Cancer and Diet: Understanding the Connection

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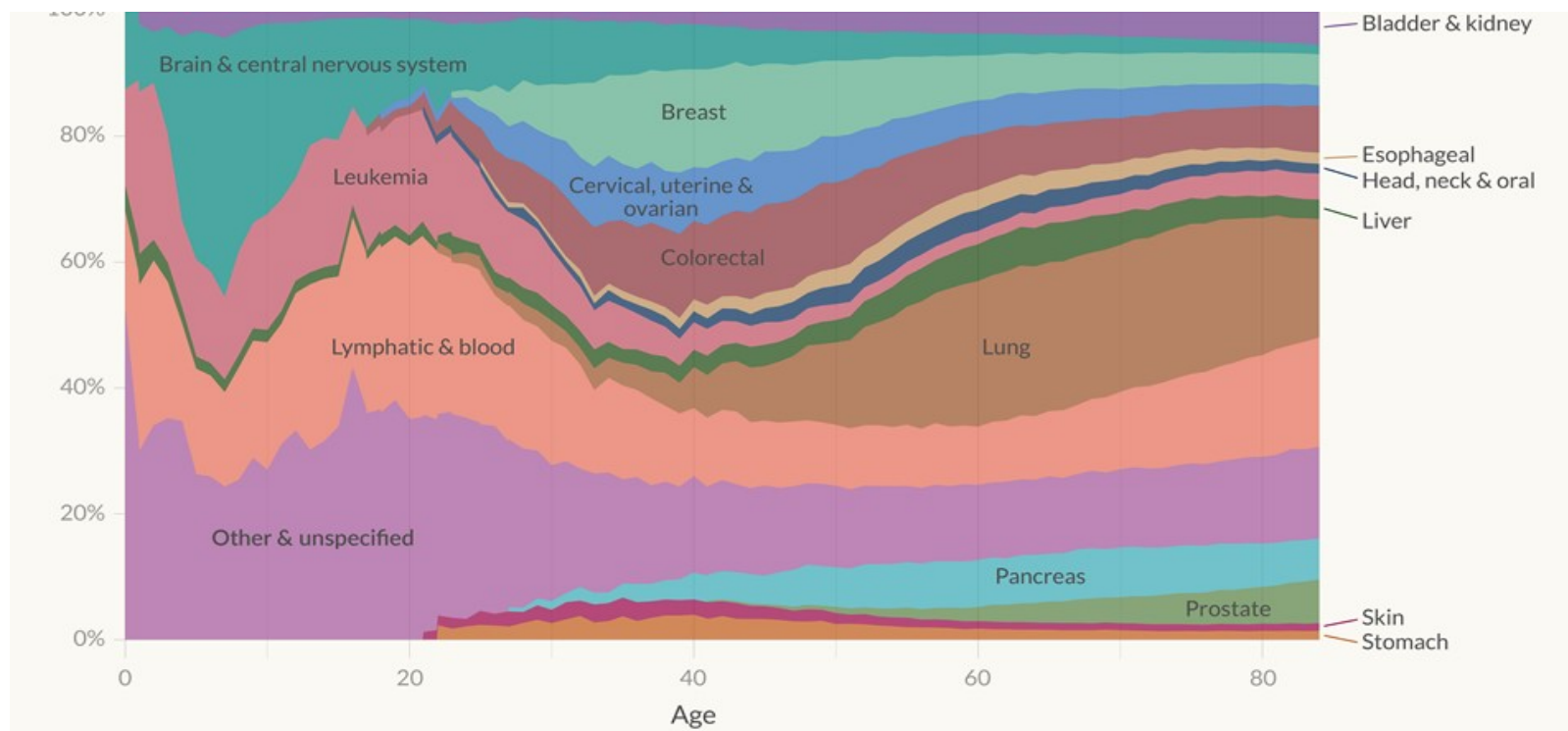Farajzadegan@med.Mui.Ac.Ir

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Outlines

- Cancer Statistics
- Role Of Diet In Cancer
- Foods Linked To Cancer Risk
- Cancer-fighting Foods
- Impact Of Diet On Cancer Patients
- DASH Or Mediterranean Diets
- Lifestyle Factors

Introduction

- Overview Of Cancer Statistics And Prevalence.

CA Cancer J Clin. 2024;74:12–49.wileyonlinelibrary.com/journal/caac

Estimated New Cases

Male				Female		
Prostate	299,010	29%		Breast	310,720	32%
Lung & bronchus	116,310	11%		Lung & bronchus	118,270	12%
Colon & rectum	81,540	8%		Colon & rectum	71,270	7%
Urinary bladder	63,070	6%		Uterine corpus	67,880	7%
Melanoma of the skin	59,170	6%		Melanoma of the skin	41,470	4%
Kidney & renal pelvis	52,380	5%		Non-Hodgkin lymphoma	36,030	4%
Non-Hodgkin lymphoma	44,590	4%		Pancreas	31,910	3%
Oral cavity & pharynx	41,510	4%		Thyroid	31,520	3%
Leukemia	36,450	4%		Kidney & renal pelvis	29,230	3%
Pancreas	34,530	3%		Leukemia	26,320	3%
All sites	**1,029,080**			**All sites**	**972,060**	

Estimated Deaths

Male				Female		
Lung & bronchus	65,790	20%		Lung & bronchus	59,280	21%
Prostate	35,250	11%		Breast	42,250	15%
Colon & rectum	28,700	9%		Pancreas	24,480	8%
Pancreas	27,270	8%		Colon & rectum	24,310	8%
Liver & intrahepatic bile duct	19,120	6%		Uterine corpus	13,250	5%
Leukemia	13,640	4%		Ovary	12,740	4%
Esophagus	12,880	4%		Liver & intrahepatic bile duct	10,720	4%
Urinary bladder	12,290	4%		Leukemia	10,030	3%
Non-Hodgkin lymphoma	11,780	4%		Non-Hodgkin lymphoma	8,360	3%
Brain & other nervous system	10,690	3%		Brain & other nervous system	8,070	3%
All sites	**322,800**			**All sites**	**288,920**	

Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates do not include Puerto Rico or other US territories. Ranking is based on modeled projections and may differ from the most recent observed data.

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Top 5 most frequent cancers**

Males
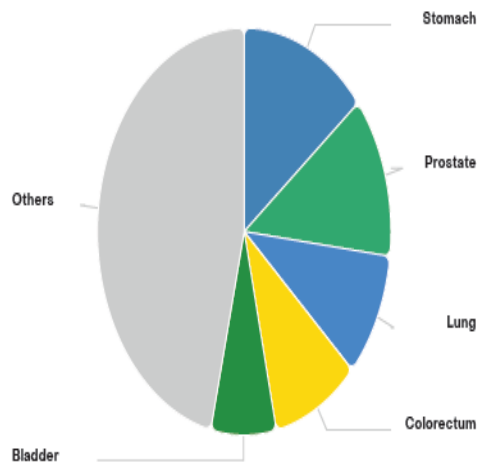
Total: 76 441

Rank	Cancer site	Number of cases	Percent
1st	🔵 Stomach	10 804	14.1%
2nd	🟢 Prostate	9 793	12.8%
3rd	🔵 Lung	7 576	9.9%
4th	🟡 Colorectum	7 354	9.6%
5th	🟢 Bladder	5 499	7.2%
-	⚪ Others	35 415	46.3%

Number of new cases in 2022, males, all ages

Females
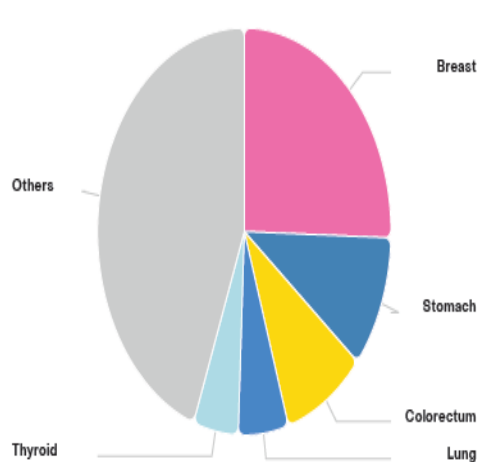
Total: 60 757

Rank	Cancer site	Number of cases	Percent
1st	🔴 Breast	15 492	25.5%
2nd	🔵 Stomach	6 387	10.5%
3rd	🟡 Colorectum	5 545	9.1%
4th	🔵 Lung	3 358	5.5%
5th	🔵 Thyroid	3 017	5.0%
-	⚪ Others	26 958	44.4%

Number of new cases in 2022, females, all ages

Both sexes
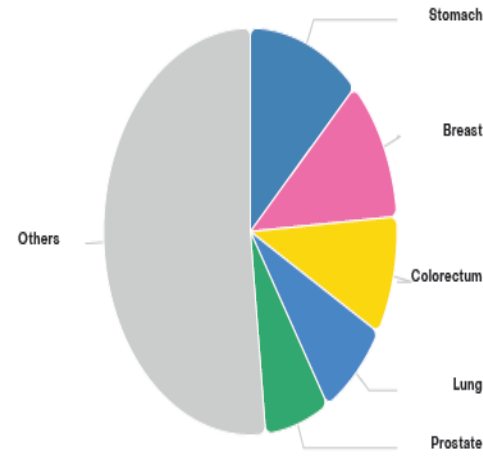
Total: 137 198

Rank	Cancer site	Number of cases	Percent
1st	🔵 Stomach	17 191	12.5%
2nd	🔴 Breast	15 492	11.3%
3rd	🟡 Colorectum	12 899	9.4%
4th	🔵 Lung	10 934	8.0%
5th	🟢 Prostate	9 793	7.1%
-	⚪ Others	70 889	51.7%

Number of new cases in 2022, both sexes, all ages

What is the balance diet ?

- Macronutrients
    - Carbohydrate
    - Protein
    - Fats
- Micronutrients
    - Vitamins
    - Mineral
    - Fiber

Principle Of Balanced Diet

- Portion Control

- Variety

- Limit Added Sugars and Sodium

- Hydration

Balanced diet

The Role of Diet in Cancer

- Dietary Influence on Cancer Risk

- Cancer Promotion

- Cancer Protection

How Diet affect the cancer

- 1)Promoting A Healthy Weight

  - Hormonal Balance
    - Estrogen
    - Insulin Resistance
  - Inflammation Reduction
  - Immune System Function

How Diet affect the cancer

- 2)Enhancing The Immune System
  - **Vitamins and Minerals**
  - **Plant Compounds (**Phytochemicals)
  - **Amino Acids**
  - **Probiotics and Prebiotics**
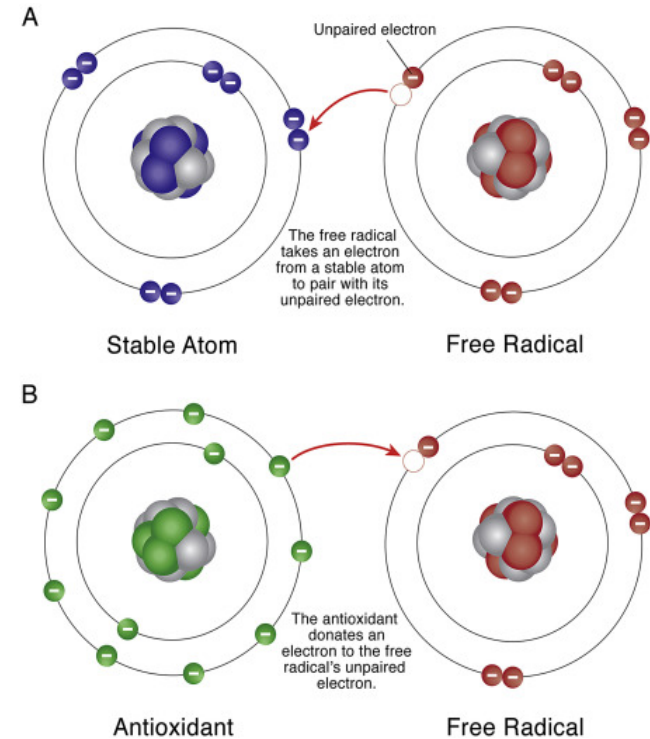- 3)Providing Essential Nutrients That May Lower Cancer Risk

Cancer-Fighting Foods

- **Fruits and vegetables**: High in *vitamins, minerals*, and *antioxidants*

- **Whole grains**: Reduce risk of colon cancer

- **Healthy fats**: Omega-3 fatty acids found in fish and nuts may have protective effects.

- **Legumes**: Rich in fiber and protein, can aid in maintaining a healthy weight.

Antioxidants

- Neutralizing Free Radicals
- Reducing Oxidative Stress

Oxidative stress

Normal cell

The free radicals that damage all components of the cell

Cell with oxidative stress

Time

A

Unpaired electron

The free radical takes an electron from a stable atom to pair with its unpaired electron.

Stable Atom — Free Radical

B

The antioxidant donates an electron to the free radical's unpaired electron.

Antioxidant — Free Radical

Foods Linked to Cancer Risk

- ***Processed and red meats***

(colorectal cancer)

Author	Year	Subgroup		RR (95% CI) per 100g/day increase	% Weight
Colorectal cancer					
Chen	1998	Male		1.11 (0.76, 1.63)	4.18
Pietinen	1999	Male		1.05 (0.74, 1.49)	4.86
Flood	2003	Female		1.14 (0.74, 1.75)	3.41
Lin	2004	Female		0.73 (0.55, 0.99)	6.13
Larsson	2005	Female		1.20 (0.99, 1.45)	10.58
Norat	2005	Mixed		1.25 (1.10, 1.42)	14.68
Berndt	2006	Mixed		1.38 (0.84, 2.28)	2.64
Cross	2007	Mixed		1.31 (1.20, 1.44)	17.51
Kabat	2007	Female		1.12 (0.60, 2.09)	1.77
Fung	2010	Female		1.10 (0.99, 1.22)	16.80
Fung	2010	Male		1.07 (0.97, 1.17)	17.43
Subtotal (I-squared = 56.2%, p = 0.011)				1.14 (1.04, 1.24)	100.00
Colon cancer					
Willett	1990	Female		1.57 (1.08, 2.29)	8.10
Bostick	1994	Female		0.97 (0.74, 1.25)	12.41
Giovannucci	1994	Male		1.73 (1.25, 2.39)	9.86
Chao	2005	Mixed		1.12 (0.93, 1.35)	16.18
Larsson	2005	Female		1.54 (1.22, 1.95)	13.65
Norat	2005	Mixed		1.26 (1.07, 1.48)	17.59
Kabat	2007	Female		0.61 (0.29, 1.28)	2.75
Cross	2010	Mixed		1.20 (1.05, 1.37)	19.46
Subtotal (I-squared = 59.6%, p = 0.015)				1.25 (1.10, 1.43)	100.00
Rectal cancer					
Chao	2005	Mixed		1.33 (0.98, 1.80)	20.12
Larsson	2005	Female		1.28 (0.75, 2.21)	7.20
Norat	2005	Mixed		1.22 (0.99, 1.51)	34.63
Kabat	2007	Female		4.27 (1.42, 12.77)	1.86
Cross	2010	Mixed		1.31 (1.07, 1.61)	36.18
Subtotal (I-squared = 18.2%, p = 0.299)				1.31 (1.13, 1.52)	100.00

NOTE: Weights are from random effects analysis

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0020456

Foods Linked to Cancer Risk

- *Sugary beverages*

- **Overall Cancer** ,100ml/D **Increase 1.18, (95**% Cl 1.10 To 1.27,)

- **Breast Cancer (1.22,   95% CI 1.07 To 1.39)**

- **Of note, 100% fruit juices were also associated with the risk of overall cancer in this study.**

- https://doi.org/10.3390/nu13020516
- https://www.bmj.com/content/bmj/366/bmj.l2408.full.pdf

Foods Linked to Cancer Risk

- **Refined carbohydrates (**(insulin resistance)

■ High intake of refined grains was associated with increased

risk of **_colon_** and **_gastric cancer._**

■ Some studies found a link between **high glycemic index diets** and increased

breast cancer risk.

■ **Dietary Glycemic Load (Linked To Refined Carbohydrate Intake) And Endometrial Cancer Risk**

Nutrients **2020**, 12, 3756; doi:10.3390/nu12123756 www.mdpi.com/journal/nutrients

Curr Colorectal Cancer Rep. 2017 Oct 17;13(6):440–454. doi: 10.1007/s11888-017-0390-5

Cancer](https://bmccancer.biomedcentral.com/articles/10.1186/s12885-020-07059-z)

The Impact of Diet on Cancer Patients

- Helps maintain strength and energy.

- Aids in recovery and reduces treatment side effects.

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Recommended Eating Patterns

- **Plant-based diet**: Focus on whole, minimally processed foods.

- *DASH* or *Mediterranean diets:* Emphasize fruits, vegetables, whole grains, and healthy fats.

- Limit intake of red and processed meats.

THE MEDITERRANEAN DIET

Wine
In moderation

Meats & Sweets
Limit

Water
At least 8 cups a day

Poultry, Eggs & Dairy
Moderate portions daily to weekly

Fish & Seafood
Often, at least twice a week

Vegetables, Fruits, Whole Grains, Olive Oil, Beans, Nuts, Legumes, Seeds, Herbs & Spices
Base all meals on these foods

Savor meals with loved ones and be active every day.

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The Role of Hydration

- Dilution of Carcinogens(bladder cancer)

- Kidney Function

- Body Weight Management

- Water's Role in Cell Physiology

- Tumor Microenvironment

- Oxygen and Nutrient Supply
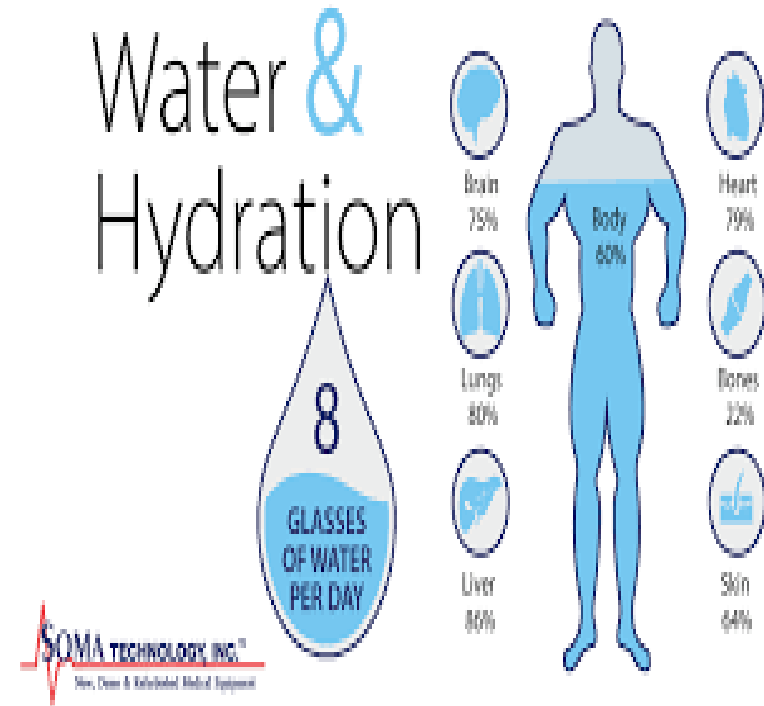
Conclusion

- Recap of the relationship between diet and cancer

- Encouragement to adopt a healthy diet as part of a cancer prevention strategy