Nutrition Interventions in Cancer Patients

Symposium on
Integrating Food and Nutrition into Oncology Care Through Food is Medicine Interventions

September 25, 2024

Joya Chandra, PhD
Professor, Department of Pediatrics Research
University of Texas MD Anderson Cancer Center, Houston, Texas, USA

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center
Children's Cancer Hospital

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

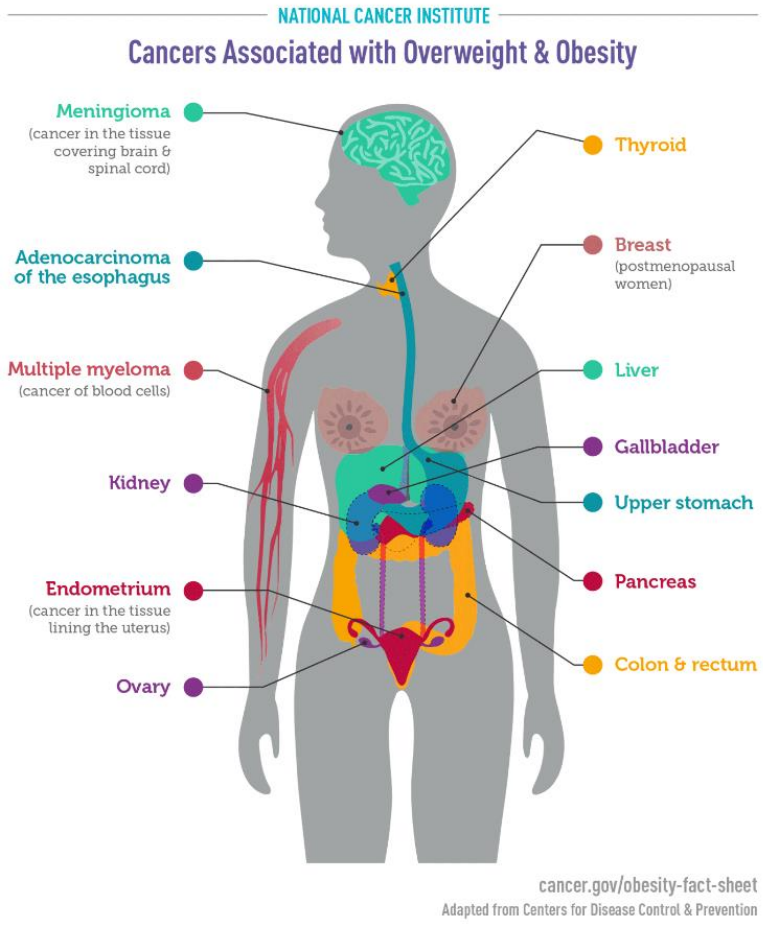
Nutrition Interventions in Cancer Patients

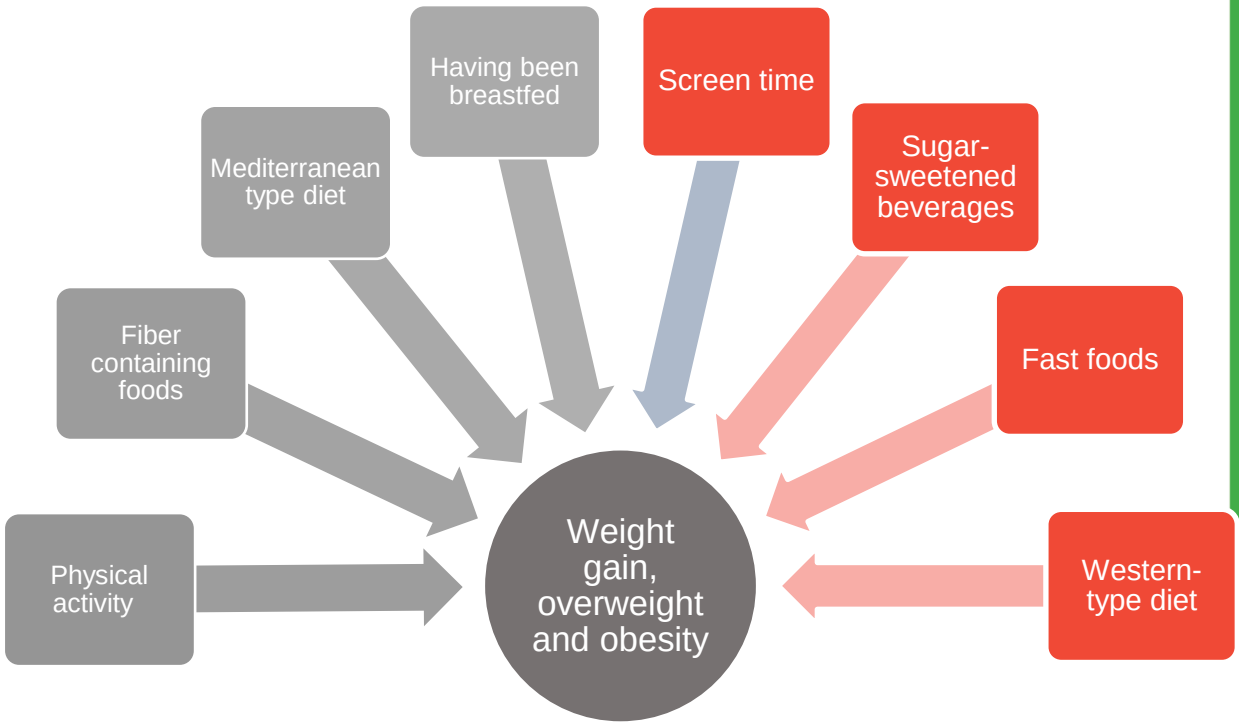
who what when how

- Who will benefit and how to measure benefit?
- What specific intervention should be conducted?
- When should the intervention be delivered and for how long?
- How can nutrition resources and content be disseminated?

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Who will benefit from nutrition interventions?





3rd Expert Report, American Institute of Cancer Research/World Cancer Research Fund, 2018

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Certain food types affect cancer risk independent of obesity

Exposure	Cancer site	Strength/ Direction
Red, processed meat	Colorectal	↑ ↑
Salted fish	Nasopharyngeal	↑
Aflatoxins	Liver	↑ ↑
Foods preserved by salting	Stomach	↑
Dairy products	Colorectal	↓
Whole grains, fiber containing foods	Colorectal	↓
Non-starchy vegetables or fruits	Aerodigestive cancers	↓

↑ ↑ Convincing association, increased risk
↑ Probable association, increased risk
↓ ↓ Convincing association, decreased risk
↓ Probable association, decreased risk

3rd Expert Report, American Institute of Cancer Research/World Cancer Research Fund, 2018

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Will cancer patients benefit from nutrition interventions? The obesity lens…

www.the-innovation.org

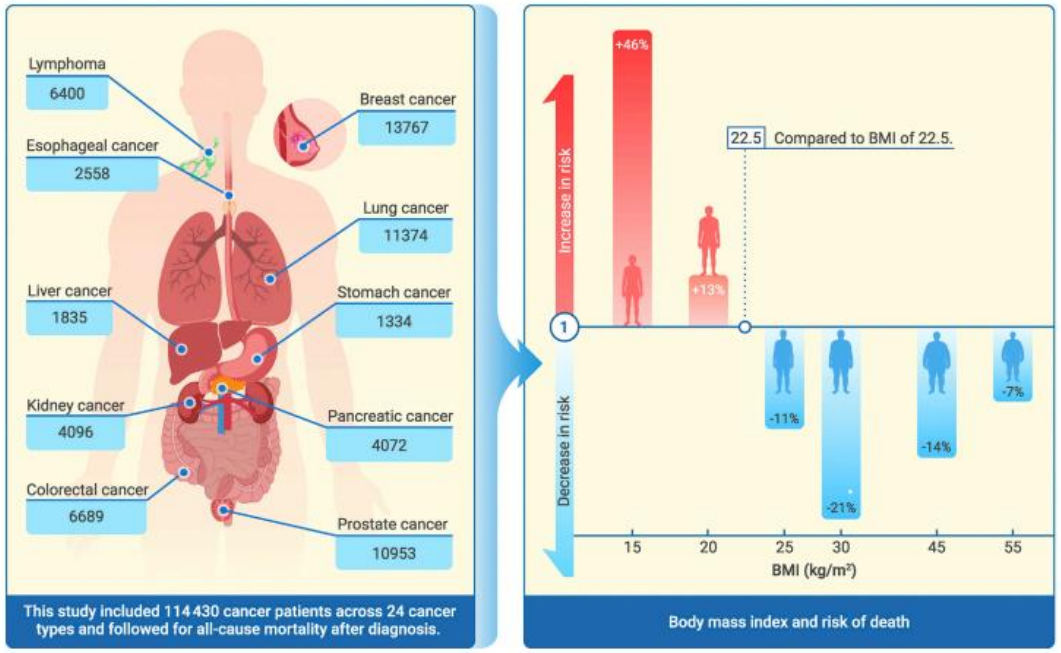
Body mass index and survival after cancer diagnosis: A pan-cancer cohort study of 114 430 patients with cancer

Huakang Tu,[1,2,3] Jennifer L. McQuade,[4] Michael A. Davies,[4] Maosheng Huang,[2] Kunlin Xie,[2,5] Yuanqing Ye,[2] Wong-Ho Chow,[2] Alma Rodriguez,[6] and Xifeng Wu[1,2,3,7,*]

*Correspondence: xifengw@zju.edu.cn

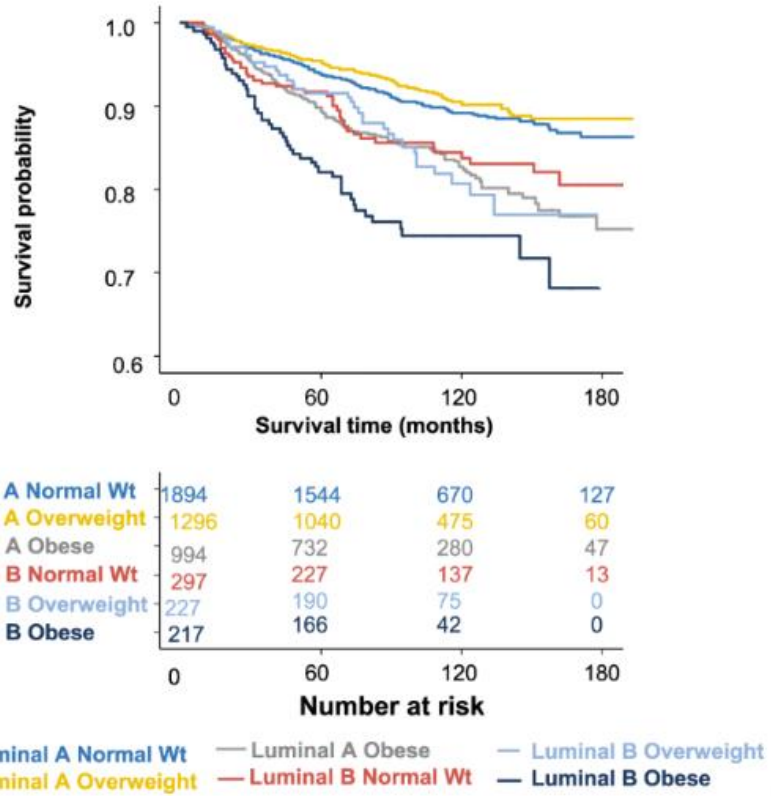
Received: May 28, 2022; Accepted: October 14, 2022; Published online: October 18, 2022; https://doi.org/10.1016/j.xinn.2022.100344

GRAPHICAL ABSTRACT



PUBLIC SUMMARY

- Excess body weight increases the risk of developing cancer in general population
- Overweight or mild obesity was associated with better survival in cancer patients
- It may be harmful for overweight or mildly obese cancer patients to lose weight



Blair, C.K., Wiggins, C.L., Nibbe, A.M. *et al.* Obesity and survival among a cohort of breast cancer patients is partially mediated by tumor characteristics. *npj Breast Cancer* **5**, 33 (2019).

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Who will benefit from nutrition interventions? Role of diet quality in cancer outcomes and survivorship

OXFORD

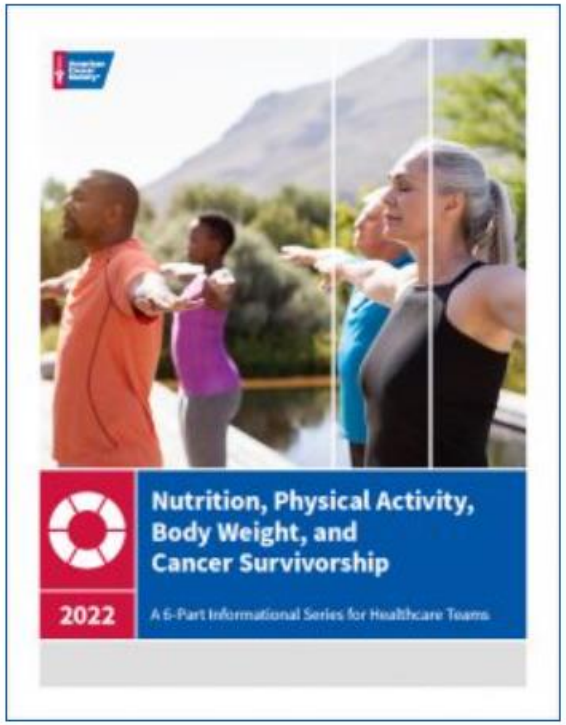
JNCI J Natl Cancer Inst (2018) 0(0): pky022

doi: 10.1093/jncics/pky022
Brief Communication

BRIEF COMMUNICATION

The Association Between Dietary Quality and Overall and Cancer-Specific Mortality Among Cancer Survivors, NHANES III

Ashish A. Deshmukh, Shervin M. Shirvani, Anna Likhacheva, Jagpreet Chhatwal, Elizabeth Y. Chiao, Kalyani Sonawane

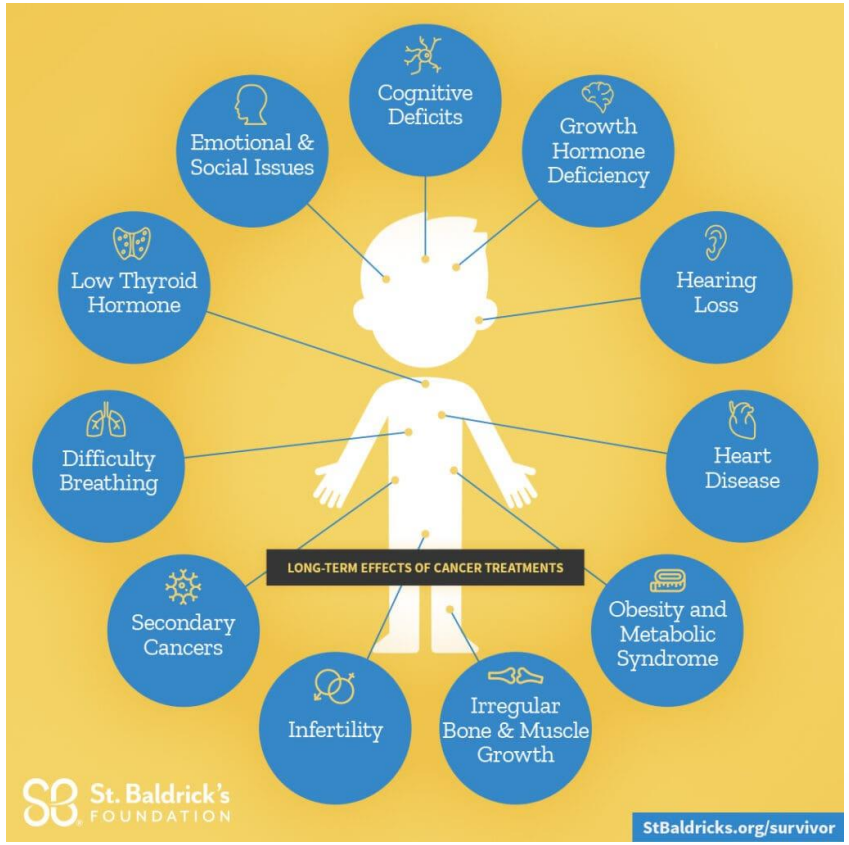


High quality diet as measured by healthy eating index associated with decreased risk of cancer specific mortality.

- Grouping of HEI scores
- Diet assessment method

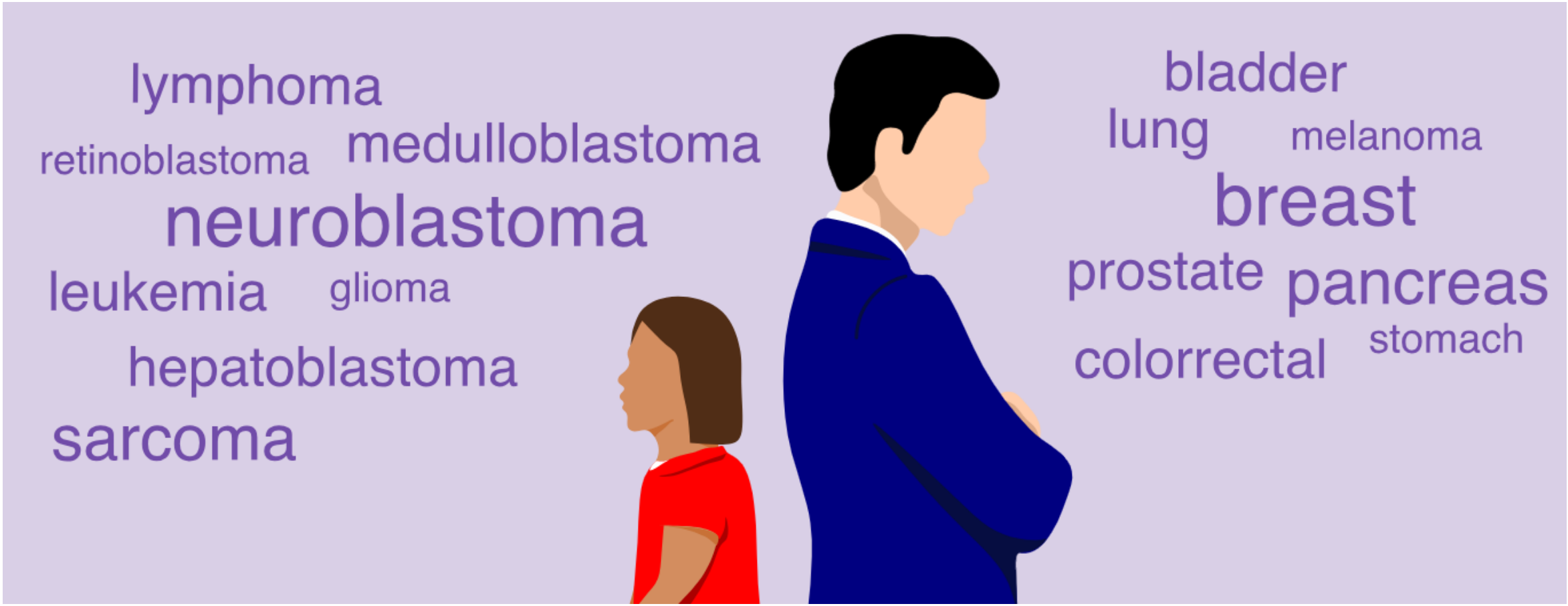
WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Who will benefit from nutrition interventions? Role of diet quality in cancer outcomes and survivorship



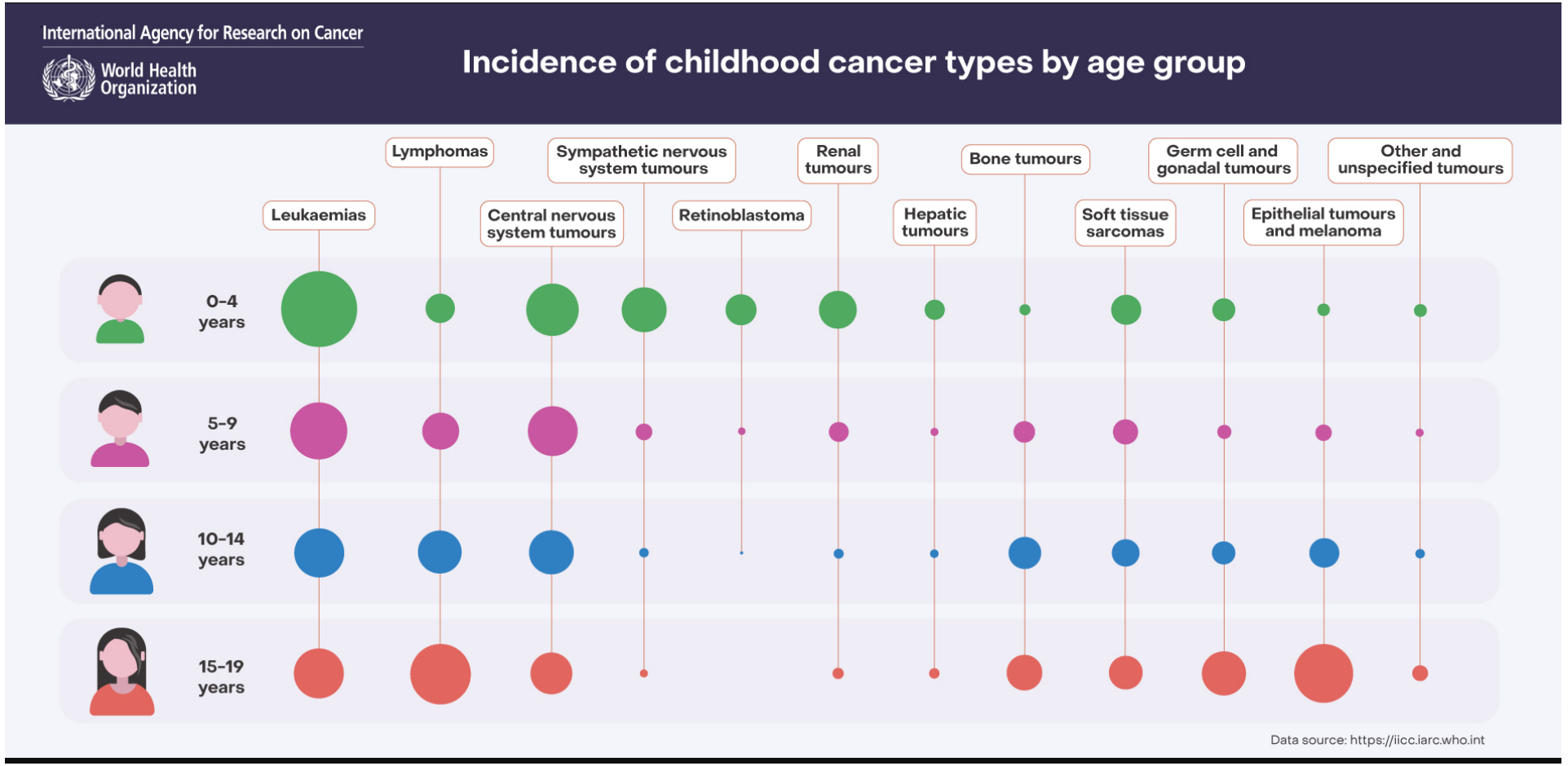
Will cancer patients benefit from nutrition interventions?

Pediatric versus adult cancer diagnoses and consequent survivorship issues are distinct



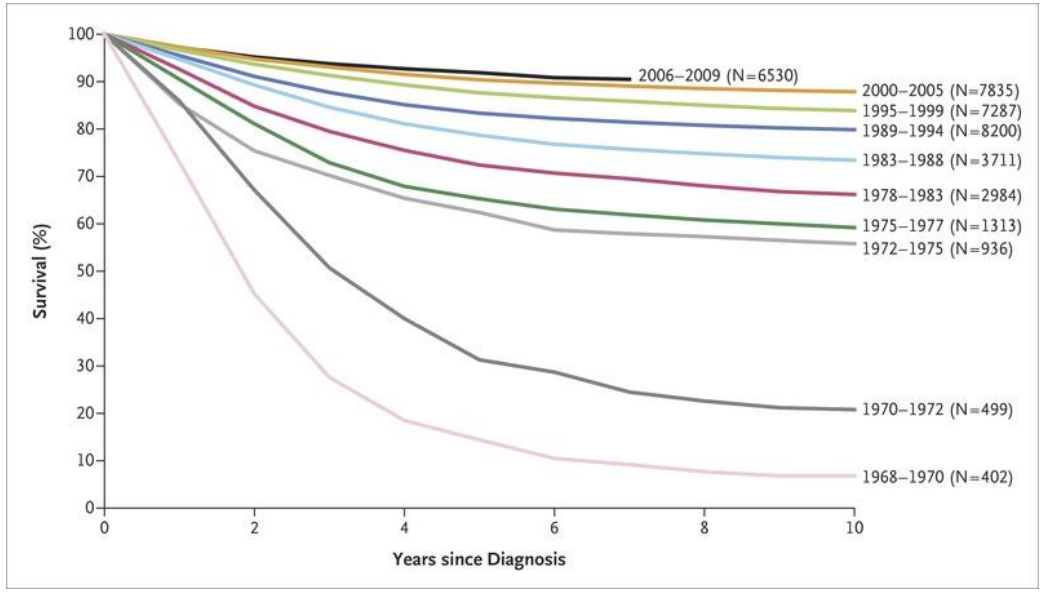
https://vagabondnetwork.com/blog/pediatric-vs-adult-cancers-why-are-children-not-just-small-adults/

Impact of diagnosis and age in pediatric cancer patients and potential for benefit from nutrition interventions

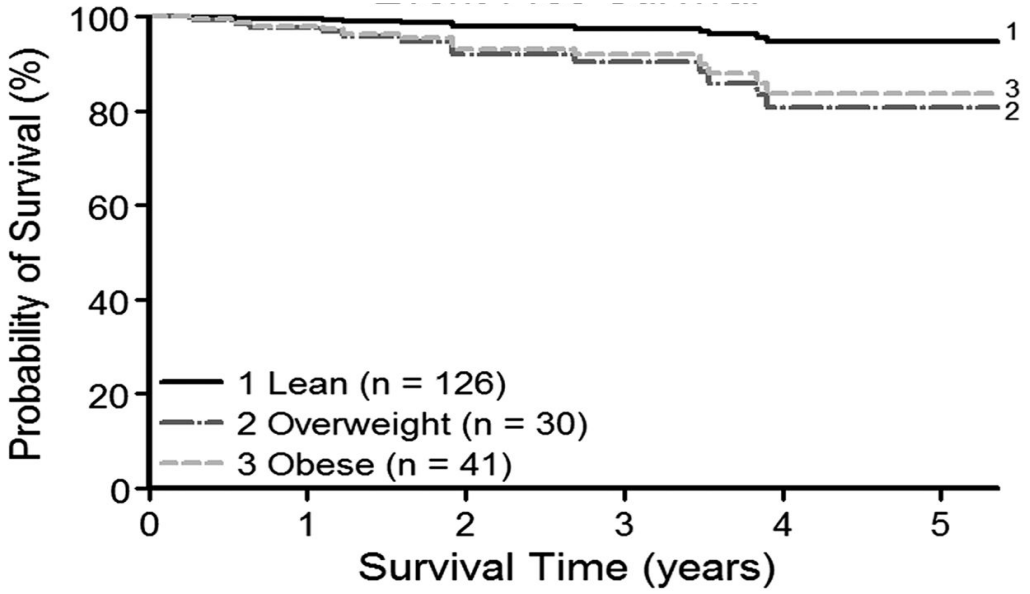


WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Pediatric acute leukemia patient outcomes and weight status



Hunger & Mulligan. NEJM 2015

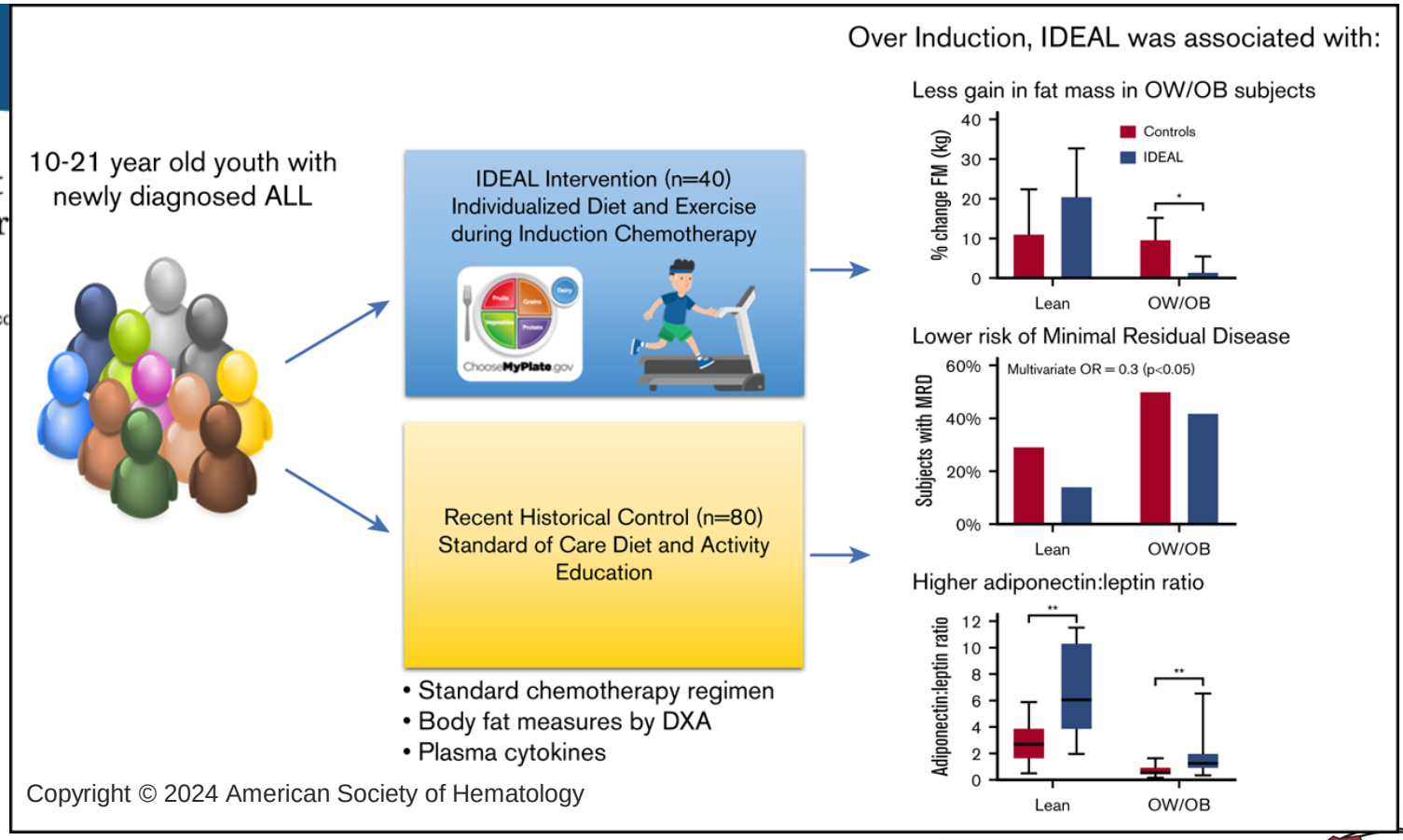


Orgel….Mittelman. Blood 2017

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

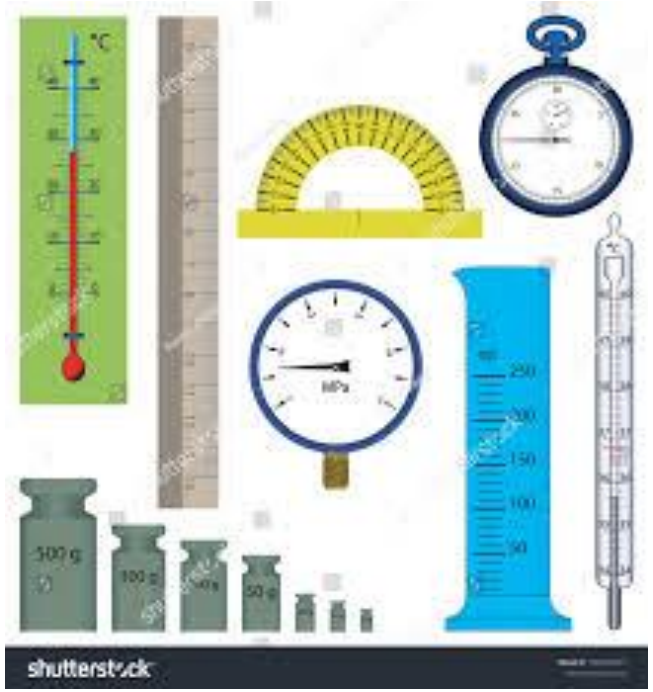
Who will benefit from nutrition interventions?

- Phase II Trial Underway in Acute Lymphocytic Leukemia by TACL (Therapeutic Advances in Childhood Leukemia and Lymphoma) Consortium



WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

How to measure who will benefit from and outcomes of nutrition interventions?



Diet Quality

Food Insecurity

Malnutrition Risk

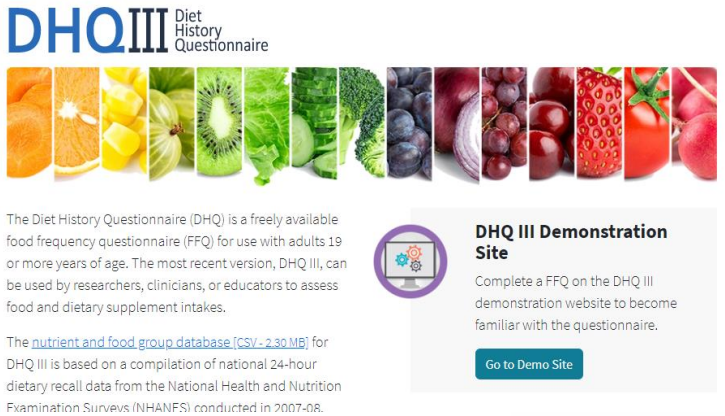
WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Instruments for diet assessment

Diet Recall and Food Frequency

NIH NATIONAL CANCER INSTITUTE

Automated Self-Administered 24-Hour Dietary Assessment Tool



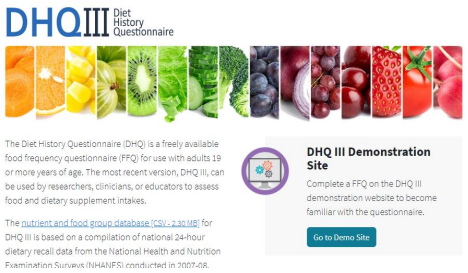
https://epi.grants.cancer.gov/asa24/

WCE WORLD CONGRESS OF EPIDEMIOLOGY 2024

How to identify who will benefit from nutrition interventions?

NATIONAL CANCER INSTITUTE
Automated Self-Administered
24-Hour Dietary Assessment Tool

Multiple day dietary recalls (3 nonconsecutive days)



Food frequency questionairre

Scoring systems

Further Analysis

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Scoring and further analysis of diet data

USDA National Agricultural Library
U.S. DEPARTMENT OF AGRICULTURE

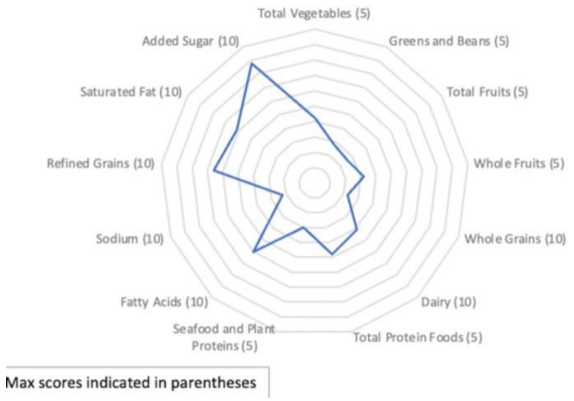
UNIVERSITY OF MINNESOTA
NDSR
NUTRITION DATA SYSTEM FOR RESEARCH

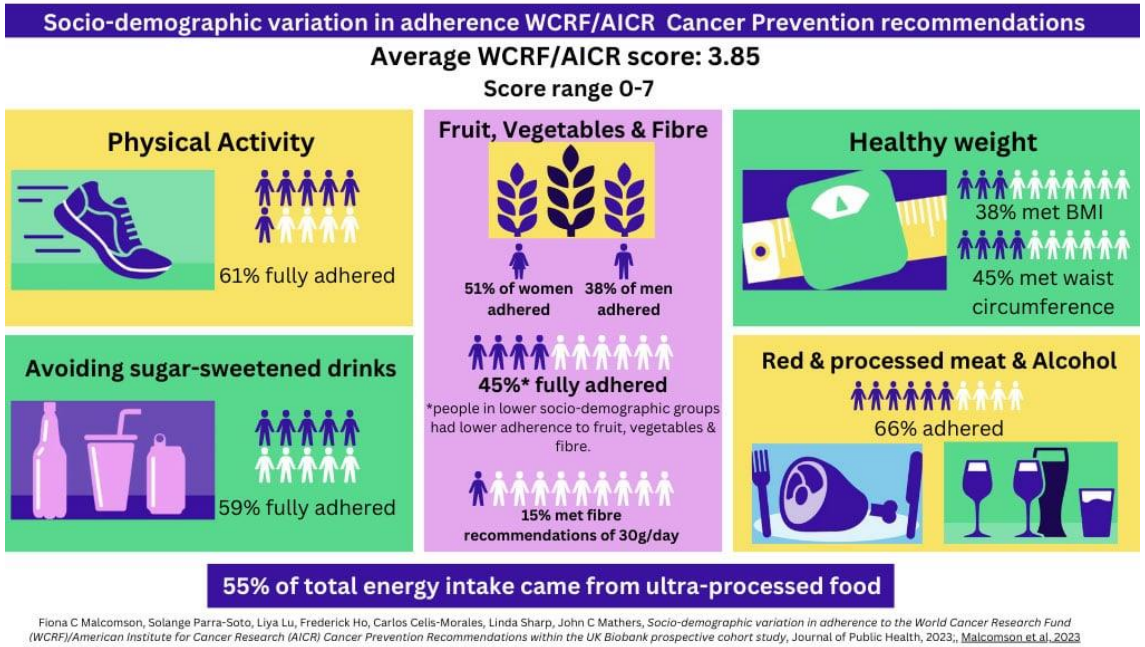
NDSR is a Windows-based dietary analysis program designed for the collection and analyses of 24-hour dietary recalls, food records, menus, and recipes.

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Scoring and further analysis of diet

https://epi.grants.cancer.gov/hei/





Fiona C Malcomson, Solange Parra-Soto, Liya Lu, Frederick Ho, Carlos Celis-Morales, Linda Sharp, John C Mathers, *Socio-demographic variation in adherence to the World Cancer Research Fund (WCRF)/American Institute for Cancer Research (AICR) Cancer Prevention Recommendations within the UK Biobank prospective cohort study*, Journal of Public Health, 2023;, Malcomson et al. 2023

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Scoring the diet of pediatric cancer survivors

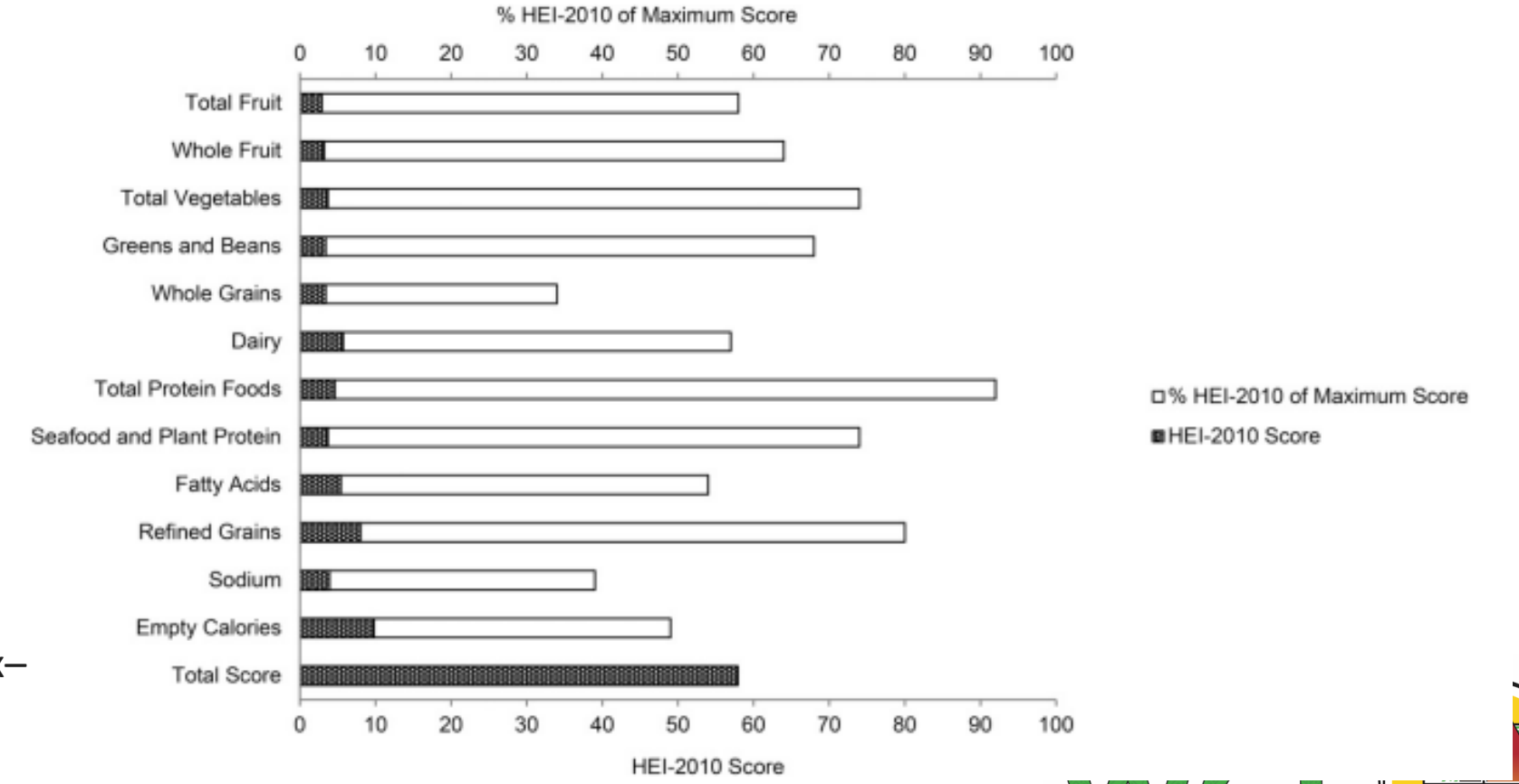
The Journal of Nutrition
Nutrition and Disease

Adult Survivors of Chil
Adherence to Dietary C

Fang Fang Zhang,[5,6*] Rohit P Ojha,[7] Kevin R Kru
Wassim Chemaitilly,[8] Leslie L Robison,[7] and Melis

[5]Friedman School of Nutrition Science and Policy and [6]Jean May
Boston, MA; and Departments of [7]Epidemiology and Cancer Co
Hospital, Memphis, TN

- 2570 adult survivors of childhood cancer (mean age = 32.3 y)
- Diet assessment by food-frequency questionnaire
- Diet quality calculated using Healthy Eating Index–2010 (HEI-2010)



Limitations of dietary assessment methods

•Accuracy: multiple non-consecutive 24-hour recall is considered the most accurate method for assessing food and nutrient intake.
•Participant burden: diet records, can be burdensome for participants. For example, weighing all food items can lead to changes in eating habits.
•Reactivity: methods can cause reactivity, or changes in behavior due to the instrument.
•Cost: methods can be expensive, especially in the early stages of research.

•Image-assisted methods: require clear images and reference materials to determine serving sizes.
•Wearable cameras: can improve portion size accuracy
•Sensors: chewing and hand motions indicating eating can be measured
•Biomarker based nutrition measures: sample collection and assessment is expensive
•Microbiome analyses:

Food insecurity

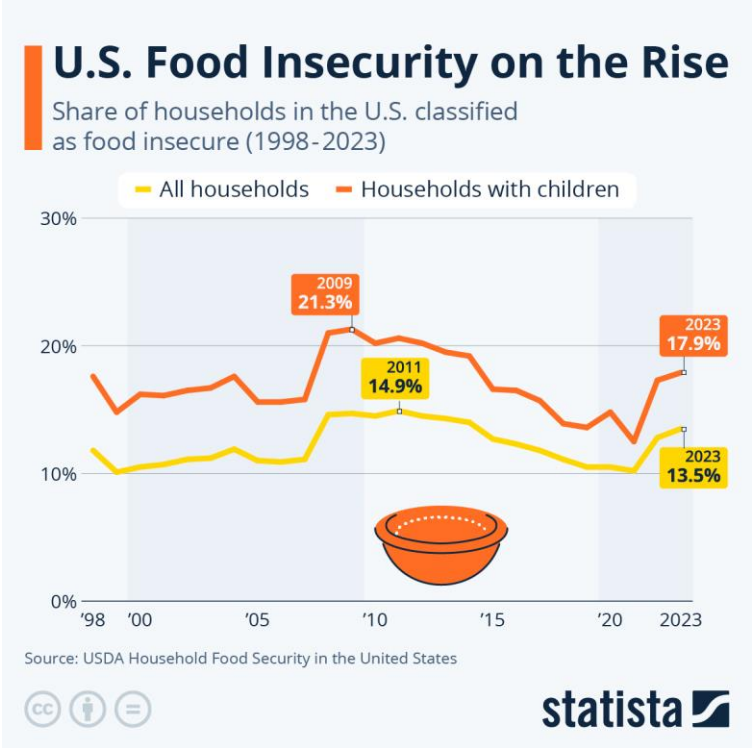
Food insecurity is a household's limited or uncertain access to enough food to meet the needs of all its members. It can be caused by a lack of money or other resources for food.

The United States Department of Agriculture (USDA) divides food insecurity into the following 2 categories:[1]

•Low food security: "Reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake."

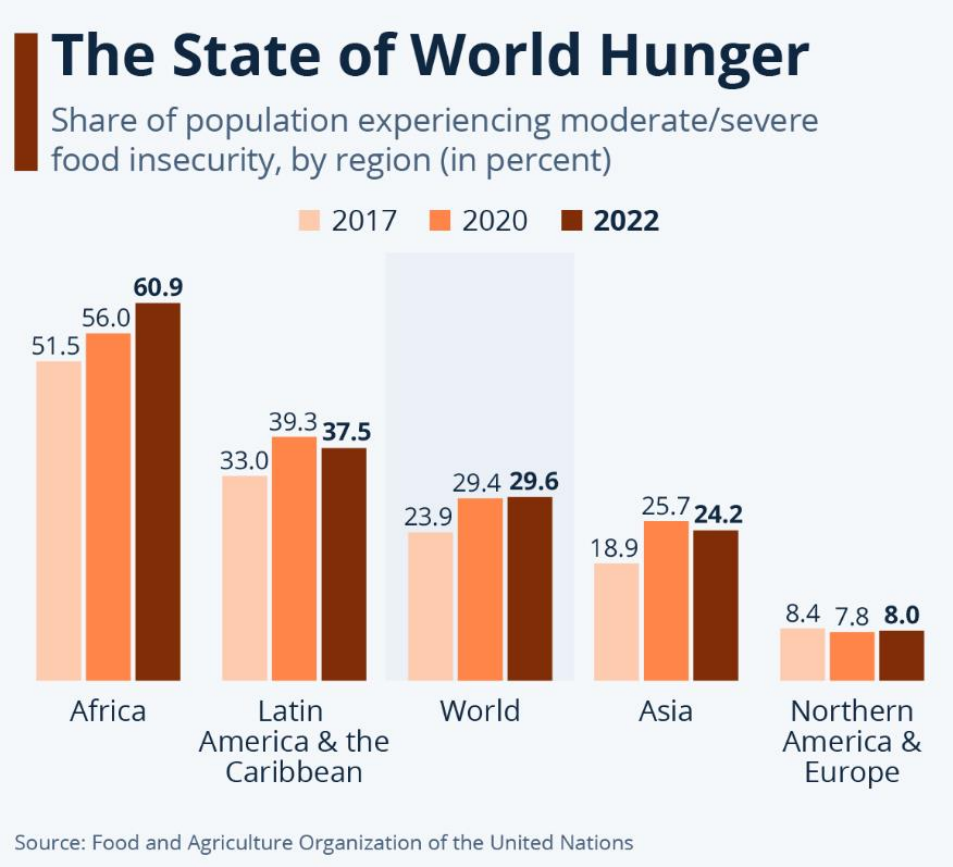
•Very low food security: "Reports of multiple indications of disrupted eating patterns and reduced food intake."

https://health.gov/healthypeople/priority-areas/social-determinants-health/literature-summaries/food-insecurity



WORLD CONGRESS OF EPIDEMIOLOGY 2024

Food insecurity



https://www.statista.com/chart/27885/change-in-share-experiencing-food-insecurity-by-world-region/

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Screening for Food insecurity

An example of the Hunger Vital Sign screening tool:

1. Within the past 12 months, we worried whether our food would run out before we got money to buy more.

- Often True
- Sometimes True
- Never True
- Don't know/Refused

At Risk

2. Within the past 12 months, the food we bought just didn't last, and we didn't have money to get more.

- Often True
- Sometimes True
- Never True
- Don't know/Refused

At Risk

OXFORD

JNCI J Natl Cancer Inst (2022) 114(12): djac135

https://doi.org/10.1093/jnci/djac135
First published online September 21, 2022
Commentary

Food Insecurity Among People With Cancer: Nutritional Needs as an Essential Component of Care

Margaret Raber, DrPH,[1,*] Ann Jackson, PT, DPT, MPH,[2] Karen Basen-Engquist, PhD, MPH,[3] Cathy Bradley, PhD,[4,5] Shonta Chambers, MSW,[6] Francesca M. Gany, MD, MS,[7] Chanita Hughes Halbert, PhD,[8] Stacy Tessler Lindau, MD, MA,[9] Rafael Pérez-Escamilla, PhD,[10] Hilary Seligman, MD, MAS[11,12,13]

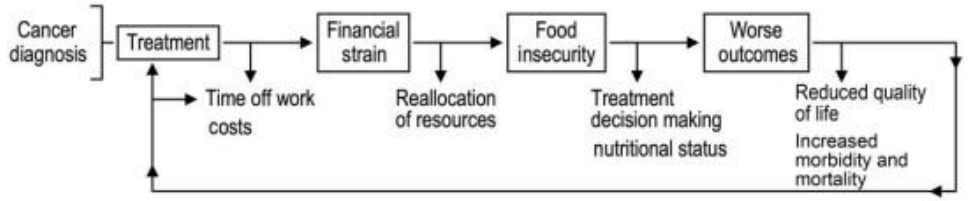


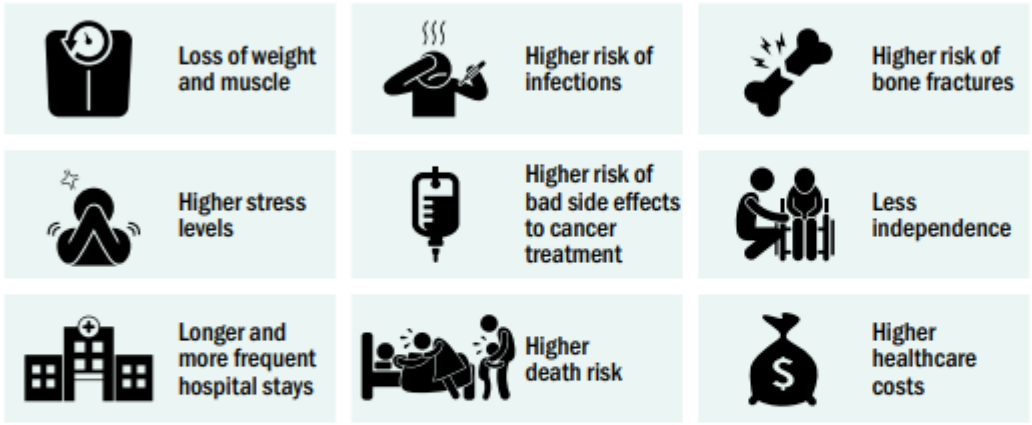
Figure 1. Food insecurity in cancer. Scheme outlining food insecurity in cancer and up- and downstream factors. This general illustration of the process occurs in a broader socio-environmental context that includes psychosocial factors, access to health care, comorbidities, and other factors.

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Malnutrition and Cancer Outcomes

WHY IT MATTERS

Malnutrition is a serious issue that can have dangerous consequences on your well-being. The effects of malnutrition in cancer patients include:



Cancer patients are at a higher risk of malnutrition. In fact, the rate of malnutrition among cancer patients is reported up to 80%.[1]

Malnutrition is most common among patients with gastrointestinal tract, head and neck, and liver and lung cancers.

It is also more common among those of older age and those with cancer at more advanced stages.

Continued...

[1] Trujillo EB et al. Closing the gap in nutrition care at outpatient cancer centers: ongoing initiatives of the Oncology Nutrition Dietetic Practice Group. *J Acad Nutr Diet*, 2018; 118(4); 749-760

aspen | LEADING THE SCIENCE AND PRACTICE OF CLINICAL NUTRITION
American Society for Parenteral and Enteral Nutrition

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Malnutrition Screening

Malnutrition Screening Tool (MST)

STEP 1: Screen with the MST

1. Have you recently lost weight without trying?

No	0
Unsure	2

If yes, how much weight have you lost?

2-13 lb	1
14-23 lb	2
24-33 lb	3
34 lb or more	4
Unsure	2

Weight loss score:

2. Have you been eating poorly because of a decreased appetite?

No	0
Yes	1

Appetite score:

Add weight loss and appetite scores

MST SCORE:

STEP 2: Score to determine risk

MST = 0 OR 1
NOT AT RISK
Eating well with little or no weight loss

MST = 2 OR MORE
AT RISK
Eating poorly and/or recent weight loss

Abbott Nutrition

Malnutrition Universal Screening Tool ('MUST')

BMI SCORE

BMI	SCORE
> 20	0
18.5 - 20	1
< 18.5	2

WEIGHT LOSS SCORE
(Unexplained weight loss in past 3 - 6 months)

Weight loss	SCORE
< 5 %	0
5 - 10 %	1
> 10 %	2

ACUTE DISEASE EFFECT SCORE

If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days.

Score 2

www.openmed.co.in

Add all Scores

SCORE = 0	SCORE = 1	SCORE ≥ 2
LOW RISK	MEDIUM RISK	HIGH RISK

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Malnutrition Screening for Pediatric Cancer Patients

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Original article

Evaluation of the nutrition screening tool for childhood cancer (SCAN)

Alexia J. Murphy [a, *], Melinda White [b], Karina Viani [c], Terezie T. Mosby [d]

[a] Children's Nutrition Research Centre, Queensland Children's Medical Research Institute, The University of Queensland, Brisbane, Australia
[b] Department of Nutrition and Dietetics, Royal Children's Hospital, Brisbane, Australia
[c] Hematology-Oncology Department and Hematopoietic Stem Cell Transplant Unit, Institute for Treatment of Childhood Cancer – Hematology-Oncology Department of Instituto da Criança, Hospital das Clínicas, University of Sao Paulo's Medical School, São Paulo, Brazil
[d] Food, Nutrition & Dietetics, Didactic Program in Dietetics, Tennessee Technological University College of Agriculture and Human Ecology, Cookeville, TN, USA

Nutrition screening tool for childhood cancer (SCAN)

Does the patient have a high risk cancer ?	1
Is the patient currently undergoing intensive treatment?	1
Does the patient have any symptoms relating to the GI tract?	2
Has the patient had poor intake over the past week?	2
Has the patient had any weight loss over the past month?	2
Does the patient show signs of under nutrition?	2
Total	

Score indication

≥3 At risk of malnutrition – Refer to dietician for further assessment

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

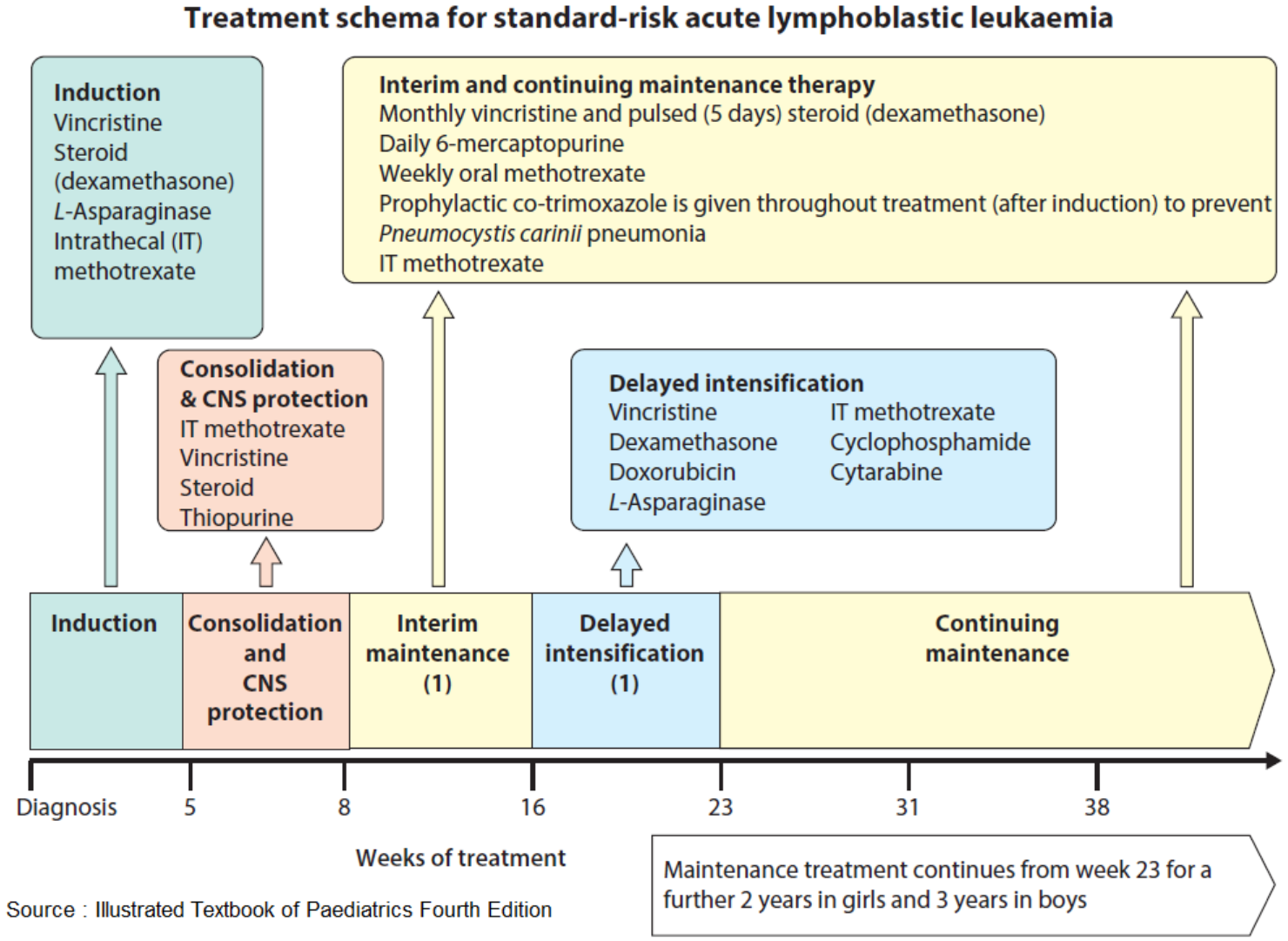
Nutrition Interventions in Cancer Patients

who what when how

- Who will benefit and how to measure benefit?
- What specific intervention should be conducted?
- When should the intervention be delivered and for how long?
- How can nutrition resources and content be disseminated?

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Pediatric acute lymphocytic leukemia regimens



Source : Illustrated Textbook of Paediatrics Fourth Edition

Diet Quality in Pediatric Acute Lymphocytic Leukemia

Clinical Nutrition 38 (2019) 2866–2874

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Original article

Fluctuations in dietary intake during treatment for childhood leukemia: A report from the DALLT cohort

Elena J. Ladas [a, b, c, *], Manuela Orjuela [a, c], Kristen Stevenson [d], Peter D. Cole [e, o], Meiko Lin [f], Uma H. Athale [g], Luis A. Clavell [h], Jean-Marie Leclerc [i], Caroline Laverdiere [i], Bruno Michon [j], Marshall A. Schorin [k], Jennifer Greene Welch [l], Barbara L. Asselin [m], Stephen E. Sallan [d], Lewis B. Silverman [d], Kara M. Kelly [n]

original reports

Protective Effects of Dietary Intake of Antioxidants and Treatment-Related Toxicity in Childhood Leukemia: A Report From the DALLT Cohort

Elena J. Ladas, PhD, RD[1,2,3]; Traci M. Blonquist, MS[4]; Maneka Puligandla, MS[4]; Manuela Orjuela, MD, ScM[1,3]; Kristen Stevenson, MS[4]; Peter D. Cole, MD[5]; Uma H. Athale, MD[6]; Luis A. Clavell, MD[7]; Jean-Marie Leclerc, MD[8]; Caroline Laverdiere, MD[9]; Bruno Michon, MD[9]; Marshall A. Schorin, MD[10]; Jennifer Greene Welch, MD[11]; Barbara L. Asselin, MD[12]; Stephen E. Sallan, MD[4]; Lewis B. Silverman, MD[4]; and Kara M. Kelly, MD[13]

- Diet and Acute Lymphoblastic Leukemia Treatment (DALLT) cohort
- Prospectively collected dietary intake in 640 pediatric ALL patients

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

What specific intervention should be conducted?

When should the intervention be delivered and for how long?

Co-clinical trials – challenges and caveats

What mouse model should be used?

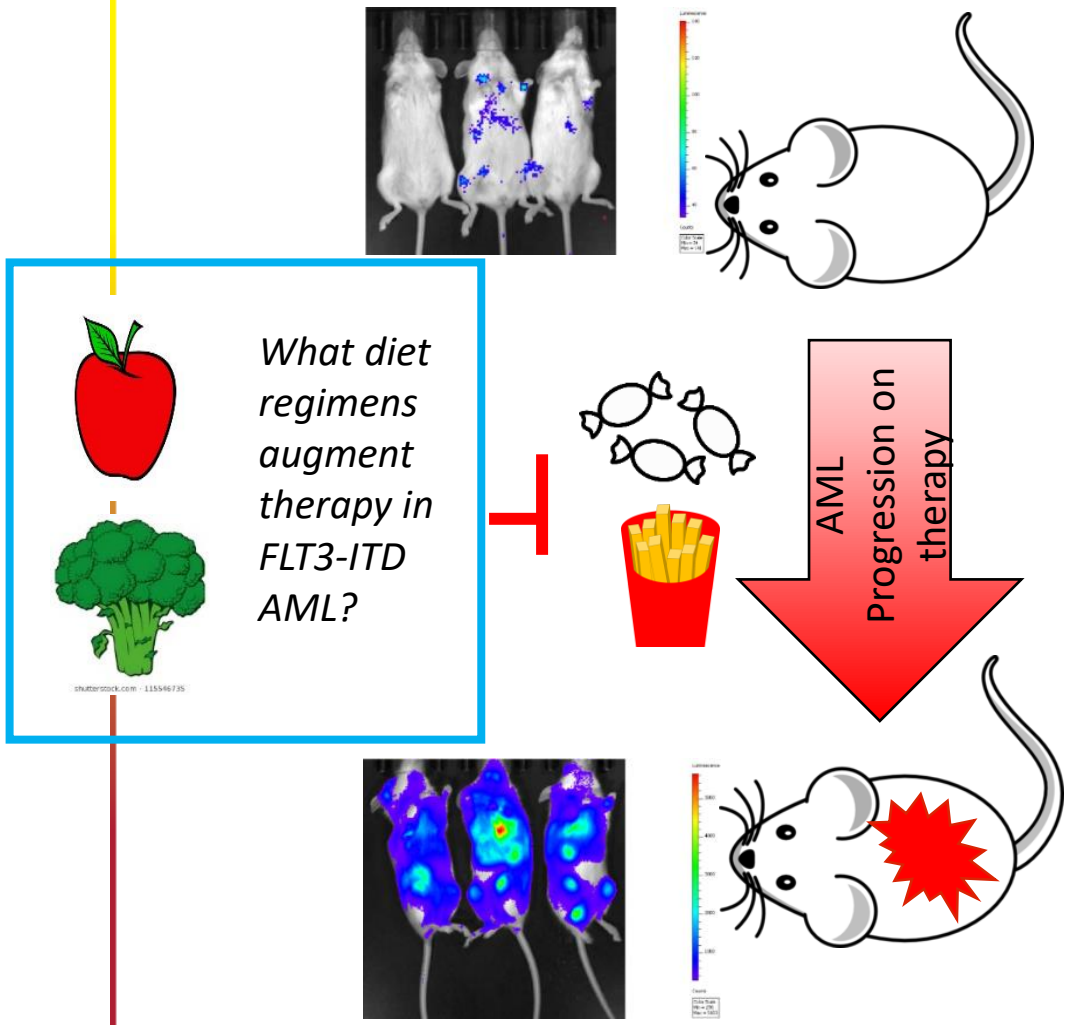
Is the diet regimen relevant to human diets?

What patient subset and age range should be studied?

How can the diet be delivered in a manner which accommodates symptoms and preferences?

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

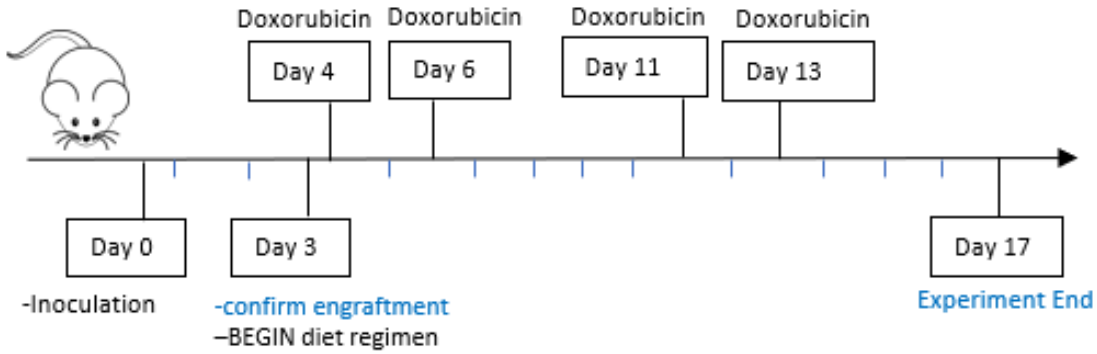
Modeling healthy diets in FLT3 mutant acute myeloid leukemia

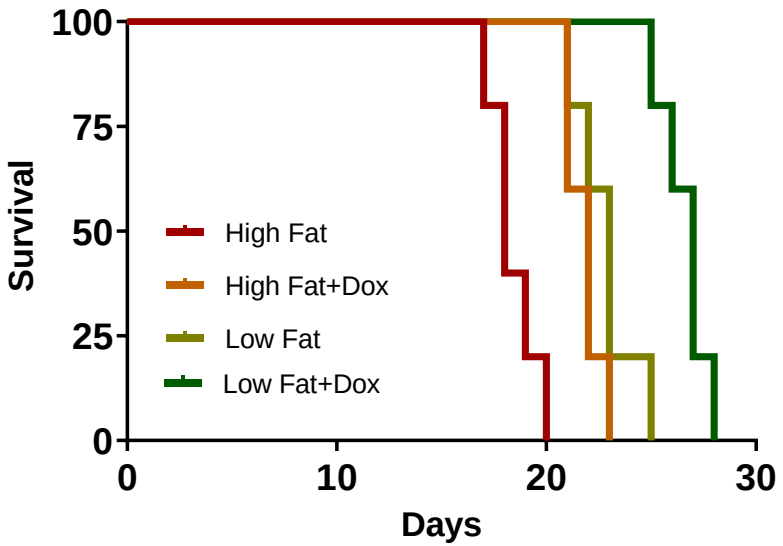


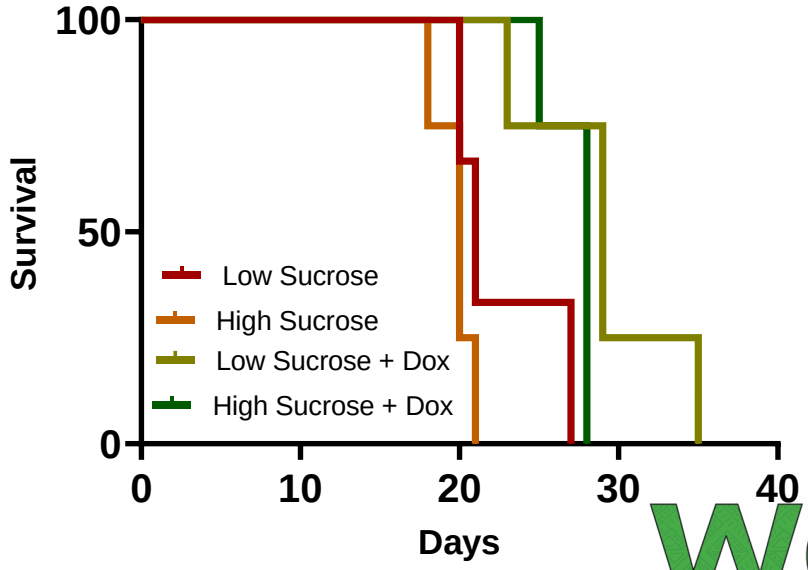
Diet description	Research Diets Cat #	Fat (kcal%)	Sucrose (kcal%)
Low fat/low sugar	D12492	30	10
Low sucrose	N/A	19	0
High sucrose	N/A	19	45% sucrose added to drinking water
Low fat	D12450H	10	0
High fat	D12451	45	0

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Low fat or low sucrose diet in combination with anthracycline in FLT3 mutant acute myeloid leukemia bearing mice

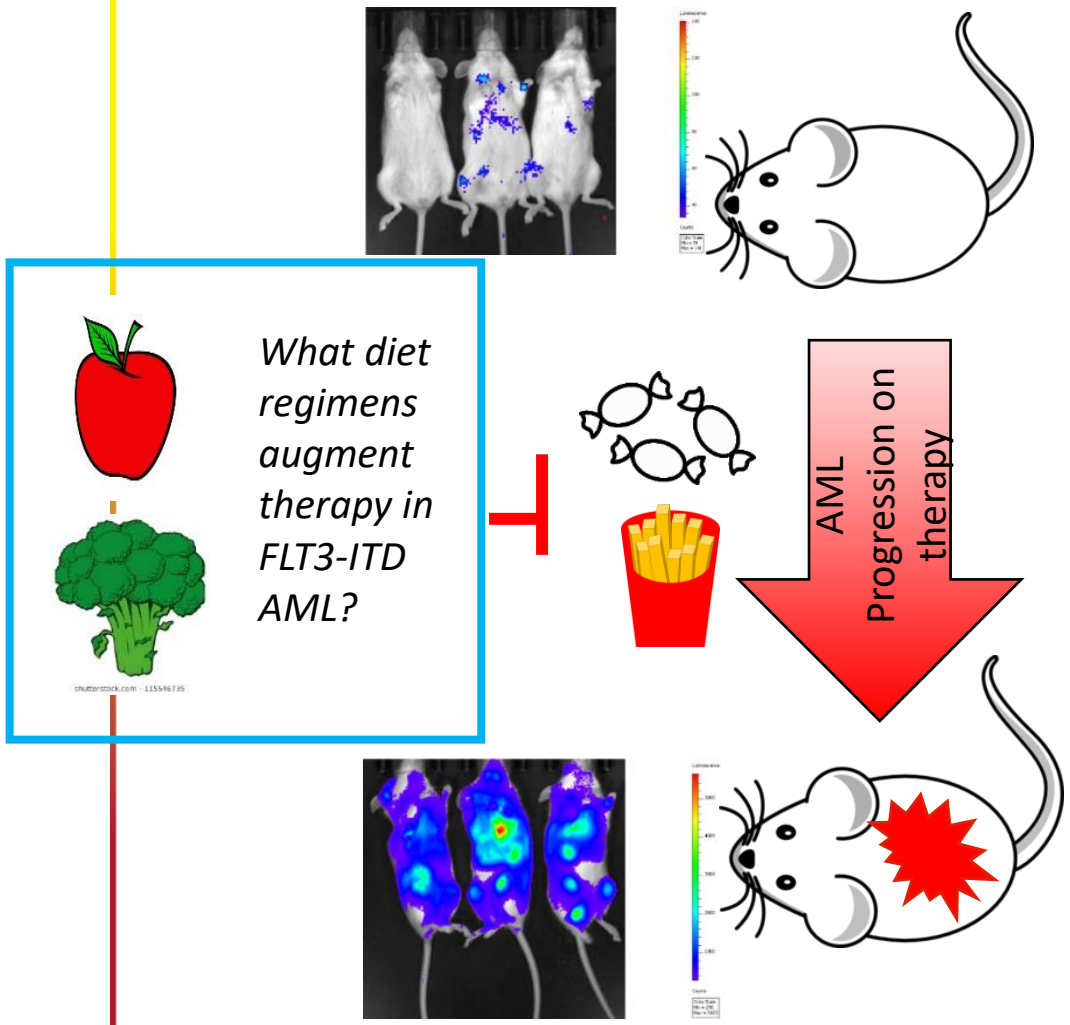






WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

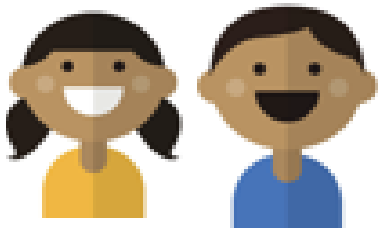
Modeling healthy diets in FLT3 mutant acute myeloid leukemia



Diet description	Research Diets Cat #	Fat (kcal%)	Sucrose (kcal%)
Low fat/low sugar	D12492	30	10
Low sucrose	N/A	19	0
High sucrose	N/A	19	45% sucrose added to drinking water
Low fat	D12450H	10	0
High fat	D12451	45	0

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Feasibility of healthy diets in FLT3 mutant acute myeloid leukemia



Tasting 1: Low Sucrose

Low sugar
≤10% Sucrose
≤35% Fat

Low Fat
≤25% Fat
≤30% Sucrose

Tasting 2: Low Fat

Observations & Qualitative Feedback

Low Sucrose						
Meal	Recipe	Kcals	Total Fat %	Total fat, g	Sucrose %	Sucrose, g
Breakfast	Cheddar Sausage Breakfast Bite	130	17%	2.47		
Lunch	Muffin-tin Pizza	183	35.00%	7.3	0%	0.27
Dinner	White bean-potato soup	230	32.20%	8.4	0%	0.4
Snack 1	Baked oatmeal snack bars	133	34.40%	5.3	0%	0.2
Snack 2	Mini black bean burrito	287	26.60%	8.7	1%	0.9

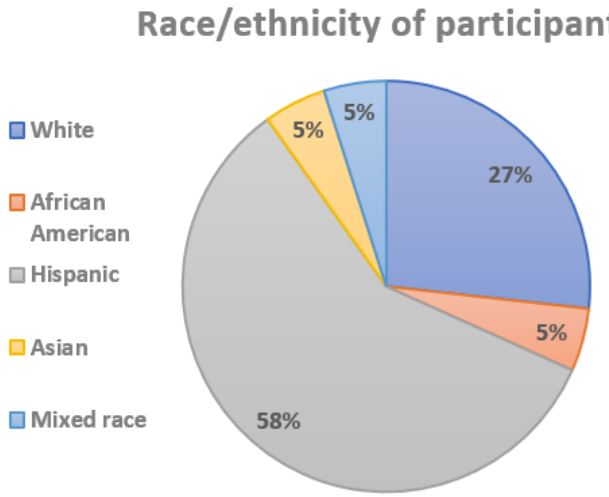
Low Fat (≤25% Fat; ≤30% Sucrose)					
Meal	Recipe	Kcals	Total Fat %	Total fat, g	Sucrose %
Breakfast	WW-buttermilk pancakes with fruit compote	244	18.80%	5.2	14.60%
Lunch	Southwest Chicken Chili	367	12.90%	5.3	2.50%
Dinner	Baked Rotini	353	23.90%	9.6	0.00%
Snack 1	Black bean brownies	104	24.50%	2.9	30.00%
Snack 2	Pineapple Coconut Frozen Yogurt Pop	99	11%	1.09	

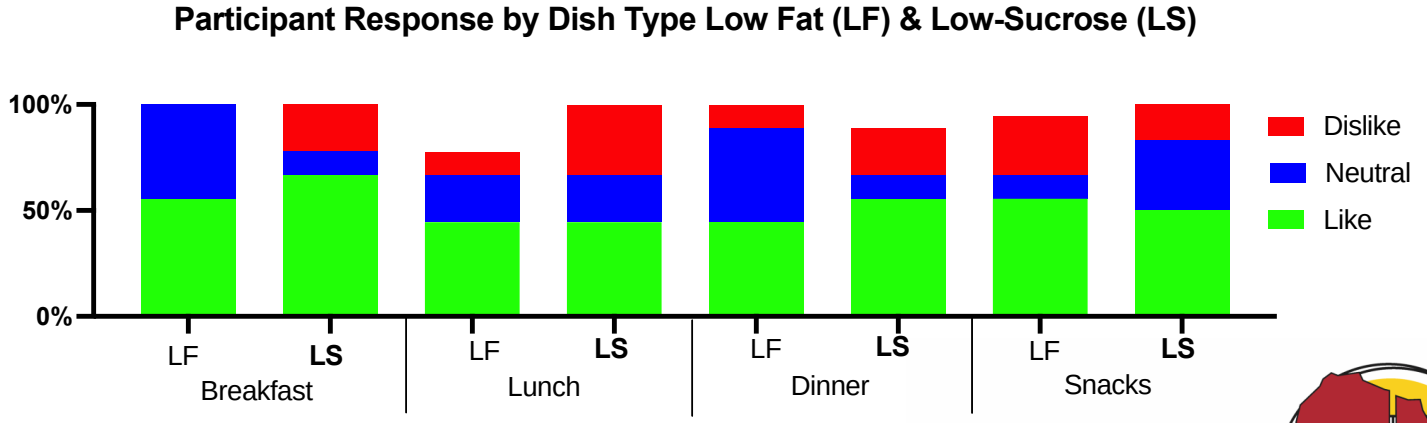
- Foods prepared by Bionutrition Research Core at MD Anderson

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Feasibility of healthy diets in FLT3 mutant acute myeloid leukemia

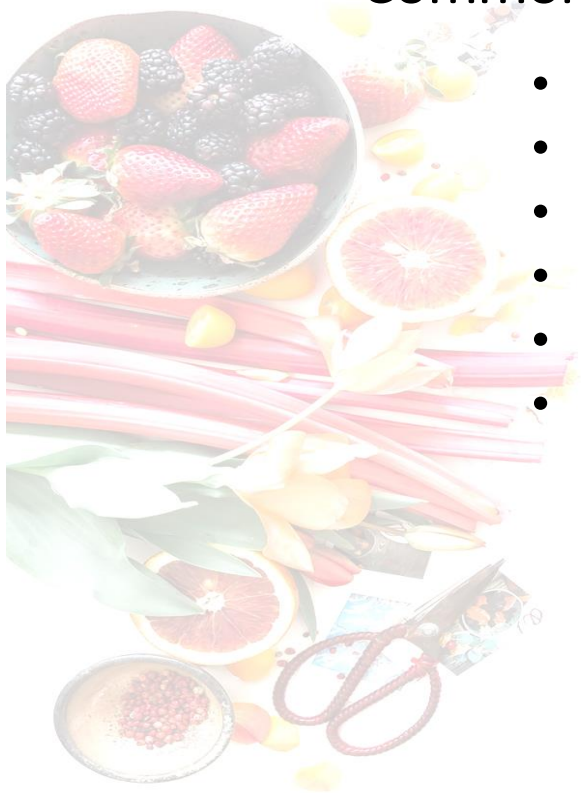
Characteristic	Total
Total	12
Gender, n (%)	
Male	7 (58%)
Female	5 (42%)
Age at consent (years), n (%)	
7-12	11 (92%)
13-18	1 (8%)
Race/ethnicity, n (%)	
White	4 (33%)
African American	2 (17%)
Hispanic	5 (42%)
Middle Eastern	1 (8%)
Asian	0 (0%)
Diagnosis, n (%)	
Standard-risk pre-B ALL	9 (75%)
High-risk pre-B ALL	1 (8%)
Relapse ALL	0 (0%)
T-cell ALL	2 (17%)
Hodgkin's Lymphoma	0 (0%)
Non-Hodgkin's Lymphoma	0 (0%)
BMI classification at consent, n (%)	
Underweight (<5th percentile)	2 (17%)
Normal (5th to <85th percentile)	4 (33%)
Overweight (85th to <95th percentile)	2 (17%)
Obese (>95th percentile)	4 (33%)





WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Qualitative Data from Pediatric Leukemia Patients and Parents Regarding Diet Change Feasibility



Common barriers to healthy nutrition-related behaviors

- Time
- Cost
- Effort
- Palatability
- Low self-efficacy
- Access to resources

Unique to our population

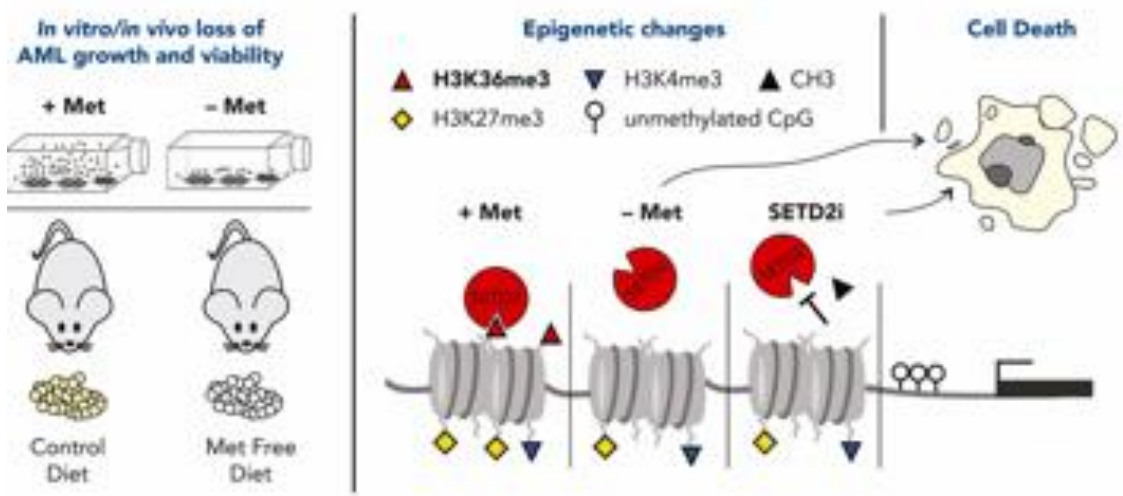
- Taste changes 2/2 treatment
- Nausea/vomiting
- Fatigue
- Constipation
- Steroid therapy
- Demanding schedules (treatment & other obligations)
- Psychosocial complicators
- Out of town?
- Food fears/anxieties

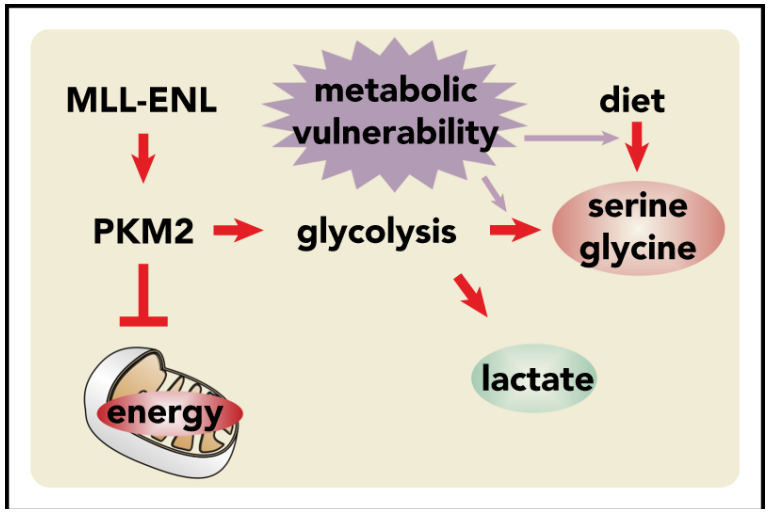
Precision Nutrition in Leukemia: Metabolic Reprogramming Through Diet

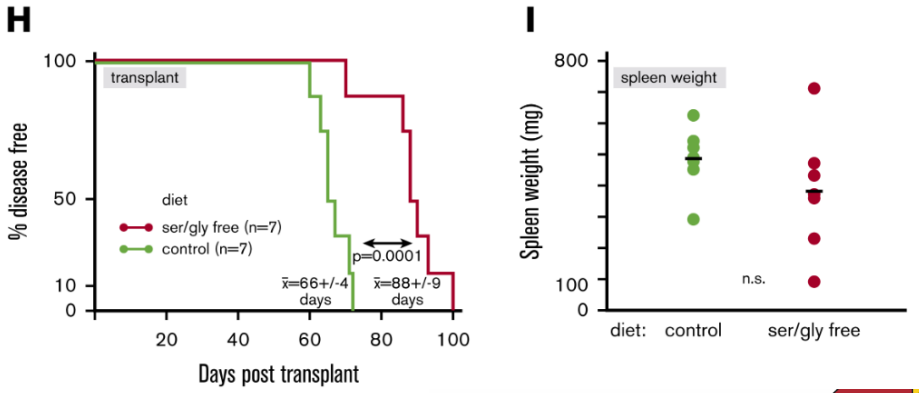
MYELOID NEOPLASIA

Dietary methionine starvation impairs acute myeloid leukemia progression

Alan Cunningham,[1] Ayşegül Erdem,[1] Islam Alshamleh,[2] Marjan Geugien,[1] Maurien Pruis,[1] Diego Antonio Pereira-Martins,[1,3] Fiona A. J. van den Heuvel,[1] Albertus T. J. Wierenga,[1] Hilde ten Berge,[1] Robin Dennebos,[1] Vincent van den Boom,[1] Shanna M. Hogeling,[1] Isabel Weinhäuser,[1,3] Ruth Knops,[4] Pim de Blaauw,[5] M. Rebecca Heiner-Fokkema,[5] Carolien Woolthuis,[1] Ulrich L. Günther,[6] Eduardo M. Rego,[3] Joost H. A. Martens,[7] Joop H. Jansen,[4] Harald Schwalbe,[2] Gerwin Huls,[1] and Jan Jacob Schuringa[1]







Garcia-Cuellar, et al. Blood Adv, 2020,

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Nutrition Interventions in Cancer Patients

who what when how

- Who will benefit and how to measure benefit?
- What specific intervention should be conducted?
- When should the intervention be delivered and for how long?
- How can nutrition resources and content be disseminated?

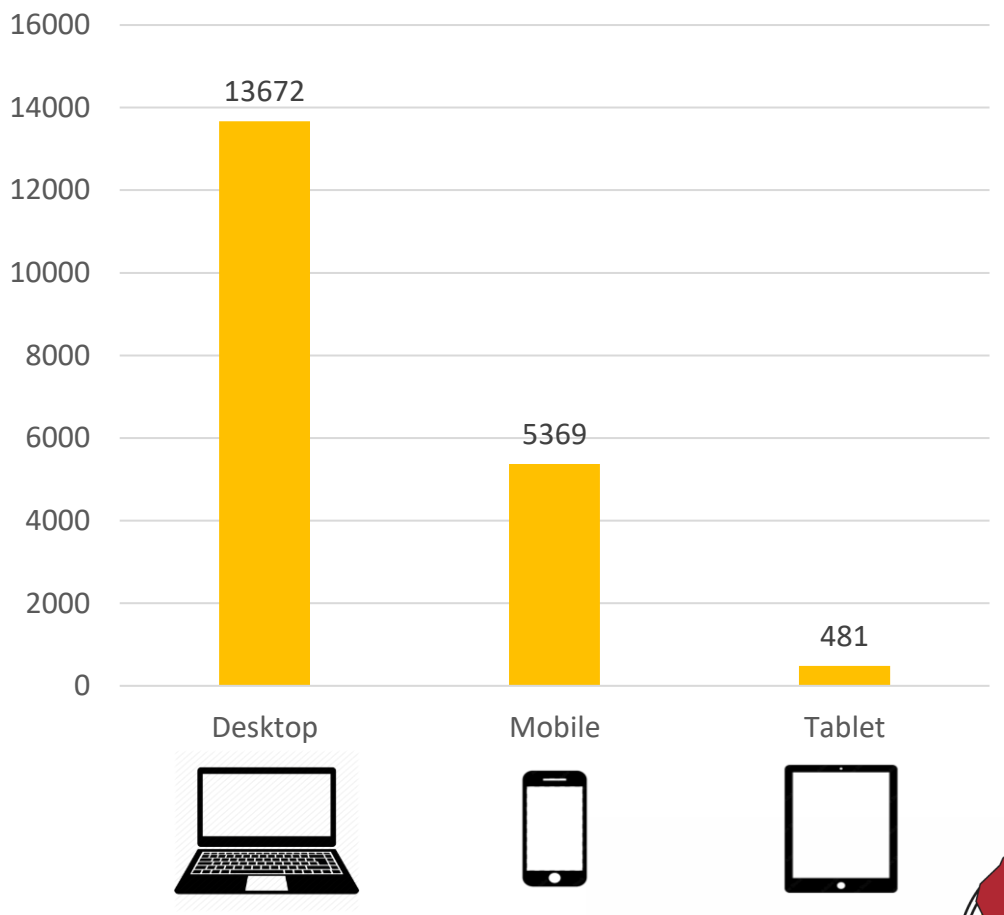
WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Creating resources for diet guidance for cancer patients

Site title	Source or Author	Recipe quantity	Search by texture	Search by symptom	Search by nutritional need	Search by meal	Child or family focus	Cancer focus	Diet tips or guidelines	Didactic videos	Other features
@TheTable*	MDACC	770+	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Question submission
Healthy Recipes$^{\alpha}$	AICR	250 - 300	No	No	No	Yes	No	Yes	Yes	No	Physical activity guidelines
CHEF Recipe for Life$^{\beta}$	CHOSA	75	No	No	No	Yes	Minimal	No	Some	Yes	Teaching kitchens; provider referrals to culinary programs
Cook for Your Life^{+}	Ann Ogden Gaffney	500+	No	No	No	Yes	No	Yes	Yes	Yes	Culturally-adapted menus; menu collections

Wartenberg L, Raber M, **Chandra J**. Unique features of a web-based nutrition website for childhood cancer populations: availability, features and content. Journal of Medical Internet Research. 2021

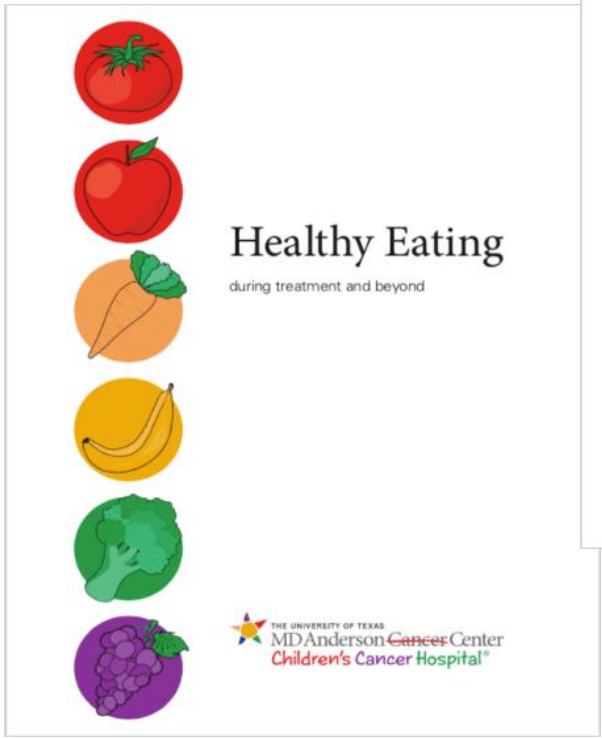
Creating resources for diet guidance for cancer patients

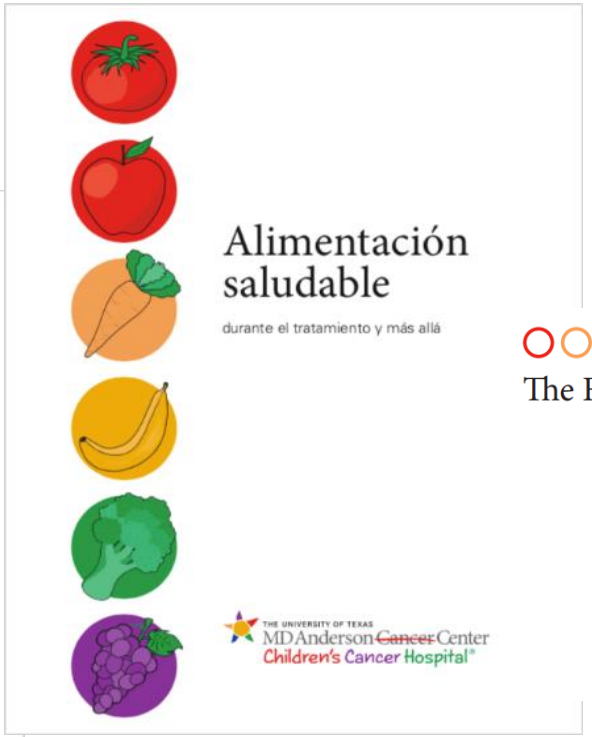


Wartenberg et al Journal of Medical Internet Research. 2021

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Multi-lingual guidance for healthy diets





Grains

include breads, pastas, rice, and cereals like oatmeal, grits, and barley. They are an important food group because of the amount of fiber they bring to the table. Fiber is needed for digestion as well as for helping our hearts stay healthy. Grains can also be a good source of B vitamins and minerals like magnesium and selenium. These are all essential for our health.

Refined grains are processed and some of the nutritional value is removed in that process. Whole grains do not go through this process, so they hold onto those nutrients and fiber. As a result, they help keep us more full than refined grains. In fact, people who eat more whole grains tend to have less problems with their heart and weight. They are also less likely to develop Type 2 Diabetes.

Every day, choose foods that feature the grains listed below:

- Whole-wheat Bread
- Whole Rye
- Millet
- Whole-wheat Pasta
- Wild Rice
- Amaranth
- Quinoa
- Bulgur
- Cornmeal
- Oatmeal
- Rolled Oats
- Brown Rice
- Barley
- Buckwheat
- Polenta

What amount of grains should my child eat each day?

Below is a general guideline for the average healthy person. This may vary based on your height, weight, sex, age, and your activity level.

- Toddler (2-3 years): 3 servings
- Child (4-8 years): 5 servings
- Pre-teen (9-13 years): 5 to 6 servings
- Teenager 14-18 years): 6 to 8 servings
- Adult (18+): 6 to 8 servings
- Older Adult: 5 to 6 servings

Quick Tips:

1 slice of bread counts as 1 serving.
Same goes for ½ cup of cooked rice or pasta!

Soak grains for a few hours to cut some cooking time!

Aim for cereals that have less than 6 grams of sugar per serving

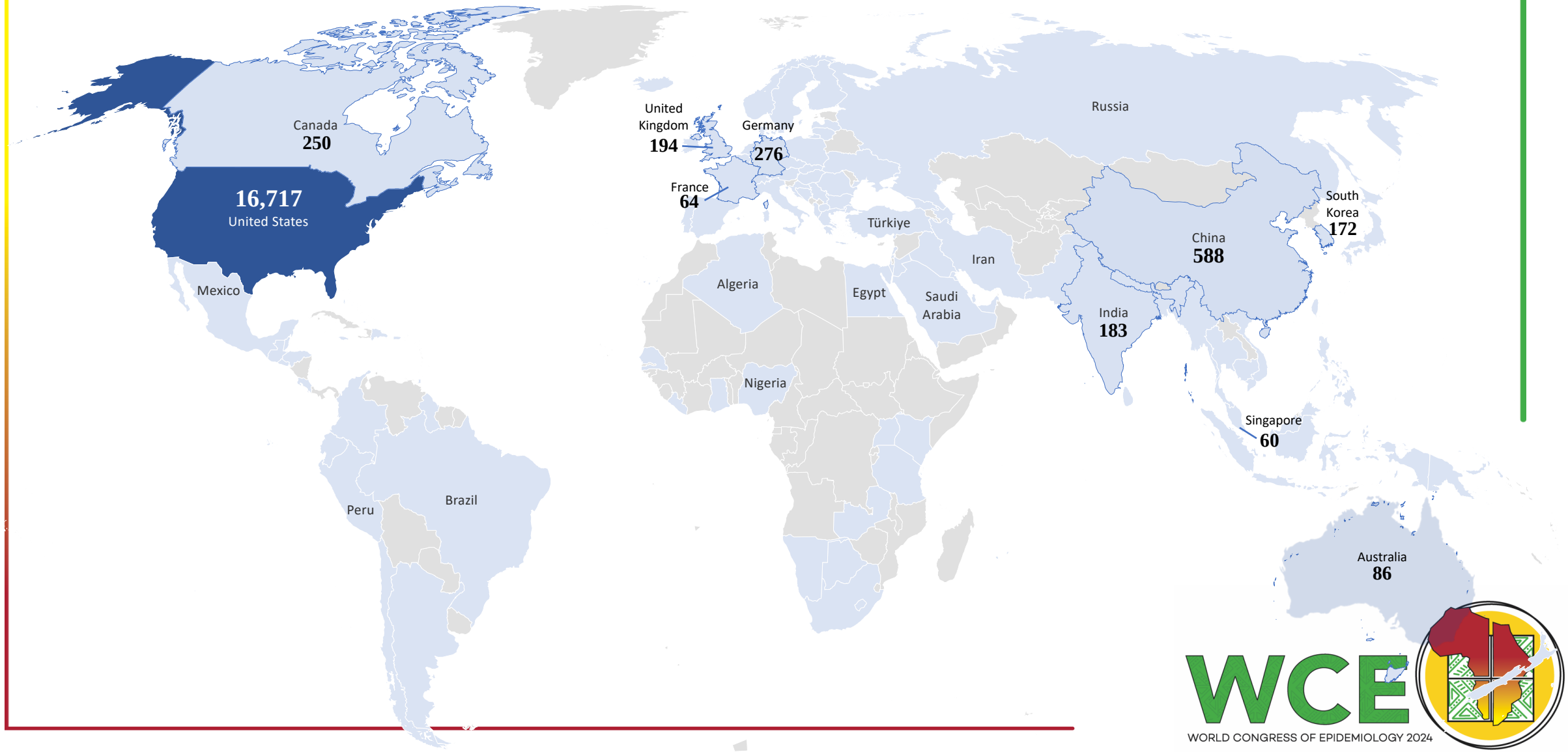
www.mdanderson.org/recipes

Look for these easy and healthy grain-filled recipes:

- Quinoa Cranberry Salad
- Oatmeal Blueberry Muffins
- Creamy Polenta with Fresh Corn
- Lentil-Barley Burger Patties
- Baked Rotini
- Veggie Brown Rice Frittata

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

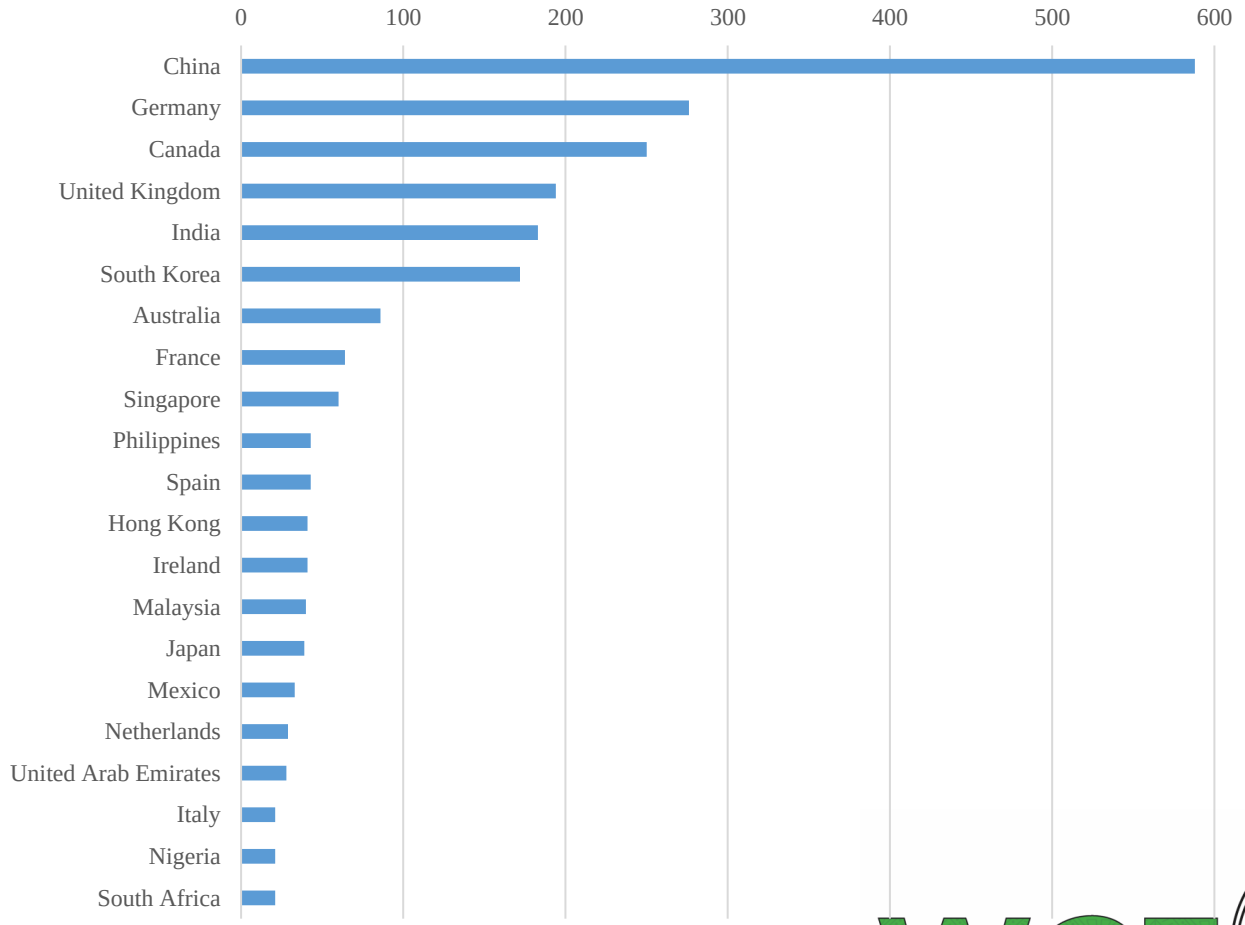
Users Across the Globe



WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

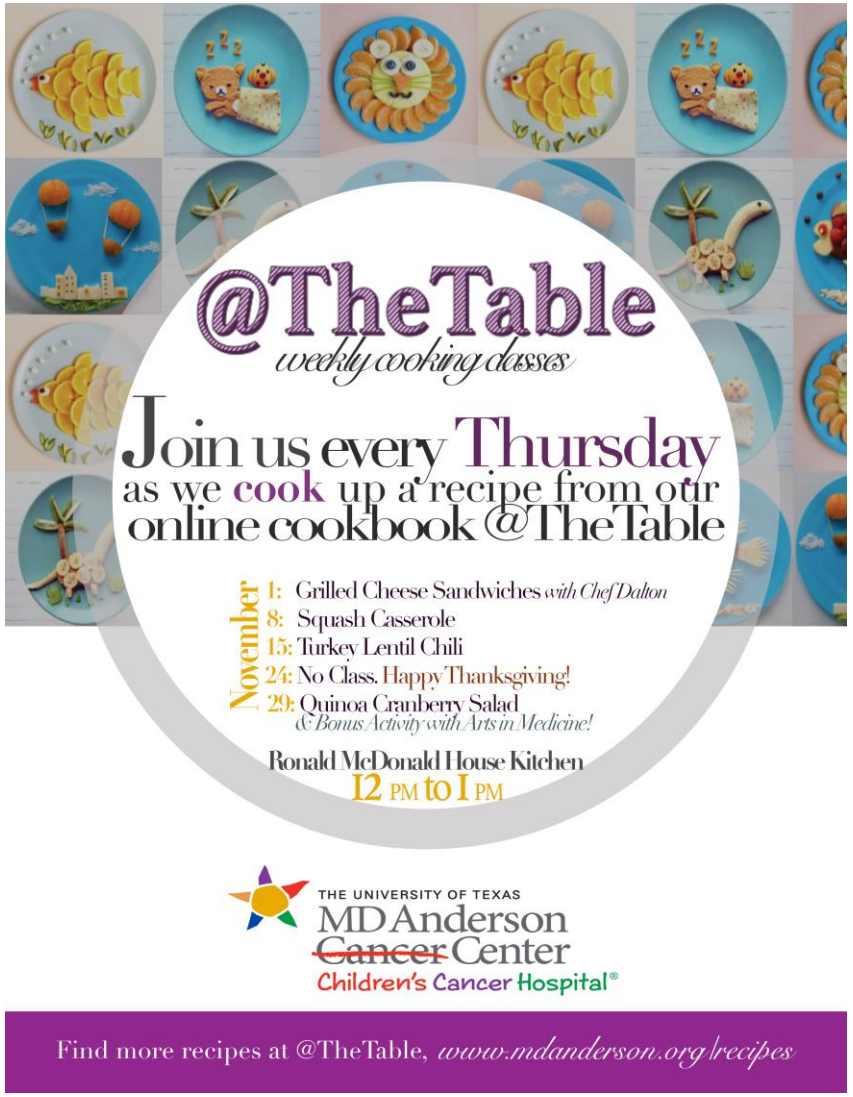
Users Across the Globe

Country	Users	New Users
United States	16717	16696
China	588	576
Germany	276	275
Canada	250	249
United Kingdom	194	193
India	183	183
South Korea	172	172
Australia	86	86
France	64	64
Singapore	60	60
Philippines	43	43
Spain	43	42
Hong Kong	41	41
Ireland	41	41
Malaysia	40	40
Japan	39	38
Mexico	33	33
Netherlands	29	28
United Arab Emirates	28	28
Italy	21	21
Nigeria	21	21
South Africa	21	21



WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Hospital based @TheTable Cooking Classes



Recruitment

Child Life

Patient Waiting Areas

Proton Therapy Center

Pediatric Calendar

Pediatric School

Family Advisory Council

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Hospital based @TheTable Cooking Classes

- **October**
  - 4th: Baked Rotini
  - 11th: Veggie Chili
  - 18th: Pumpkin Soup with Turmeric
  - 25th: Bat Cookies
    - *Special activity with Arts in Medicine!*

- **November**
  - 1st: Special Guest, Chef Dalton
  - 8th: Squash Casserole
  - 15th: Turkey Lentil Chili
  - 29th: Quinoa Cranberry Salad
    - *Special activity with Arts in Medicine!*

- Demo → Hands-on class

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Varying degrees of participation in cooking classes

- October 4th: 14 participants
  - Patients: 5
  - Family: 8
  - Others: 1
- October 11th: 13 participants
  - Patients: 5
  - Family: 7
  - Others: 1
- October 18th: 5 participants
  - Patients: 2
  - Family: 2
  - Others: 1

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Gardening interventions in cancer survivors as a means to improve diet

JAMA Network | Open

Original Investigation | Nutrition, Obesity, and Exercise

Vegetable Gardening and Health Outcomes in Older Cancer Survivors
A Randomized Clinical Trial

Wendy Demark-Wahnefried, PhD, RD; Robert A. Oster, PhD; Kerry P. Smith, MS; Harleen Kaur, MS; Andrew D. Frugé, PhD, RD; W. Walker Cole, MPH; Julie L. Locher, PhD; Gabrielle B. Rocque, MD; Maria Pisu, PhD; Jennifer R. Bail, PhD, RN; Harvey Jay Cohen, MD; Douglas R. Moellering, PhD; Cindy K. Blair, PhD, MPH

- vegetable gardening intervention in 381 cancer survivors aged 50 years or older across Alabama
- survivors assigned to the intervention had significantly increased vegetable and fruit consumption and, compared with waitlisted survivors
- significant improvements in physical performance

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Cook and Grow!

Feasibility testing for a home cooking and gardening intervention for Cancer Survivors and their Families

- **10 total patients** aged between 7-17
  - 5 ranging between 7-12
  - 5 ranging between 13-17
- **Leukemia / Lymphoma childhood cancer survivors**
  - 1- to 24- months beyond completion of therapy

Collaboration with Jaimie Davis, PhD

- Video cooking lessons and recipe demonstrations via ‘EdEN’ online program
  - **2 Grocery Deliveries**
    - Black Bean Salad, Veggie Quesadilla, and Strawberry Basil Agua Fresca
    - Winter Salad, Radishes 3 Ways, and Agua de Jamaica Agua Fresca
  - **EarthBox** Original Gardening System

WORLD CONGRESS OF EPIDEMIOLOGY 2024

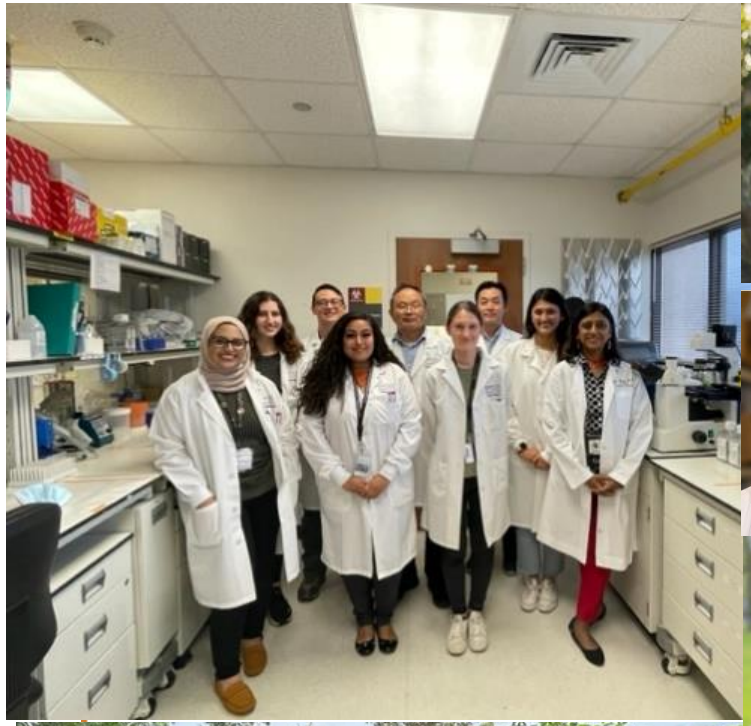
Meal Prep and Delivery Interventions

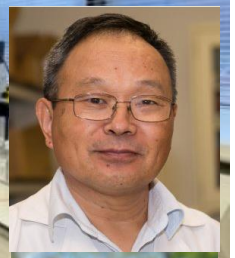
NUTRICARE

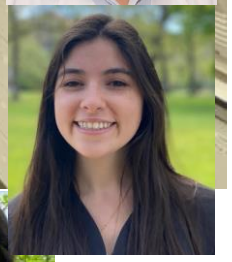
Bristol Myers Squibb™ Foundation

WCE
WORLD CONGRESS OF EPIDEMIOLOGY 2024

Acknowledgements







Past and Current Lab Members

Alaina Poche
Huaxian Ma
Megan Rodriguez
Margaret Raber, DrPH
Lisa Wartenberg
Karla Crawford
Rhea Li
Tiewei Chen
Manu Khosla
Lea Stitzlein
Deokhwa Nam
Faith Hernandez
Shaikha Alqahatani
Mary Figueroa

Collaborators

Fang Fang Zhang, PhD
Colleen Spees, PhD
Jaimie Davis, PhD
Marina Konopleva, MD
Michelle Barton, PhD
Genie Kleinerman, MD
Keri Schadler, PhD
Mike Roth, MD
Christine Ranieri, RD, LD
Saumil Gandhi, MD, PhD
Kristin Mahan, PhD
Lisa Triche, PhD
Donna Bell, PhD

Patients & families!