

The Role of Diet and Exercise in Cancer Treatment and Survivorship

FPON Session, June 19, 2025

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Presenter Disclosure

- **Presenter: Thomas Hedley**
- **Relationships with financial sponsors:**
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- **This program has not received any financial support**
- **Potential for conflict(s) of interest: n/a**

Poll Question 1

- 65yo M who you are seeing for a preventative health visit 1 year after finishing adjuvant chemotherapy for stage III colon cancer.
- “What foods should I eat to improve my health outcomes?”.
- What should you recommend?
 - a) Whole grains – at least 1 serving per day
 - b) Dairy – 1 serving of full-fat yogurt per day
 - c) Fibre supplement – 1 serving of Metamucil or Benefibre per day
 - d) Limit processed meats – max 1 serving per week

Poll Question 2

- 70yo F metastatic breast cancer sees you for a preventative health visit.
- On stable systemic therapy for the last 6 months and feeling fairly good aside from fatigue and brain fog.
- Wonders whether she might feel better if she makes lifestyle changes. Asks what you would recommend?
 - a) Increase aerobic exercise
 - b) Focus on adding 2 strength training sessions per week
 - c) Try to add more healthy whole plant foods to the diet
 - d) All of the above

Poll Question 3

- 72yo M with early-stage prostate cancer on active surveillance
- “What should do I to decrease my chances of surgery, radiation, and/or hormone therapy?”
 - a) Brisk Walking
 - b) Eat more plant foods
 - c) High intensity interval training
 - d) All of the above

Poll Question 4

- 70 yo F recently diagnosed with stage II ER positive breast cancer for which she was started on letrozole. She has been a regular consumer of soy foods for most of her life.
- “Do I need to avoid soy foods? I’ve heard eating soy may increase the risk of my cancer coming back.”
 - a) True
 - b) False

Poll Question 5

- A couple in their mid 70s come in for preventative health visit.
- Husband is part of a rowing club and wife is part of a weekly walking group. They have both been vegetarian for 20 years. They have normal BMIs and have never smoked.
- Husband has been diagnosed with stage II colon cancer and wife has been diagnosed with stage II breast cancer. Both have completed surgery and chemotherapy and have recovered.
- “What is the most powerful thing we can do to improve our health outcomes?”
- What should you recommend?
 - a) Eat a healthy diet high in fibre
 - b) Maintain physical activity, aiming for at least 150 mins/week of mod intensity PA
 - c) Transition to a fully plant-based or vegan diet.
 - d) Add one serving of almonds or walnuts per week

Objectives

- Describe the impact of diet and exercise interventions on cancer-related outcomes for patients on systemic therapy or active surveillance.
- Review exercise recommendations for cancer survivors.
- Cite the impact of post-diagnosis dietary patterns on cancer and other-health related outcomes for cancer survivors.

Key Takeaways

3 things you can tell your patients about the benefits of diet and exercise during and after their cancer treatment:

- 1) Movement is the mission** - Exercise should be considered a part of your cancer treatment as it *may*: improve cancer related symptoms and treatment side effects; improve odds of treatment working; and improve survival
- 2) Food is your fuel** - Focus on a diet high in fibre and rich in plant foods such as whole grains, nuts, vegetables, fruits, beans, and soy and low in red and processed meat and refined grains as this *may*: improve your quality of life while on treatment; improve odds of immunotherapy working; and improve survival
- 3) Sustainability is key** - Find an exercise routine and healthy dietary pattern that you can do consistently throughout treatment and beyond – consistently engaging in healthy behaviours throughout your cancer journey may help you feel better and may improve your health and cancer prognosis

Cancer Diagnosis as a Change Moment

- Reflection on lifestyle habits after diagnosis leads to strong desire to make changes
- Our patients prefer receiving lifestyle information from their healthcare team
- Discussions on lifestyle have been shown to influence behaviour change
- Cancer survivors are also at risk of morbidity from other chronic diseases
 - *Patients treated for cancer are at increased risk for diabetes, obesity, and heart disease*



Diet and Exercise Interventions



- Effect on treatment outcomes, treatment side effects, and cancer related symptoms

Diet and Exercise Intervention For Patients on Systemic Therapy

- LEANer study
 - 173 women with stage I-III breast cancer – neoadj or adj chemo
 - Arms: Usual care vs. 16 telephone diet and exercise interventions
 - **Patients on neoadjuvant chemo in diet + exercise intervention group had significantly increased chance of pathologic complete response (pCR) vs. usual care group**
 - 53% chance of pCR in diet + PA int group vs. 28% chance of pCR in usual care group

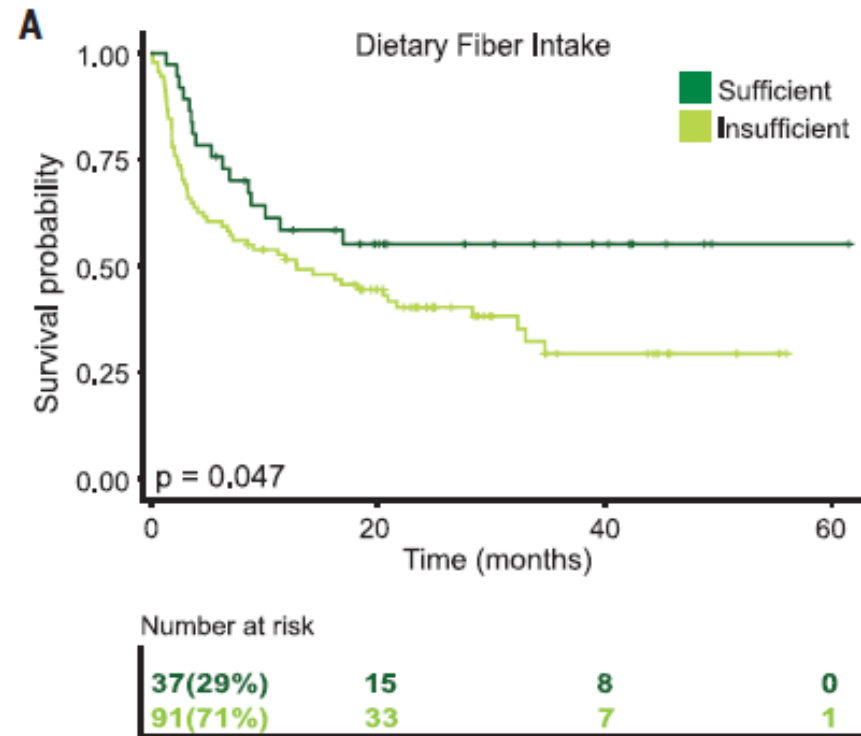


Structured Exercise Intervention in Colon Cancer Survivors

- Stage II and III colon cancer survivors who had completed surgery and adjuvant chemotherapy
- Interventions:
 - Control group: Given health education - pamphlet with diet and exercise recommendations
 - Structured exercise group - 45 minutes 3x/week, with goal to achieve sustained elevated heart rate
- Exercise group was assigned physio or personal trainer for at least once monthly check-ins **for 3 yrs**
- The exercise group had...
 - 7% absolute difference in overall survival at 8 year follow-up
 - 6% absolute difference in disease free survival at 5 years



Fibre, Microbiome and Immunotherapy Response



- Insufficient - <20g/day; Sufficient \geq 20g/day
 - highly correlated with fruit, vegetable, whole grain, and legume intake
- Consuming sufficient dietary fibre showed trend towards improved progression free survival and higher odds of response to immunotherapy
- Every 5g/day increase in dietary fibre associated with significant 30% improvement in progression free survival**
- No significant differences observed in the gut microbiota of:
 - Responders vs. non-responders – aside from one specific fibre fermenting bacteria

Spencer et al, *Science*. 2021;374:1632

Zhang et al, *eBioMedicine*. 2023;98:104873

Exercise Intervention for Prostate Cancer Patients on Active Surveillance

- ERASE Trial
 - 52 patients with low-risk prostate cancer on active surveillance
 - Usual care vs. HIIT
 - Intervention – 12-week supervised HIIT sessions 3x/week
 - Group performing HIIT experienced statistically significant decrease in PSA level (-1.1ug/L) and PSA velocity, but no sign difference in PSA doubling time between groups



Diet and Exercise Intervention for Prostate Cancer Patients on Active Surveillance

- 93 men with early stage, low risk prostate cancer on active surveillance - PSA 4-10
- Intervention: low fat plant based diet, moderate exercise (walking), stress management and support group
- Control: usual care
- At 2 years, significantly fewer patients in intervention group had received prostate cancer treatment



Case 3

- 72yo M with early stage prostate cancer on active surveillance
- “What should do I to decrease my chances of surgery, radiation, and/or hormone therapy?”
 - a) Brisk Walking
 - b) Eat more healthy plant foods
 - c) High intensity interval training
 - d) All of the above

Metastatic Breast Cancer

- 8 weeks of a whole food plant-based diet significantly improved subjective cognitive function, emotional well-being, fatigue vs. usual care in patients with metastatic breast cancer on stable systemic therapy
- **PREFERABLE-EFFECT Study**
 - Structured and individualized 9-month supervised exercise intervention vs. usual care
 - Exercise intervention
 - 1 hour supervised exercise sessions 2x/week with aerobic and strength training
 - Participants also encouraged to be "physically active" for 30 mins for other 5 days/week using app and wearable fitness tracker
 - Significant improvements in fatigue, pain, and physical functioning at 9-month follow-up

Campbell et al, *Res Sq* [Preprint]. 2023

Hiensch et al, *Nature Medicine*. 2024



Case 2

- 70yo F metastatic breast cancer sees you for a preventative health visit.
- On stable systemic therapy for the last 6 months and feeling fairly good aside from mild-moderate fatigue and brain fog.
- She wonders whether she might feel better if she makes lifestyle changes. Asks what you would recommend?
 - a) Increase aerobic exercise – try for more brisk walks
 - b) Focus on adding 2 strength training sessions per week
 - c) Try to add more healthy whole plant foods to the diet
 - d) All of the above

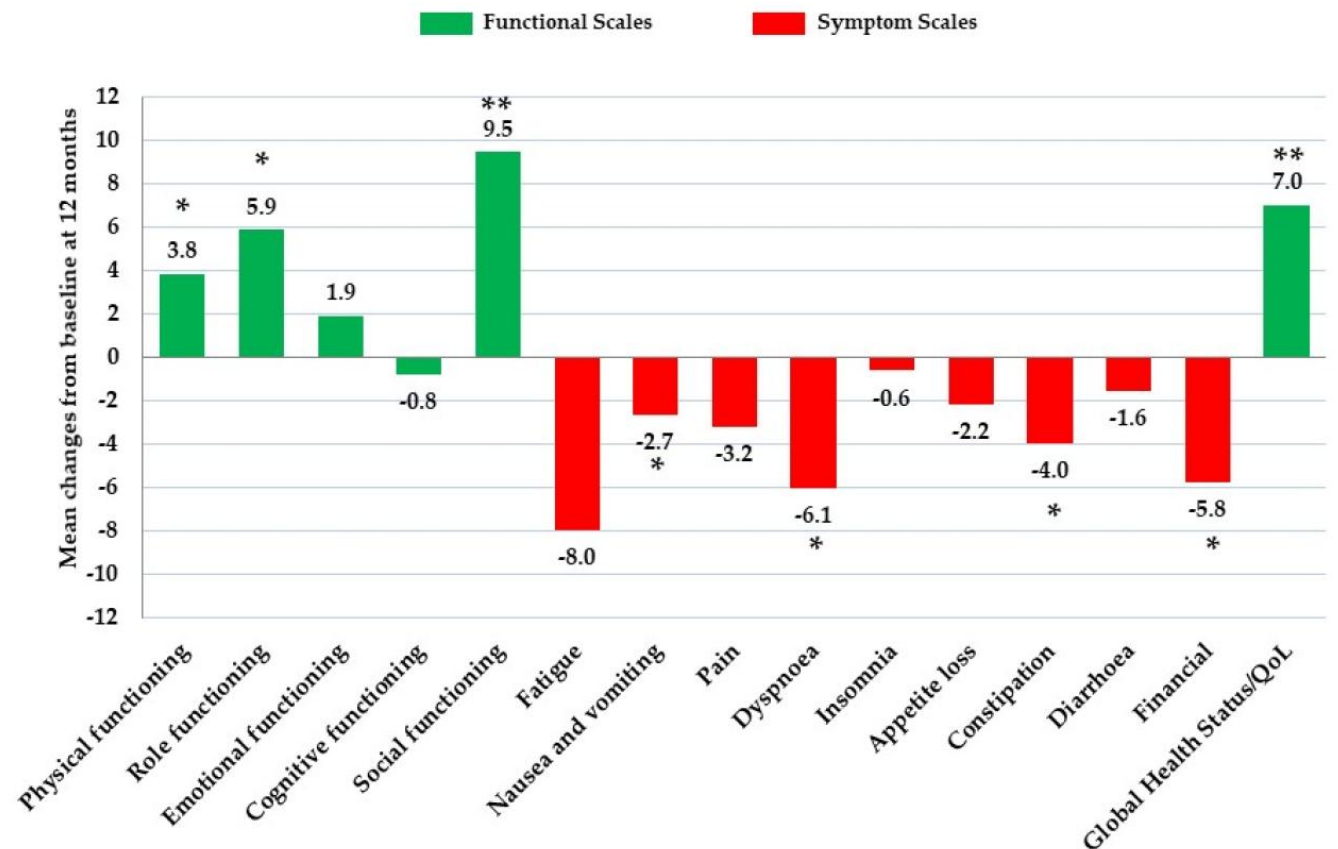
Dose of Exercise That Improves Symptoms For Breast Cancer Patients on Chemotherapy

- CARE trial – 301 patients with breast cancer on adjuvant chemotherapy receiving supervised exercise program
 - Standard vs. High aerobic groups – 25-30 mins moderate pace vs. 50-60 mins moderate pace, both done 3x/week
 - Combo groups – 50-60 mins; half aerobic, half strength training, 3x/week
 - **High aerobic exercise and combo of resistance/aerobic exercise were not superior to standard 30 min aerobic exercise for benefit on physical functioning.**

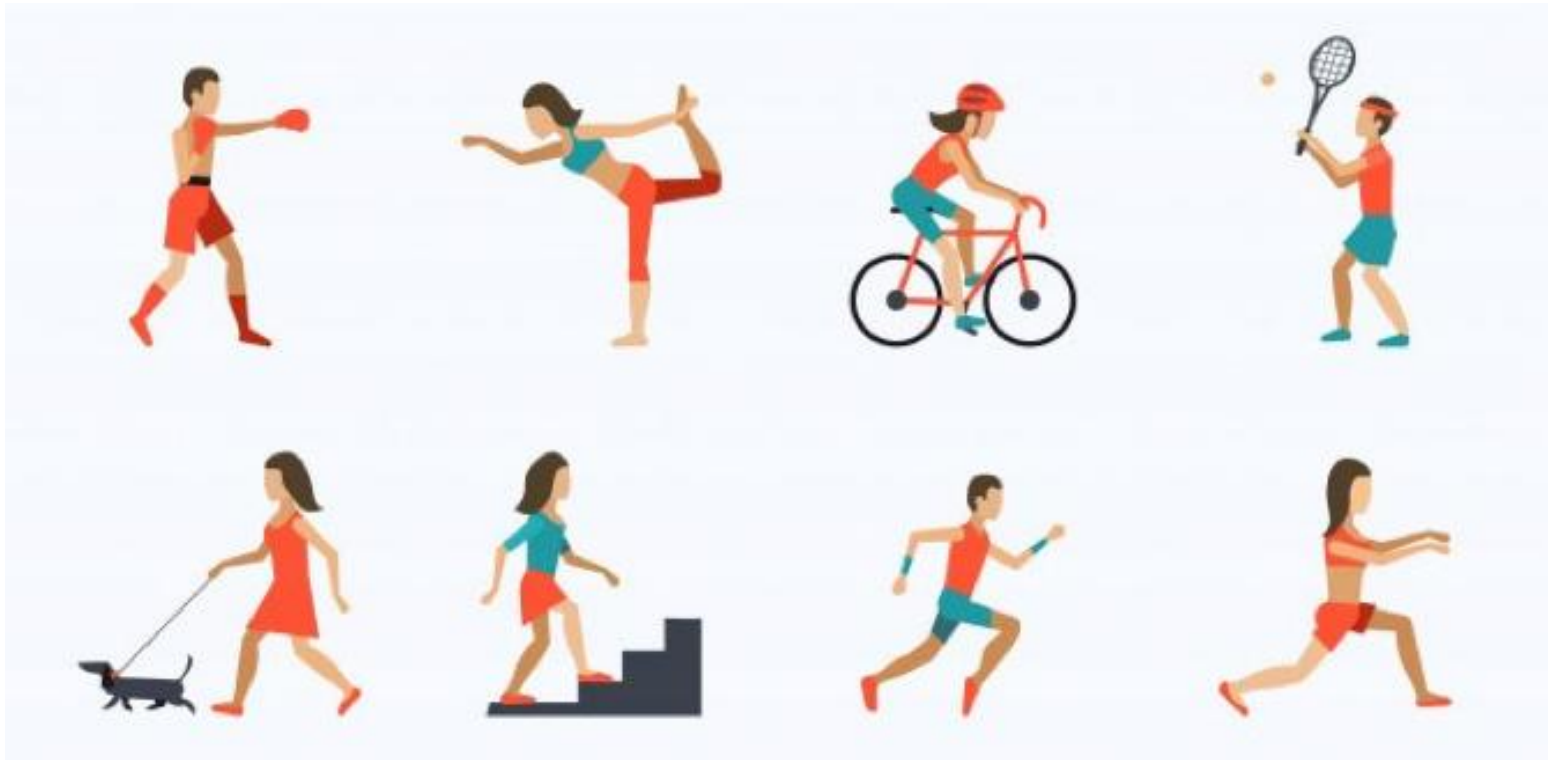


Effect of Diet and Lifestyle Intervention on Quality of Life in Breast Cancer Survivors

- 12-month lifestyle modification program for women diagnosed with breast cancer
- 227 patients - Mediterranean diet, +/- brisk daily walking, vitamin-D supplementation
- Significant improvements in global health status, physical functioning, dyspnea, ST side effects



Exercise and Cancer Survivors



Physical Activity in Cancer Survivors

- High levels of physical activity post-diagnosis of breast, colorectal, and prostate cancer is associated with decreased risk of cancer-related and all-cause mortality



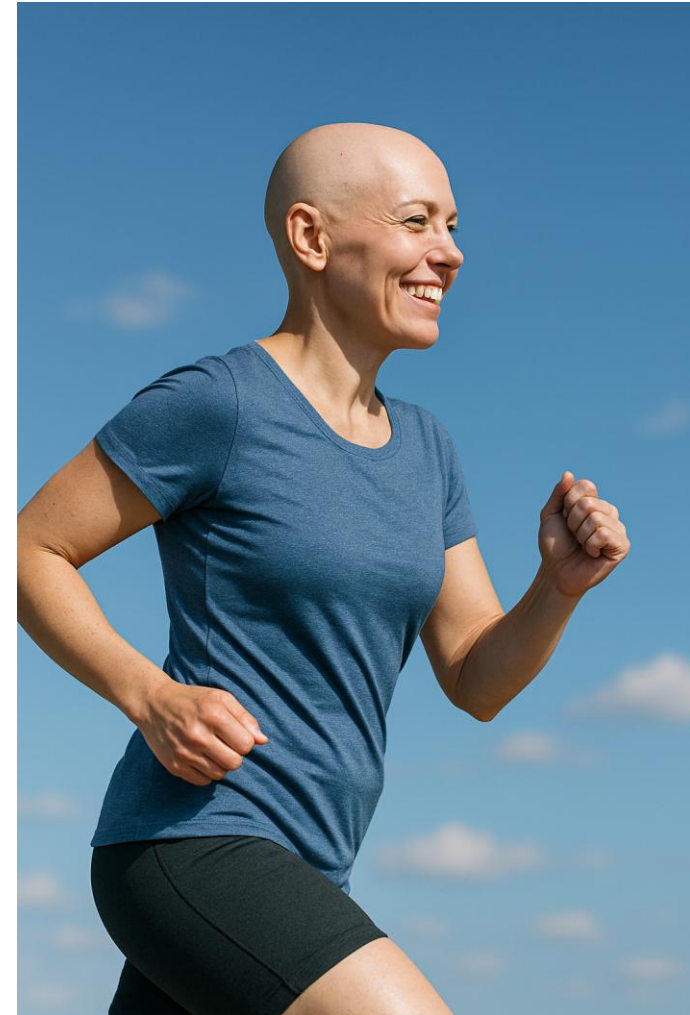
Physical Activity and Breast Cancer Survivors

- Most versus least active breast cancer survivors
 - 37% lower risk of breast cancer specific mortality
 - 42% lower risk of all-cause mortality
 - Benefits are maintained in pts with BMI >25 and <25
- 2 Exercise RCTs show significant 48% decrease in recurrence risk
- Decreasing physical activity from before to after diagnosis - 2.4x increased risk of all-cause mortality



Physical Activity Dose Required for Benefit for Breast Cancer Survivors

- Compared with no activity, even low levels of physical activity are associated with reduced risk of all-cause mortality
- Mortality benefit plateaus after 10 MET hours per week
 - i.e. **150-180 minutes per week of moderate intensity physical activity or 75-90 minutes per week of vigorous intensity physical activity**
- *No clear recommendation on whether resistance and/or aerobic can contribute to the dose of exercise*



Exercise Intensity

- Talk Test
 - Moderate – can talk, can't sing
 - Vigorous – can't talk, can't sing
- % of Max Heart Rate
 - Moderate – 64-76%
 - Vigorous – $\geq 77\%$
- METs
 - Moderate – 3 – 5.9 METs
 - Vigorous – ≥ 6 METs



Physical Activity and Colorectal and Prostate Cancer Survivors

- Highest versus lowest levels of post-diagnosis physical activity:
 - 36% lower risk of CRC specific mortality
 - 31% lower risk of prostate cancer specific mortality
 - 37-40% lower risk of all-cause mortality



EXERCISE PRESCRIPTION & REFERRAL FORM



PATIENT'S NAME: Jane Doe DOB: _____ DATE: Sept 19/23
HEALTH CARE PROVIDER'S NAME: Dr. T. Hedley SIGNATURE: _____

PHYSICAL ACTIVITY RECOMMENDATIONS

Type of physical activity:	Aerobic	Strength
Number of days per week:	5	2
Minutes per day:	30 at mod	30
Total minutes per week*:	150	60

*PHYSICAL ACTIVITY GUIDELINES

Adults aged 18-64 with no chronic conditions: Minimum of 150 minutes of moderate physical activity a week (for example, 30 minutes per day, five days a week) *and* muscle-strengthening activities on two or more days a week ([2008 Physical Activity Guidelines for Americans](#)).

REFERRAL TO HEALTH & FITNESS PROFESSIONAL

Name: _____

Phone: _____

Address: _____

Web Site: www.exerciseismedicine.org/

movethruca

Follow-up Appointment Date: January 2024

Dietary Patterns and Health Related Outcomes in Cancer Survivors

- Ways to Assess Diet
 - Prudent (healthy) vs. Western (unhealthy) diet
- Healthy diet
 - Predominance of plant based foods, including veggies and fruit, whole grains, and beans
 - Minimizes red and processed meat intake and refined grains
- Unhealthy diet
 - More red and processed meat + greater intake of refined grains and added sugars



Summary of Evidence of Dietary Patterns on Outcomes for Cancer Survivors

- Cancer patients eating the most vs. least healthy diets post-diagnosis had:
 - 26% lower risk of overall mortality
 - 33% lower risk of cancer specific mortality
- Certainty of evidence is low as it is based on meta-analysis of cohort studies
- Low risk of harm to recommend healthy dietary patterns such as plant-based, DASH, or Mediterranean diet to patients



“So doc what should I eat if I have _____ cancer to improve my chances of beating my cancer?”

- Breast Cancer
 - No specific diet that improves breast cancer outcomes
 - Increasing fibre may reduce risk of disease specific mortality
 - Consuming small daily serving of soy foods may reduce risk of recurrence
- Colorectal and Prostate Cancer
 - Consuming a more Western diet and/or high amounts of processed meat increases risk of:
 - CRC recurrence
 - Prostate cancer mortality
 - Consuming a diet high in whole plant foods may lower risk of prostate cancer disease progression
 - Colorectal cancer patients should focus on increasing fibre by adding more whole grains to decrease chances of CRC-specific mortality

Consuming More Plant Based Foods May Improve QOL and Disease Outcomes in Prostate Cancer Survivors

- Eating more plant based foods associated with improvements in cancer related symptoms
 - Significant improvements in sexual function, urinary irritation, urinary incontinence and hormonal vitality.
- Patients with diet including the **highest amounts of plant foods had a 47% lower risk of disease progression** compared with participants whose diets had the lowest amount of plant foods



Loeb et al, *Cancer*. 2024;130(9):1618

Liu et al, *JAMA Network Open*. 2024;7(5):e249053

Unhealthy Diet in Colorectal Cancer Survivors

- Higher Western diet patterns and/or higher processed meat consumption after diagnosis are associated with **increased CRC recurrence and all-cause mortality**
- 3 or more daily servings of refined grains (vs. <1/day) significantly decreases disease free survival

processed meat

Includes any type of meat that has been modified by physical and/or chemical processing to extend the shelf life of the product.

Sausage



Bacon



Hot dogs



Bologna



Pepperoni



Salami



Rock et al, *CA Cancer J Clin.* 2022;72(3):230

Brown et al, *JNCI Cancer Spectr.* 2018;2(2):pky017

Benefits of Healthy Dietary Patterns in Colorectal Cancer Survivors

- Consuming a more “prudent” diet post-diagnosis is:
 - NOT associated with reduced risk of cancer recurrence
 - NOT consistently associated with improved CRC-specific mortality risk
 - Associated with 22% decreased risk of overall mortality in CRC survivors
- Cohort study of 1400 CRC survivors – higher plant food intake post-diagnosis associated with decreased risk of all cause mortality



Rock et al, *CA Cancer J Clin.* 2022;72(3):230

Hoang et al, *Cancers.* 2020;12(11):3391

Ratjen et al, *Am J Clin Nutr.* 2021;114(2):441

Trauchburg et al, *Nutrients.* 2023;15:3151

Dietary Recommendations For CRC Patients That May Improve Outcomes

- Increase fibre intake with goal of at least 22g/day
 - Higher fibre intake significantly decreases risk of CRC mortality compared with patients consuming lowest amounts of fibre
 - When comparing pre and post-diagnosis fibre levels, *each 5g/day increase in fibre was associated with significant improvement in risk of ACM (14%) and CRC-specific mortality (18%).*
- Focus on increasing fibre by adding more whole grains
 - Whole grain intake associated with lower CRC mortality - *each 20g/day increase in whole grain intake associated with 28% reduction in CRC mortality*
 - Patients consuming the highest vs. lowest amounts of whole grains post diagnosis of CRC had 17% reduced risk of all cause mortality



Zhao et al, *Cancers*. 2022;14:3801

Song et al, *JAMA Oncol*. 2018;4(1):71

Hoang et al, *Cancers*. 2020;12(11):3391

Dietary Recommendations for Colon Cancer Patients that May Improve Outcomes

- Replacing 1 daily serving of refined grains with whole grains
 - Associated with **13-14% lower relative risk of recurrence, all-cause mortality, and improvement in DFS.**



Case 1

- 65yo M who you are seeing for a preventative health visit 1 year after finishing adjuvant chemotherapy for stage III colon cancer.
- “What foods should I eat to improve my health outcomes?”.
- What should you recommend?
 - a) Whole grains – at least 1 serving per day
 - b) Dairy – 1 serving of full-fat yogurt per day
 - c) Fibre supplement – 1 serving of Metamucil or Benefibre per day
 - d) Limit processed meats – max 1 serving per week
 - e) **Answers A + D**

Song et al, *JAMA Oncol.* 2018;4(1):71

Jochems et al, *BMJ Open.* 2017;8:e014530

Rock et al, *CA Cancer J Clin.* 2022;72(3):230

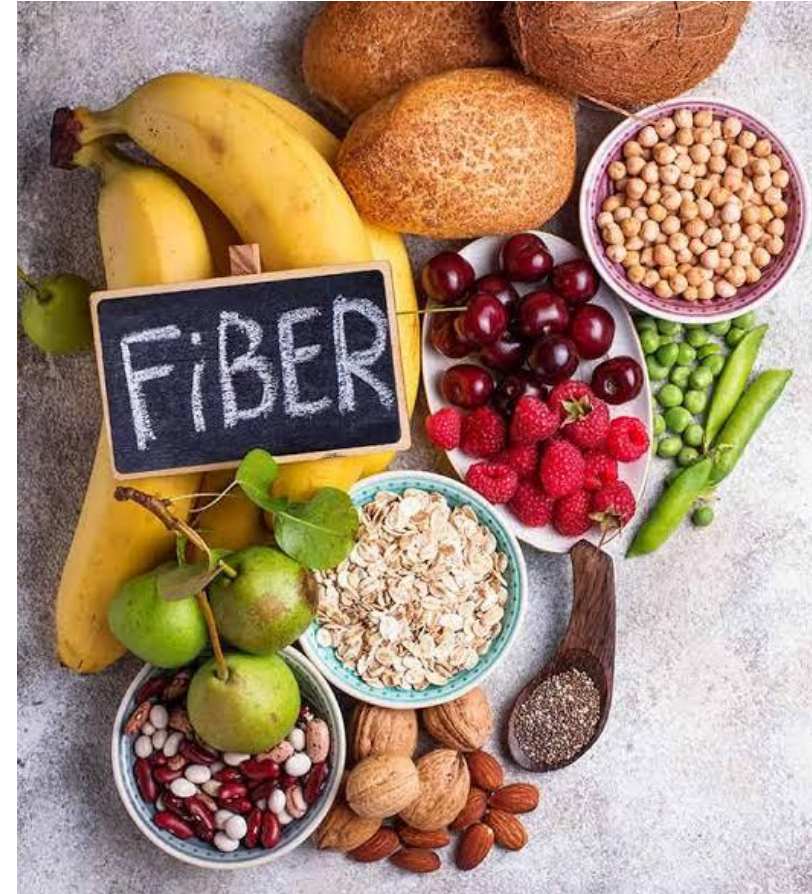
Diet in Breast Cancer Survivors

- Multiple systematic reviews show that “healthful dietary patterns” after diagnosis of breast cancer are associated with **decreased risk of all-cause mortality**
- BUT *insufficient evidence to suggest an association with diet quality and breast cancer recurrence or breast-cancer specific mortality*



Dietary Recommendation for Breast Cancer Survivors That May Improve Outcomes

- Increasing dietary fibre may improve survival
 - Significant linear association between higher fibre intake and all-cause mortality
 - Patients consuming highest vs. lowest amounts of dietary fibre had significant 28% reduction in risk of breast cancer specific mortality
 - Quality of evidence = low



33 BEST HIGH-FIBER FOODS



Lentils
15.6g/Cup 7.9g/100g



Whole Grain Pasta
6.3g/Cup 8g/100g



Okra
8.2g/Cup 3.2g/100g



Pears
5.5g/Pear 3.1g/100g



Oats
16.5g/Cup 10.6g/100g



Broccoli
2.4g/Cup 2.6g/100g



Avocados
10g/Cup 6.7g/100g



Quinoa
1.6g/Cup 2.8g/100g



Lima Beans
13g/Cup 7g/100g



Coconuts
7g/Cup 9g/100g



Popcorn
1.2g/Cup 14.5g/100g



Flaxseeds
2.8g/Tbsp 27g/100g



Artichoke
6.9g/Artichoke 5.4g/100g



Dark Chocolate
3.1g/Ounce 10.9g/100g



Carrots
3.4g/Cup 2.8g/100g



Raspberries
8g/Cup 6.5g/100g



Banana
3.1g/Banana 2.6g/100g



Pearled Barley
3.8g/Cup 6g/100g



Edamame
8g/Cup 5g/100g



Kidney Beans
11.3g/Cup 5.4g/100g



Millet
17g/Cup 8.5g/100g



Split Peas
16.3g/Cup 8.3g/100g



Strawberries
3g/Cup 2g/100g



Chia Seeds
10g/Ounce 34g/100g



Brussels Sprouts
3.3g/Cup 8.3g/100g



Black Beans
15g/Cup 8.9g/100g



Figs
1.6g/Fig 2.9g/100g



Almonds
11g/Cup 12.5g/100g



Sweet Potatoes
3.8g/Medium size 2.5g/100g



Kale
2.6g/Cup 2g/100g



Beets
3.8g/Cup 2.8g/100g



Apples
4.4g/Apple 2.4g/100g



Chickpeas
12.5g/Cup 7.6g/100g

Soy Foods for Breast Cancer Survivors

- High versus low soy food intake *pre-diagnosis* is associated with reduced risk of all-cause mortality.
- High versus low soy intake *post-diagnosis* was associated with 25% lower risk of breast cancer recurrence.



Qiu et al, *Eur J Nutr.* 2019;58:3079
Nechuta et al, *Am J Clin Nutr.* 2012;96:123

World Cancer Research Fund International. Diet, nutrition, physical activity and body weight for people living with and beyond breast cancer. The latest evidence, our guidance for patients, carers and health professionals, and recommendations for future research. 2024

Case 4

- 70 yo F recently diagnosed with stage II ER positive breast cancer for which she was started on adjuvant letrozole. She has been a regular consumer of soy foods for most of her life.
- “Do I need to avoid soy products? I’ve heard eating soy may increase the risk of my cancer coming back.”
 - a) True
 - b) False – consuming a small daily serving of soy products may decrease risk of breast cancer recurrence

Case 5

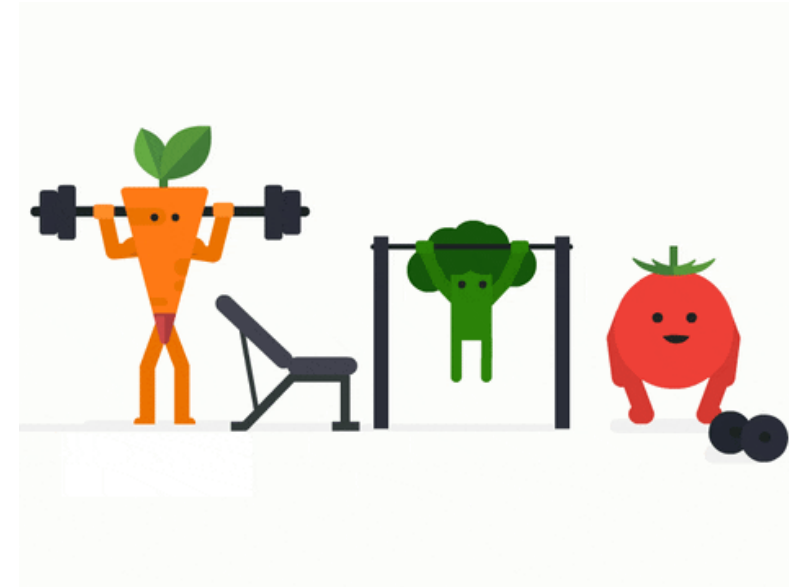
- Husband and Wife in their mid 70s come in for preventative health visit. Husband is part of a rowing team and wife is part of a weekly walking group. They have both been vegetarian for 20 years. They have normal BMIs and have never smoked.
- Husband has been diagnosed with stage II colon cancer and wife has been diagnosed with stage II breast cancer. Both have completed surgery and chemotherapy and have recovered.
- “What is the most powerful thing we can do to improve our health outcomes?”
- What should you recommend?
 - a) Eat a healthy diet high in fibre
 - b) **Maintain physical activity, aiming for at least 150 mins/week of mod intensity PA**
 - c) Transition to a fully plant-based or vegan diet.
 - d) Add one serving of almonds or walnuts per week

Limitations with Lifestyle Recommendations for Cancer Survivors

- Evidence presented is usually labelled as “weak” or “limited suggestive”
- Much of the evidence is based on observational studies, not RCTs
- Any associations found cannot be assumed to be causal
- Implication: even if patients consuming a specific diet are found to have better outcomes, if this dietary pattern does not have a causal relationship with the outcome, *we cannot assume that changing diet will change the outcome.*
- Diet and exercise behaviours change over time, particularly after a major health event like a cancer diagnosis.
- Recommendations provided are the best advice we can give patients according to current evidence and expert opinion.

Key Takeaways

- Exercise
 - The most physically active cancer survivors have improved cancer specific and all-cause mortality
 - Exercise Rx for survivors: 150-180 mins of moderate PA/week, 2 x 20-30 mins resistance training sessions per week
- Diet
 - A more healthful diet rich in vegetables, fruits, whole grains, legumes, nuts and low in red and processed meat may reduce risk of cancer specific and all cause mortality for cancer survivors.
- Exercise and Dietary Interventions
 - The introduction of exercise and healthy dietary changes for patients living with or beyond cancer may improve quality of life, reduce side effects, and possibly boost efficacy of their systemic therapy.



Where to Send Your Patients for Information - BC Cancer Website

Nutrition Information

Good nutrition is vital at every stage of your cancer treatment and recovery.

Eating well gives you energy, helps you feel better and keeps your body strong so that you can better manage side effects from treatment. It will also help you heal and recover after treatment.



Have questions about nutrition? For answers to common questions, click "+" on the questions below.

What do I eat after a cancer diagnosis?	+
Does sugar feed cancer?	+
Should I follow a ketogenic diet?	+
Should I follow an alkaline diet?	+
Should I be eating only organic foods?	+

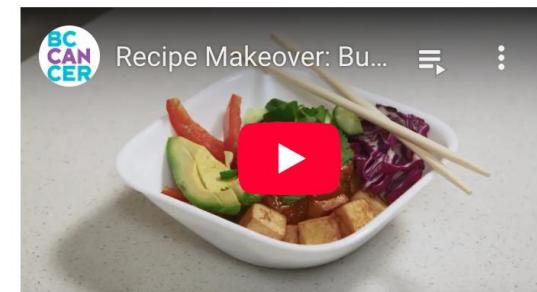


Do you have nutrition questions?

For individual diet advice you can speak to an oncology dietitian at [HealthLink BC](#) by calling 8-1-1 from anywhere in BC.



Looking for ways to makeover your meals? Watch these dietitian-approved recipe videos:



<http://www.bccancer.bc.ca/health-info/coping-with-cancer/nutrition-support#Common--questions>

Plant Based Canada Podcast



Welcome to the Plant-Based Canada Podcast. Join us as we talk with experts to explore the field of nutritional sciences and how our food choices...

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Episode 82: How To Go Plant Based for Beginners with Dr. Thomas Hedley

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Thank you!

- Any questions or feedback?
I'd love to hear it.



Supplemental Slides

Ideas and Inspirations for Incorporating Lifestyle Medicine into Cancer Care pathways in BC

- Healthy10 Program
 - American Institute of Cancer Research Program
- Inspire Health (BC)
- Aroga Lifestyle Medicine Clinic (BC/Ontario)

 InspireHealth
Supportive Cancer Care



Resources

- American Institute of Cancer Research
 - <https://www.aicr.org/cancer-survival/>
 - <https://www.aicr.org/cancer-prevention/food-facts/>
- American College of Sports Medicine
 - Best handout on benefits of exercise for cancer survivors - <https://www.acsm.org/blog-detail/acsm-certified-blog/2019/11/25/acsm-guidelines-exercise-cancer-download>
 - Exercise Rx - <https://www.exerciseismedicine.org/wp-content/uploads/2021/04/EIM-moving-through-cancer-form-web.pdf>
- American College of Lifestyle Medicine
 - <https://lifestylemedicine.org/tools-and-resources/>
- BC Cancer
 - Nutrition Guide for Breast Cancer pts - http://www.bccancer.bc.ca/nutrition-site/Documents/Patient%20Education/a_nutrition_guide_for_women_with_breast_cancer.pdf
 - Cancer Prevention Lifestyle Resources - <http://www.bccancer.bc.ca/prevent/nutrition-exercise/healthy-eating>

Resources

- American College of Lifestyle Medicine
 - ACLM Cancer Survivorship Toolkit – email me and I can send this to you!
- Sunnybrook Hospital
 - How to eat plant-based link

Lifestyle Interventions are Cost Effective

- 6 of 9 studies reviewed showed lifestyle interventions were cost-effective for pts with cancer
 - 7 studies examined benefits of physical activity with cancer treatment
 - 2 studies - exercise + psychosocial counselling with cancer treatment
- 6 studies with exercise intervention reported larger quality-adjusted life year (QALY) gains compared with usual care
- *Exercise appears to be the most cost-effective intervention according to cost per QALY*

AICR's Foods that Fight Cancer™

No single food can protect you against cancer by itself.

But research shows that a diet filled with a variety of vegetables, fruits, whole grains, beans and other plant foods helps lower risk for many cancers. In laboratory studies, many individual minerals, vitamins and phytochemicals demonstrate anti-cancer effects. By including more foods that fight cancer into your diet, you will help reduce your risk of developing cancer.



APPLES



ASPARAGUS



BLUEBERRIES



BROCCOLI AND
CRUCIFEROUS
VEGETABLES



BRUSSELS SPROUTS



CARROTS



CAULIFLOWER



CHERRIES



COFFEE



CRANBERRIES



FLAXSEED



GARLIC



GRAPEFRUIT



GRAPES



KALE



ORANGES



PULSES: DRY BEANS,
PEAS, AND LENTILS
(LEGUMES)



RASPBERRIES



SOY



SPINACH



SQUASH (WINTER)



STRAWBERRIES



TEA



TOMATOES



WALNUTS



WHOLE GRAINS

Foods to Limit to Reduce Cancer Risk

A lot of us grow up eating foods that might be *okay* to eat, but aren't necessarily the *best* thing to eat. As you build your meal plans, make sure you're not overdoing it with foods that are best to have in small portions. Excessive consumption of alcohol, processed meats, red meats and sugar-sweetened drinks can all increase your risk of cancer. Read further to learn more about each of these foods, and the impact they can have on your risk of cancer.



ALCOHOL



PROCESSED MEAT
(SAUSAGES, HAM,
BACON, HOT DOGS,
SALAMI)



RED MEAT (BEEF,
PORK, LAMB)



SUGAR-SWEETENED
DRINKS

- *“In general moving towards a more healthful diet (such as a plant-based and/or Mediterranean diet) and away from a more Western diet is associated with best health outcomes after a cancer diagnosis”*

What is a plant-based diet?

- 85% of foods are whole or minimally processed plant foods, including beans, lentils, peas, whole grains, soy products, nuts and seeds, vegetables and fruits
- 1 day per week could have meat, dairy, egg
- 3 meals per week could include meat, dairy, eggs
- I don't recommend that a patient who did not eat a plant-based diet prior to cancer tries to transition to a 100% PB diet during active treatment, unless they have regular follow-up and support from a dietitian
- Like any diet a plant-based diet needs to be planned to ensure all micronutrient requirements are met.
 - Requires Vitamin-B12 and Vitamin-D supplementation +/- iodine.

To Go Plant Based or Not

- Generally, I do not recommend that patients transition to a 100% plant-based diet during active treatment
- If someone consumed a 100% plant-based diet prior to treatment then likely ok, but should consult with a dietitian, especially for help with consuming sufficient protein
- After completing treatment (i.e. chemotherapy), there is weak evidence for patients to transition towards a more plant-based diet.
- **Remember that the goals for nutritional intake are different during active treatment vs. survivorship setting.**
 - **Dietary recommendations for cancer prevention do not match recommendations for a patient on active treatment.**

Tips for Patients to Consume More Protein

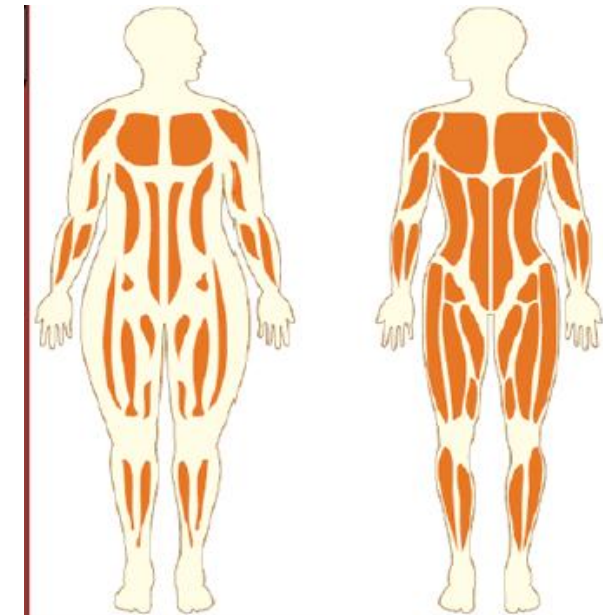
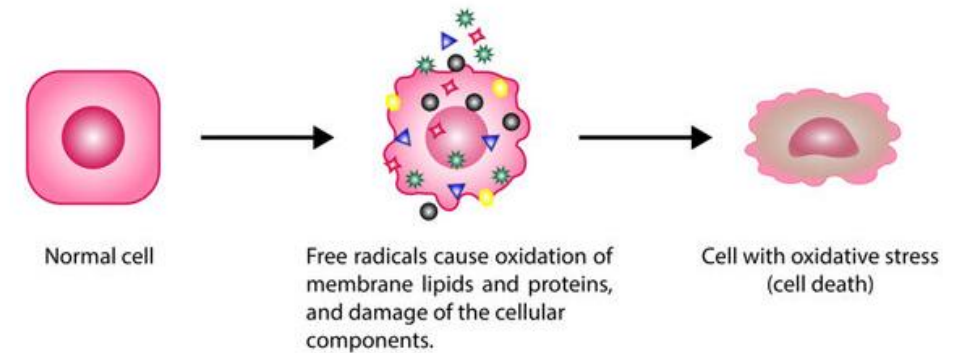
- Build meals and snacks around protein
- Eat protein rich food first
- Choose protein rich snacks – hard boiled egg, nuts/seeds, Greek yogurt, hummus
- Only top up with protein powder, protein drinks or nutritional supplements if not able to meet protein targets with foods.

Weight Changes After Breast Cancer

- Mounting evidence to suggest that weight gain after diagnosis is associated with higher breast cancer specific mortality but there is poor evidence that weight loss after diagnosis may be beneficial or sustainable
- However weight loss is complicated
 - Intentional vs. non-intentional (i.e. from cancer recurrence)
 - Loss of lean body mass (muscle) vs. fat mass - loss of lean muscle mass (sarcopenia) can be associated with worsened all-cause mortality and other cancer related outcomes
 - For reducing chronic disease risk, morbidity, and improving overall QOL clinically significant weight loss goal would be 3-5% body weight
- Lifestyle interventions that include both dietary changes and exercise (aerobic + resistance) are more likely to produce weight loss
- *Consistently eating healthy and engaging in physical activity may be more important than whether those behaviours lead to the outcome of weight loss.*

Potential Mechanisms of Benefit for Healthy Diets and Exercise During Treatment

- Exercise and healthy nutrition → reductions in fat mass and preservation of lean body mass → improved pharmacokinetics of chemotherapy → improved chemo tolerance/toxicity
- Exercise induced reduction in reactive oxygen species may promote quicker recovery of hemoglobin and neutrophils
- Resistance exercise and protein supplementation to maintain muscle mass
 - May preserve physical function and reduce side effects (GI, Neuropathy, Fatigue)
 - Severe symptom burden increases odds of dose reductions and delays.



Adapted from:
Prado et al, *J Cachexia Sarcopenia Muscle*.
2020;11:366

Sugar and Cancer



Limiting all sources of carbohydrates will not starve cancer cells.



Cancer cells find alternative fuel sources, particularly from our muscles.



Preserving muscle mass is paramount.

Information from BC Cancer Website: Oncology Nutrition - Sugar and Cancer

<http://www.bccancer.bc.ca/nutrition-site/Documents/Patient%20Education/Sugar-and-cancer.pdf>

Anti-Oxidant Supplements During Treatment

- Best to avoid anti-oxidant supplements while on cytotoxic chemotherapy as it may reduce efficacy of treatments
- Some supplements may interact with treatments and increase risk of side effects like hepatotoxicity
- Anti-oxidants in food (i.e. eating cooked mushrooms, cooking with turmeric powder or ginger root) is safe and encouraged
- It may be ok to consider some anti-oxidants supplements if patient is only taking hormone therapy (i.e. letrozole or tamoxifen) for breast cancer if the supplement does not have estrogenic properties
 - When in doubt --> ask pharmacists



Cancer Specific Key Takeaways for Diet and Exercise – for providers

- Breast cancer survivors
 - Focus most on exercise – incorporate both aerobic and strength training to improve overall outcomes, reduce symptoms, and improve function
 - Know that soy is safe and potentially beneficial for reducing risk of recurrence
 - Try to increase dietary fibre
- Colorectal survivors
 - Focus most on exercise
 - Minimize red and processed meats
 - Introduce 2 or more servings of tree nuts into their diet per week
 - Try to increase fibre by swapping refined grains for whole grains at least once per day
- Prostate cancer survivors
 - Focus most on exercise, especially brisk walking and high intensity interval training if on active surveillance
 - Eat more plant foods, including vegetables, fruits, and nuts
 - Add daily serving of lycopene rich tomatoes if they have advanced disease

Goal Setting with Your Patients on Systemic Therapy

- “I will exercise ___ minutes per day or week with weights/cycling/brisk walking while on chemotherapy”
- Why?
 - Usually patients will want to do this to improve their outcomes (i.e. cancer survival) or lose weight
 - Clarify - What will losing weight or surviving longer allow them to feel or do?
 - Orient them towards reasons that consider how they will feel or what they will be able to do
 - “...so I can feel more energy to show up for my loved ones” OR “so I can still play with my grandchildren”
 - If they cannot identify this greater purpose, ask them to consider what gives them satisfaction (what do they feel good about when they can do it) and joy (what experiences make them feel good)
 - Satisfaction: being able to walk my children to school up the big hill
 - Joy: feeling the sun on my face and smelling the ocean air when I kayak with my friends and family on the weekends

More Dietary Recommendations for Colon Cancer Patients that May Improve Outcomes

- Increase whole grains and start by replacing 1 daily serving of refined grains with whole grains
 - Patients consuming the most vs. least amounts of whole grains had 35% improvement in overall survival
 - Replacing a daily serving of refined grains with whole grains associated with 13-14% lower relative risk of recurrence, all-cause mortality, and improvement in DFS
- Consume 2 or more servings of tree nuts each week
 - Compared with non-nut consumers, those who consumed ≥ 2 servings per week of nuts had significant improvements in disease-free survival (42%) and overall survival (57%)
 - Tree nuts = almonds, walnuts, pistachios, pecan, hazelnuts, but NOT peanuts
 - Serving = 1 handful
- Target > 5 servings/day of vegetables and fruits
 - Patients consuming ≥ 5 servings/day of vegetables and fruits had 40% improvement in overall survival compared with those consuming < 5 servings/day

Blarigan et al, *JAMA Oncol.* 2018;4(6):783

Brown et al, *JNCI Cancer Spectr.* 2018;2(2):pky017

Fadelu et al, *J Clin Oncol.* 2018;36(11):1112

Specific Foods to Recommend to Prostate Cancer Patients

- Higher consumption of nuts (≥ 5 servings/week vs. < 1 serving/month) after diagnosis of prostate cancer was associated with 34% lower risk of overall mortality.
- Higher intake of dietary lycopene post-diagnosis improved prostate cancer specific mortality compared to lower intake in patients with advanced prostate cancer
 - Lycopene rich foods: tomatoes (pureed the most, then canned and fresh), watermelon, grapefruit, red peppers

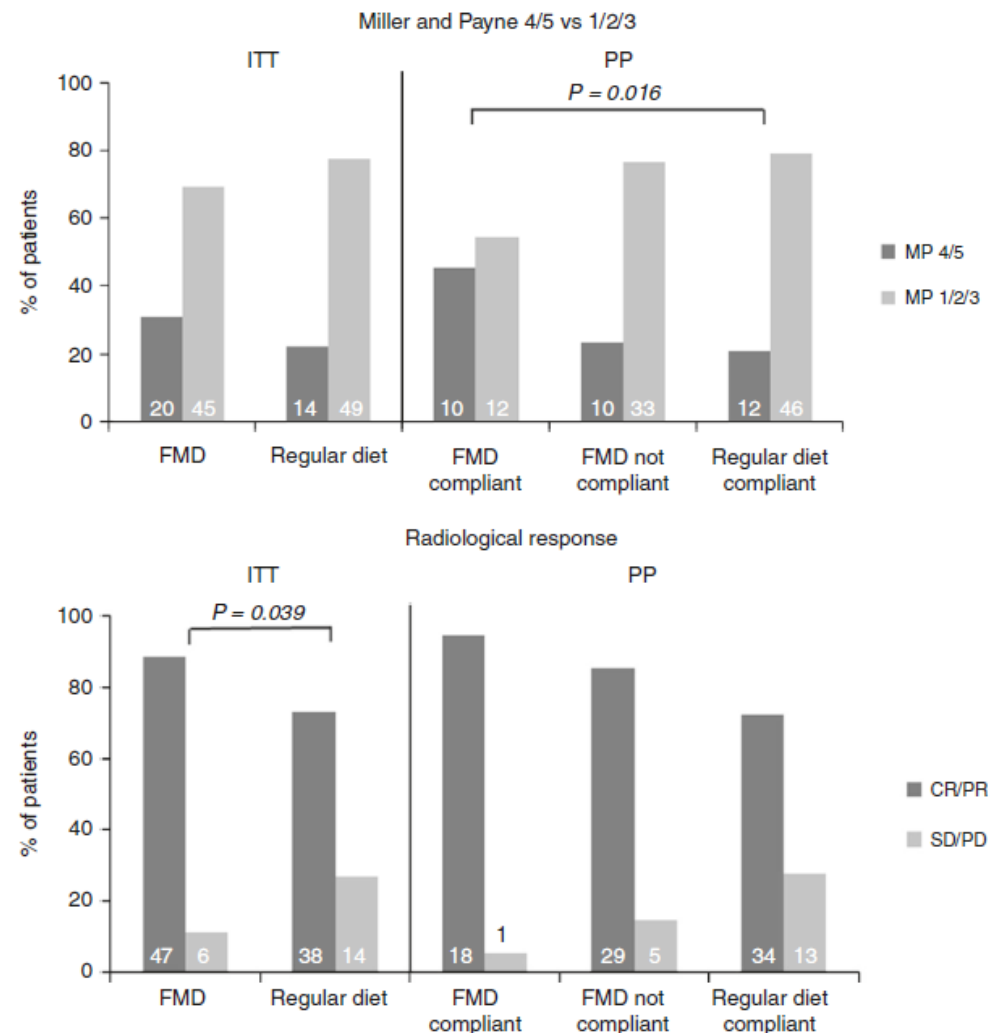
Fasting - Definitions

- Fasting – caloric restriction vs. time restricted feeding
 - Water only
 - Fasting Mimicking Diet (FMD)
 - Generally ≤ 600 total calories/day



Fasting Mimicking Diet in Breast Cancer Patients on Neoadjuvant ST

- Phase II study - 129 patients with stage II or III Her2 negative breast cancer, without T2DM, and BMI >18 receiving either 8 cycles ACT vs. 6 cycles FEC-T
- Intervention: Fasting mimicking diet (FMD) for 3 days prior to and on day of neoadjuvant chemotherapy
- Control: Regular diet
- Adherence - 34% of pts in intervention group completed at least 4 cycles with FMD
- No difference in ST toxicity between groups (including neutropenia/feb neutropenia)
- **Miller&Payne pathological response score of 4/5 was more likely to occur in pts on FMD (OR 4.1, $P = 0.016$) vs. regular diet**
- No difference in pCR rates
 - 10.8% FMD group, 12.7% control group, no sign difference



Recommendations for Fasting for Patients on Systemic Therapy

- Right now we cannot make a specific recommendation for a specific protocol of fasting (i.e. water only vs. FMD)
 - Duration and timing of fasting is variable in studies
- Although there is limited evidence of benefit with no safety concerns in trials, we can't recommend this to our patients at this time
 - In these studies pts doing fasting were under frequent medical supervision
- Limited evidence for breast cancer pts to do intermittent fasting with 13 hours between last meal in evening and first meal in morning to reduce recurrence risk (WHEL study)

Breast and Prostate Cancer and Dairy

- Mixed evidence – some studies suggest that worsens outcomes, other observational studies show no effect
- Best to recommend that if patients are consuming dairy to prioritize lower fat versions (if off of chemotherapy), higher protein versions – yogurt, kefir, cottage cheese > milk > cheese > butter
- Remind patients that there are other calcium rich foods which are not dairy-based:
 - Greens – Collard Greens, Kale, Bok Choy
 - Milk alternatives - soy milk, almond milk, oat milk
 - Tofu and Edamame
 - White beans – navy beans (i.e. in cans of “baked beans”)
 - Nuts – almonds
 - Seeds – sesame and chia seeds (1 tbsp)
 - Fruits - Oranges (highest), kiwis, figs (highest dried fruit), apricots; strawberries, bananas (lowest)
 - Fish – sardines and canned salmon
 - Protein powder – specifically whey protein protein
 - Fortified cereals and whole grains (particularly amaranth)

Post diagnosis Alcohol Consumption and Breast Cancer Outcomes

- Multiple analysis showed no association with post-diagnosis alcohol intake or high vs. low alcohol intake and overall mortality
- Limited evidence to suggest alcohol may increase recurrence risk:
 - High versus low alcohol intake was associated with increased risk of recurrence, 1.21 (95% CI, 1.06-1.39) - BUT, no distinction between pre-diagnosis of post diagnosis EtOH consumption.
 - Risk of late recurrence (>5 years after diagnosis) in pts with ER positive breast cancer for one drink per day was RR 1.28 (95% CI, 1.01-1.62) compared with non-drinkers
 - Increased risk of >0.5 drink/day versus none for breast cancer recurrence among post-menopausal women, HR 1.19 (95% CI, 1.01-1.40) but not pre-menopausal women.
- For pre-menopausal women does not appear to be strong positive association between alcohol intake and risk of recurrence

Saturated Fat and Breast Cancer

- 2021 meta-analysis
 - Saturated fat intake associated with significantly increased risk of breast cancer specific mortality
- Strategies patients can use to limit saturated fat:
 - Eat more fat from plant foods, i.e. snack on nuts at least once per week
 - Plant foods also happen to be rich in fibre and higher fibre may improve cancer outcomes.

