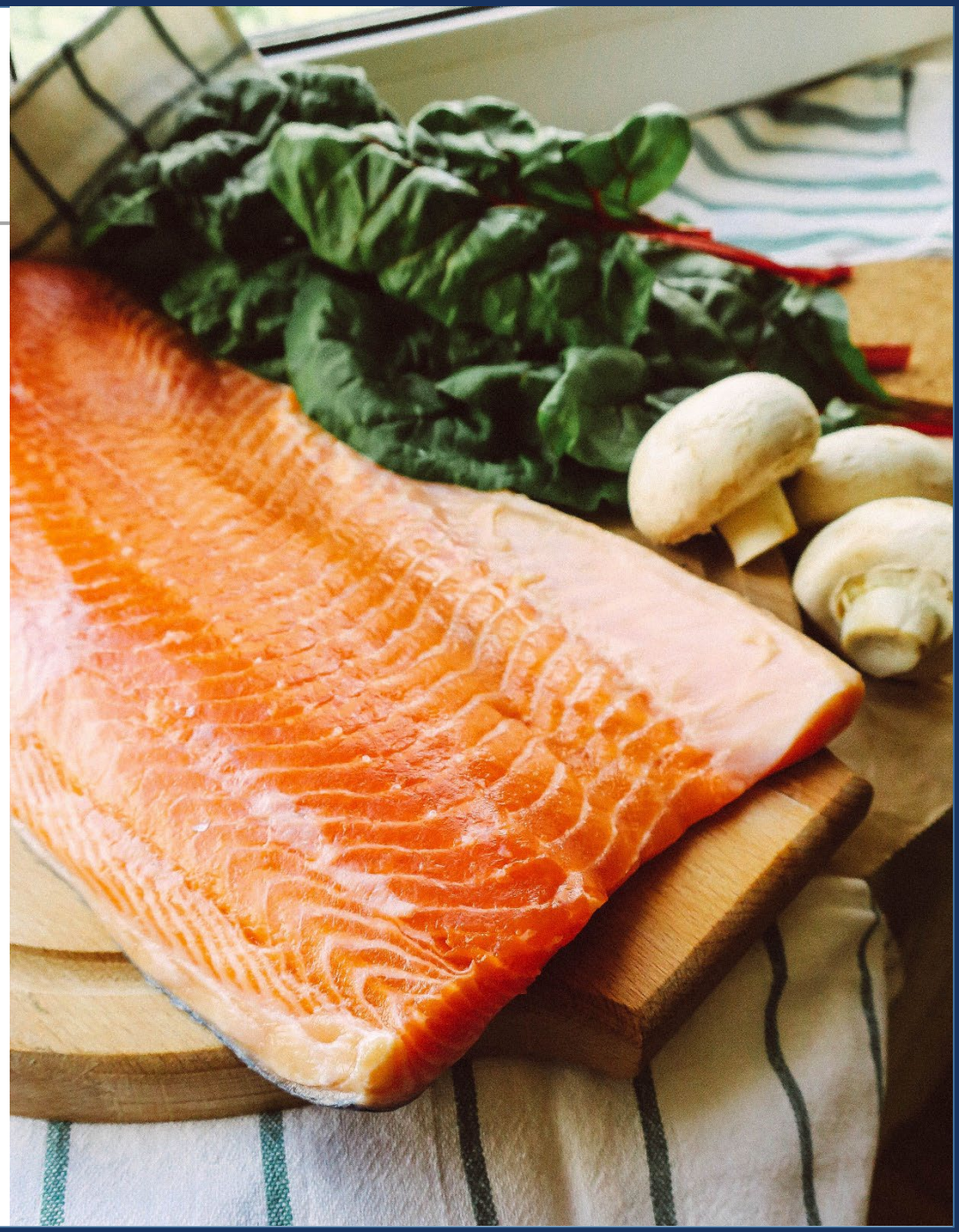
Endocrine Society's Clinical guidelines:

- 0-12 months: **400 IU - 1000 IU** (or 10-25 mcg)
- 1-18 years: **600 IU – 1000 IU** (or 15-25 mcg)
- 19-70 years: **600 IU – 2000 IU** (or 15-50 mcg)
- 70+ years: **800 IU – 2000 IU** (20-50 mcg)



Vitamin D - Food Sources

- Oily Fish:
  - Salmon (11.1 mcg or 444 IU)
  - Trout (16.2 mcg or 648 IU)
  - Sardines (4.1 mcg or 164 IU)
  - Canned Tuna (3.9 mcg or 156 IU)
- Mushrooms – exposed to UV light
  - (7.9 mcg or 316 IU)
- Fortified foods:
  - Milk (2.9 mcg or 116 IU)
  - Orange Juice (3.4 mcg or 136 IU)
  - Yogurt (2 mcg or 80 IU)



Other Nutrients

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Protein makes up 50% of bone volume
  - High protein diets were once thought to leach calcium from bones but now are thought to play an important role in building bone
  - Epidemiologic studies show great protein intake to be beneficial to bone health
- Research is still lacking regarding the role other nutrients play in bone health
  - Other nutrients include selenium, magnesium, and vitamin K
- Magnesium – involved in laying down of bone
  - RDA is 310-420 mg/day: pumpkin seeds, almonds, spinach, cashews, peanuts, black beans and edamame

Vitamin K2

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Vitamin K also has two forms: K1 and K2
- **Vitamin K2 deficiency** is more prevalent and potentially linked to heart and bone health (serum levels aren't reliable for testing)
- Bone Health = activates osteocalcin > can draw calcium into the bones
- Heart Health = Vitamin K2-activated matrix gla protein is responsible for removing excess calcium that can accumulate in soft tissues like arteries and veins

Vitamin K2 Sources

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

	Vitamin K1	Vitamin K2
Role	Coagulation	Proper **calcium** utilization
Food Sources	Leafy greens Green vegetables	Liver Meat Egg Yolks High-fat Dairy Natto (only vegetarian option)
DRI	90-120 mcg/day	Not yet determined
Deficiency	Rare	Prevalent

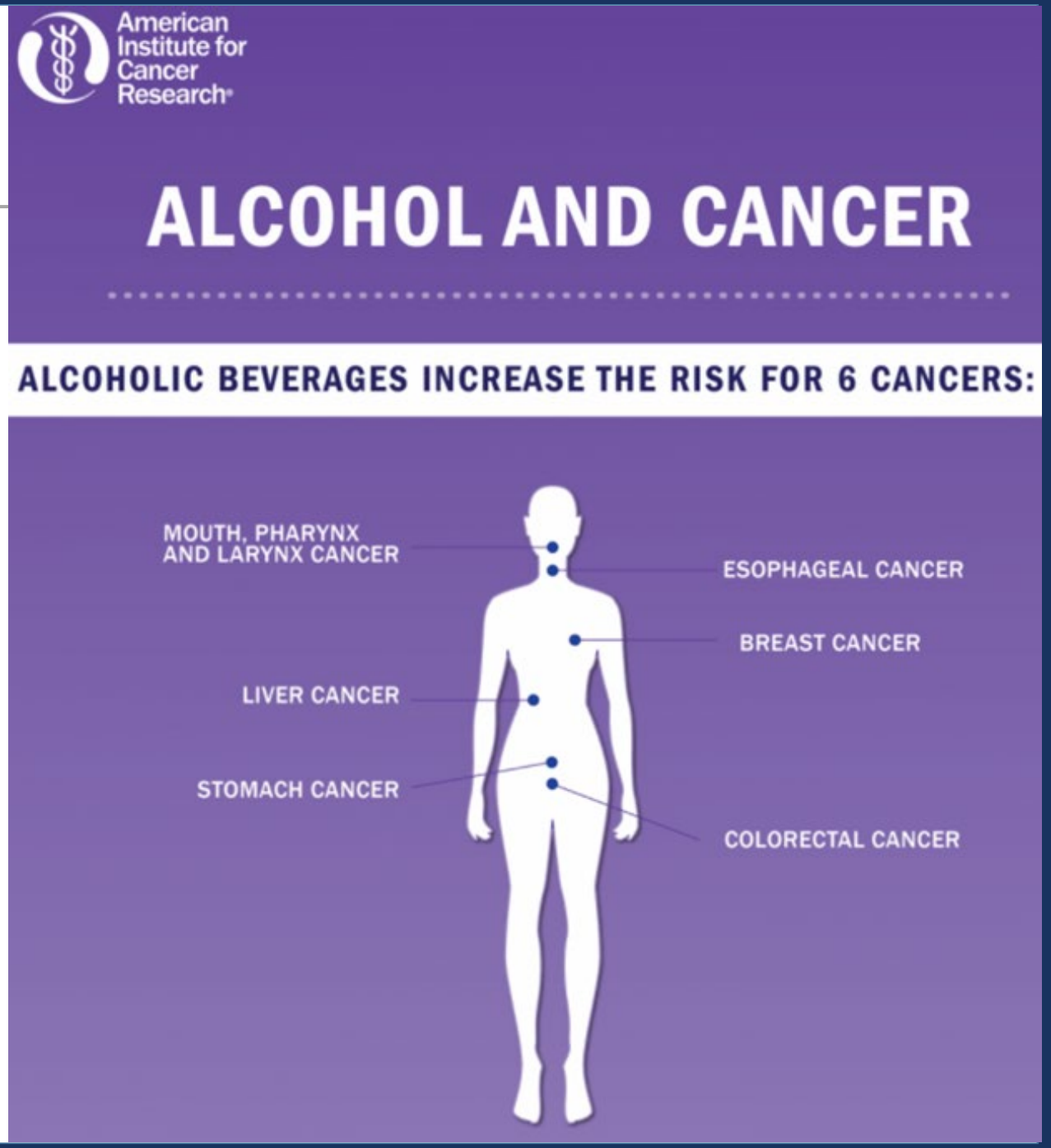
Physical Activity

- Aim to get 150 minutes of moderate intensity physical activity per week (30 minutes, 5 days per week)
  - Walking, jogging, resistance training, yoga/balance
- Start small; it all counts!
- Space it out throughout the day
- Add walking or standing breaks to limit time sitting
- Limit “screen time” to ≤ 2 hours

Limit Alcohol Consumption

- For cancer – it is best **not** to drink alcohol
- Previous research showed that modest amounts of alcohol may have a protective effect against heart disease
- Alcohol in any form is a potent carcinogen
- For those concerned about cancer do not drink
- It is linked to 6 different cancers

* If you do choose to drink alcohol – limit your consumption to 1 drink for women & 2 for men per day



Smoking Cessation

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Talk to your doctor about smoking cessation programs
- Northside Smoking Cessation Program
  - Call: 404-780-7653
  - Email: smokingcessation@northside.com
  - Website: https://www.northside.com/community-wellness/built-to-quit

Osteoporosis Treatment

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Treatment may also include the recommendations for prevention
- There are several classes of medications available to treat osteoporosis and your healthcare provider will determine the best fit if needed
  - Hormone & hormone-related therapy (Fortical, Miacalcin, Evista)
  - Bisphosphonates (Boniva, Reclast, Fosamax)
  - Biologics (Prolia)
  - Anabolic agents (Evenity, Forteo, Tymlos)

NORTHSIDE HOSPITAL
CANCER INSTITUTE
BUILT TO BEAT CANCER

Questions?

References

NORTHSIDE HOSPITAL CANCER INSTITUTE
BUILT TO BEAT CANCER

- Mayo Clinic. Bone Health: Tips to Keep Your Bones Healthy; https://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/bone-health/art-20045060. Accessed January 2022.
- American Institute for Cancer Research. Recommendations for Cancer Prevention; https://www.aicr.org/cancer-prevention/. Accessed January 2021.
- National Osteoporosis Foundation. https://www.nof.org/patient-support/
- Mayo Clinic. Calcium and Calcium Supplements; https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/calcium-supplements/art-20047097 . Accessed January 2022.