Università di Catania

Uni ct SCIENZE BIOMEDICHE E BIOTECNOLOGICHE

PreDiCT
Centro di Ricerca per la Prevenzione, Diagnosi e Cura dei Tumori
Research Center for Prevention, Diagnosis and Treatment of Cancer

LILT
LEGA ITALIANA PER LA LOTTA CONTRO I TUMORI
prevenire è vivere

Il ruolo dell'alimentazione nella prevenzione e nella cura dei tumori

Massimo Libra

Naturalmente Siciliano

Simposio nutraceutico
Il compito dei prodotti ortofrutticoli
Siracusa, 25/06/2024

I PARTE:

- Epidemiologia
- Dieta Mediterranea e Prevenzione

II PARTE:

- Meccanismi di sviluppo di tumore
- La dieta mediterranea nella cura dei tumori

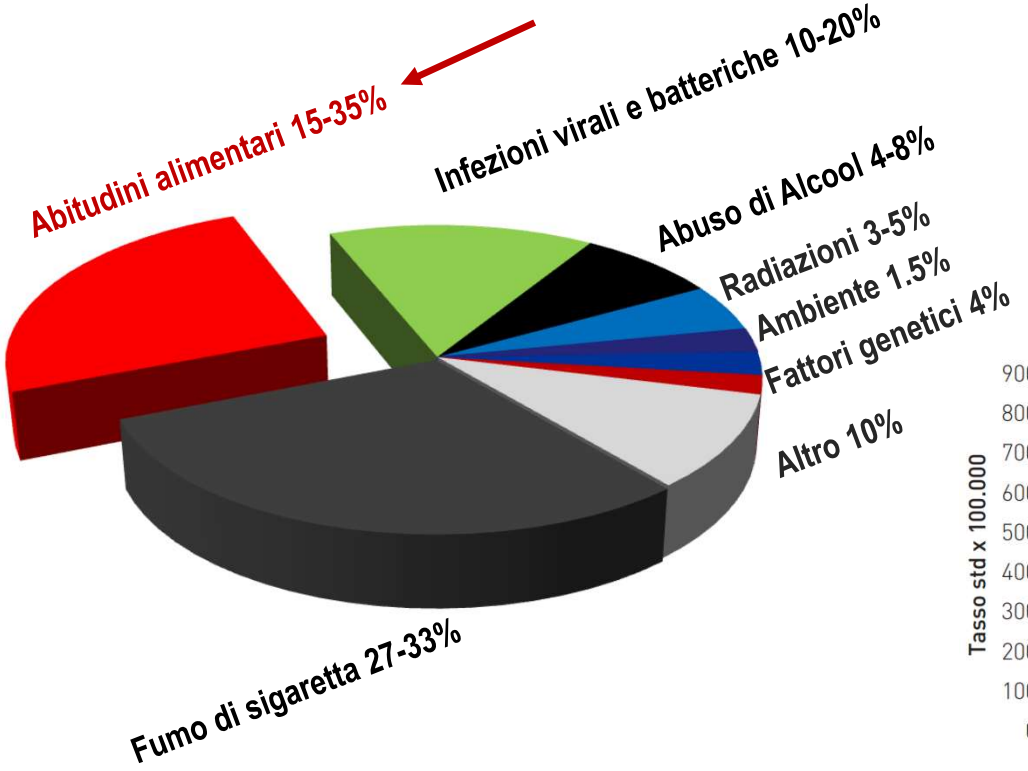
Il cancro è una malattia multifattoriale legata a diversi fattori rischio

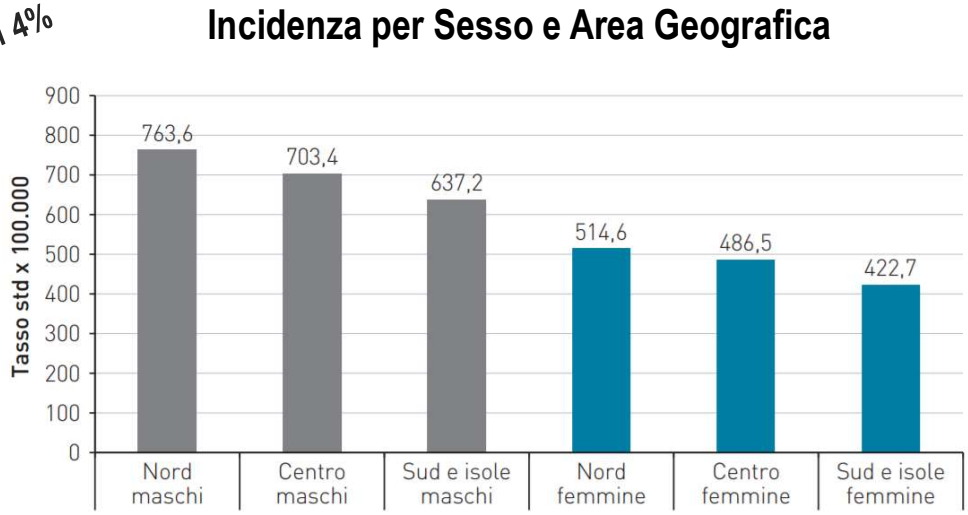
Stili di vita

Fattori genetici

Infezioni

Fattori ambientali





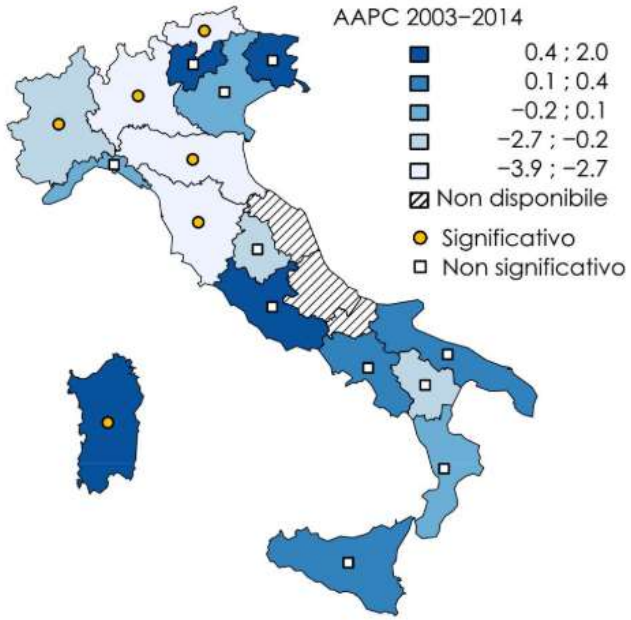
Scheda specifica per tumore

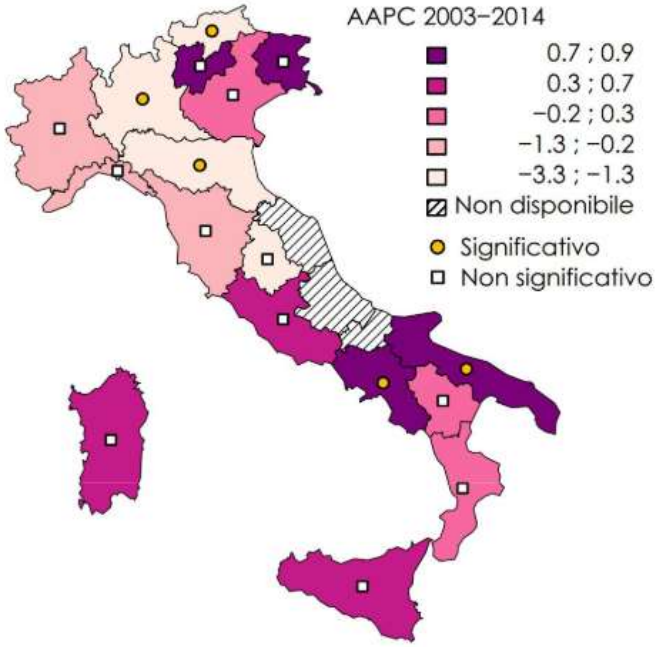
INCIDENZA
TUMORI DEL COLON E DEL RETTO

C18-21

Uomini Donne

VARIAZIONE ANNUA PERCENTUALE DELL'INCIDENZA

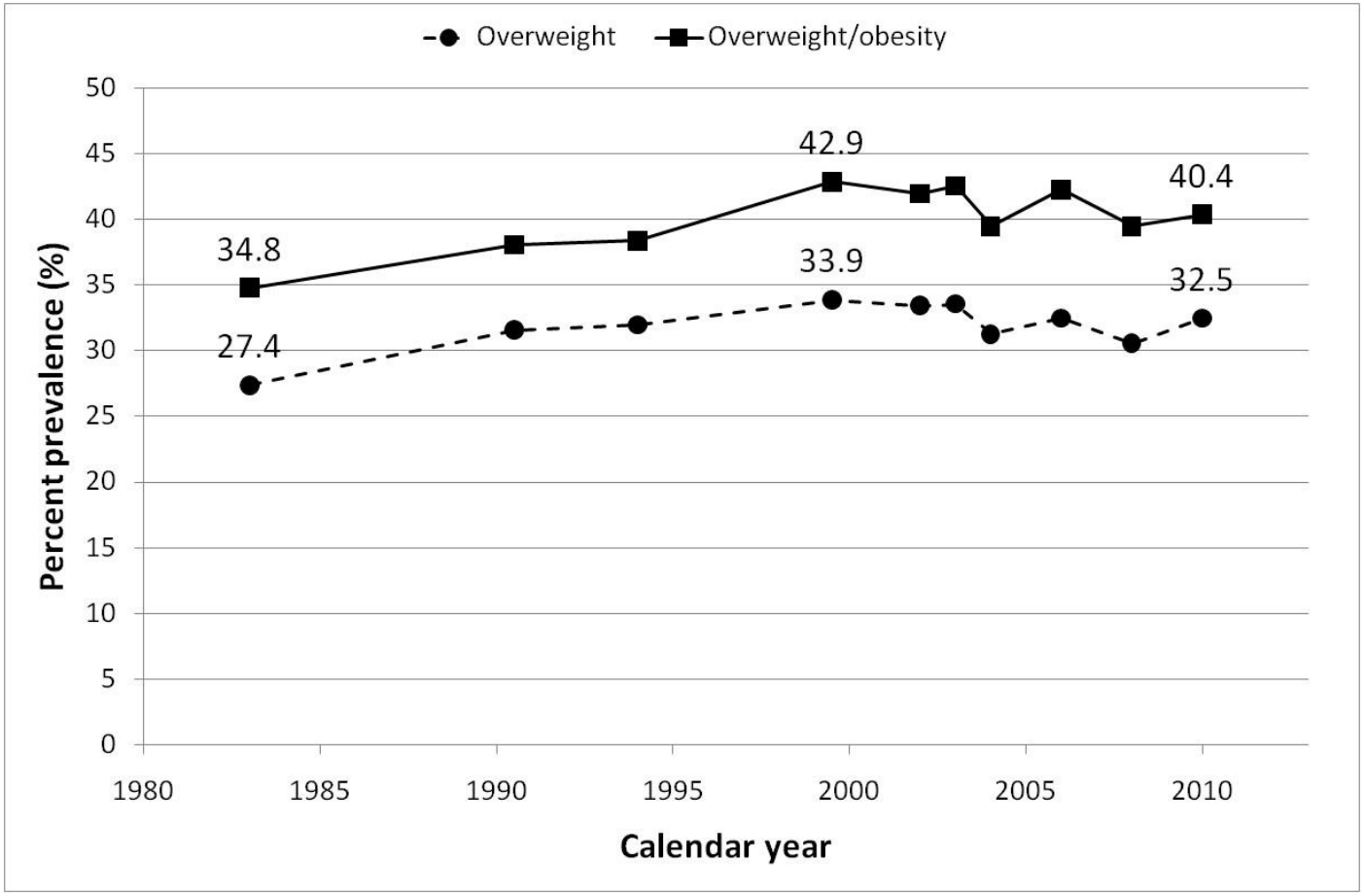




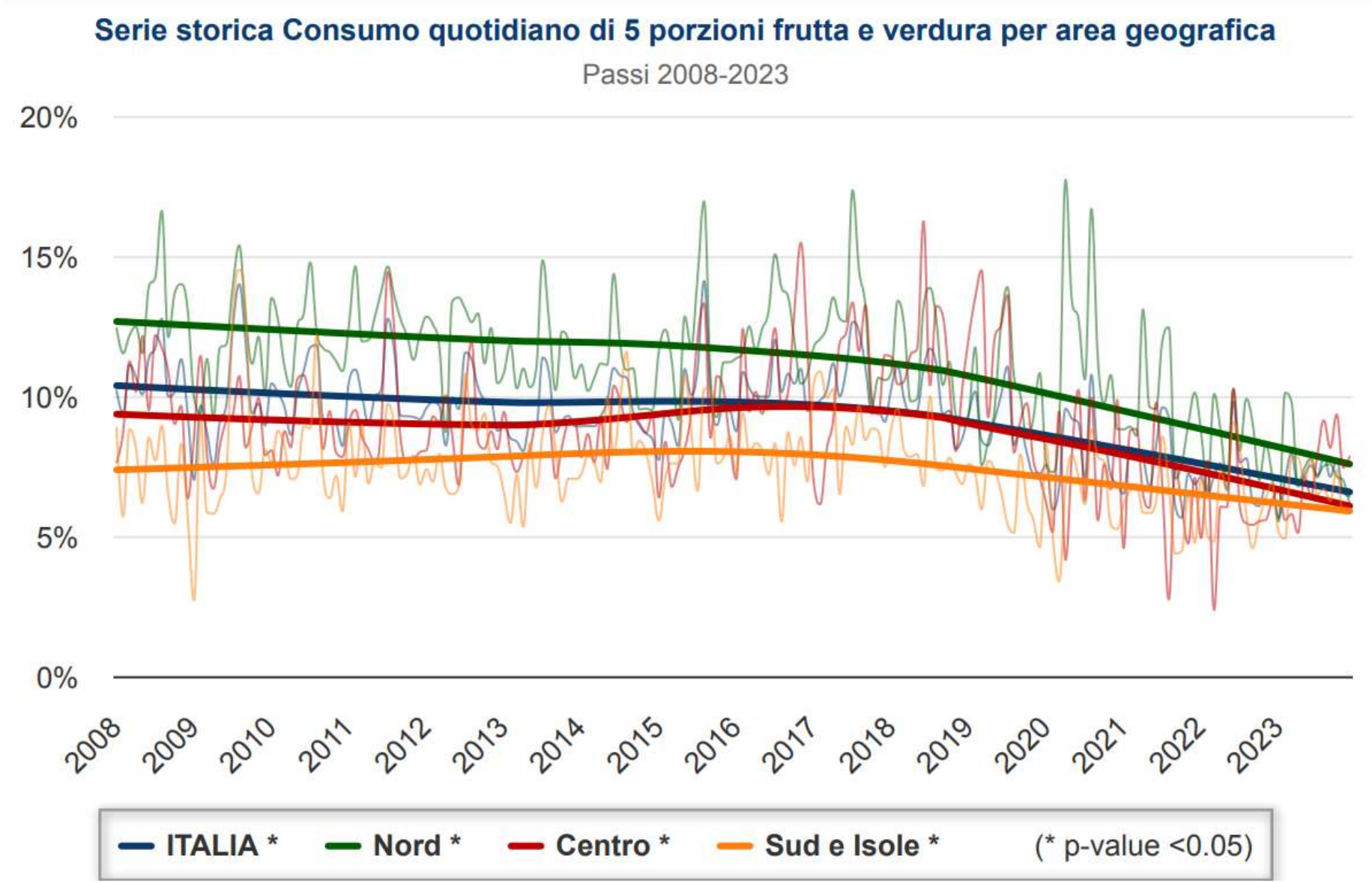
La stima della variazione annua percentuale in Sicilia mostra **un minimo aumento non significativo** ma a cui bisogna **prestare attenzione** e potrebbe essere dovuto all'aumento ponderale, alla mancata partecipazione allo screening e al graduale abbandono della dieta mediterranea

I Tumori in Italia 2003-2014 - AIRTUM

Variazione della percentuale di italiani obesi e in sovrappeso nel periodo 1980-2010

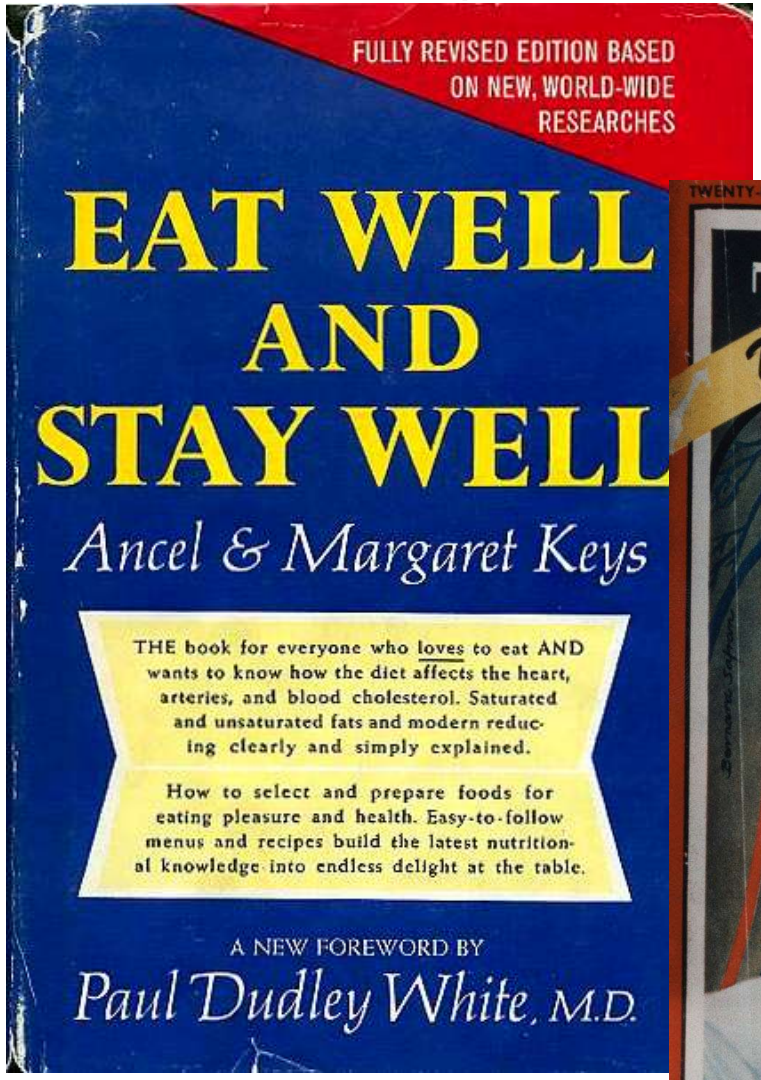


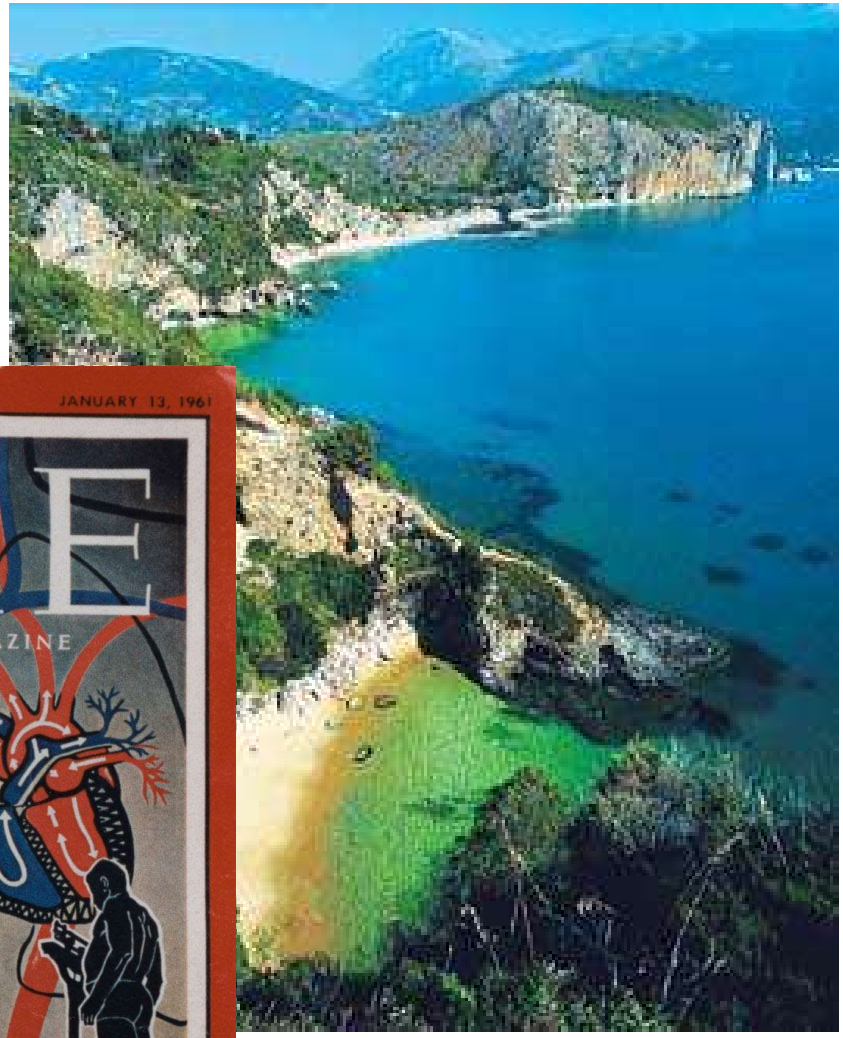
(Gallus et al, 2006; Gallus et al, 2012)



Sorveglianza Passi
(Progressi delle Aziende Sanitarie per la Salute in Italia) - ISS

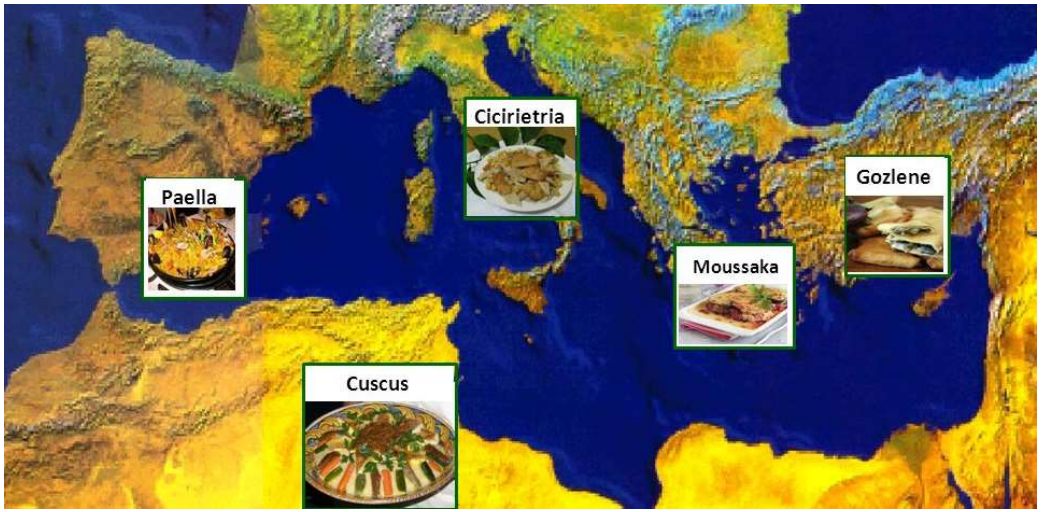
Ancel Keys fu tra i primi a scoprire il ruolo della dieta mediterranea nella prevenzione delle patologie cardiovascolari





Gennaio 1961

Caratteristiche della Dieta mediterranea



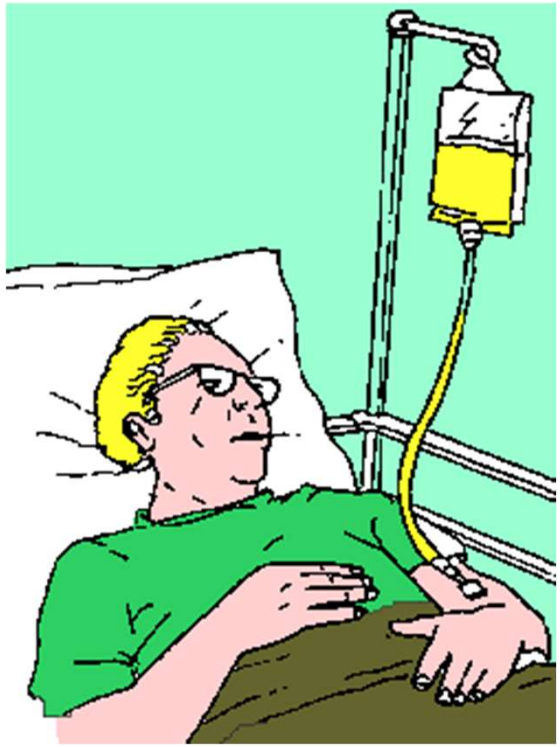
- Abbondante consumo di **frutta e verdura**
- Elevato consumo di **cereali**
- **Olio d'oliva** come principale condiment al posto dei grassi animali (burro, strutto…)
- Limitato consumo di carne (rossa)
- Moderato consumo di vino

Frutta e Verdura

Una dieta ricca di frutta e verdura diminuisce significamente il rischio di sviluppare tumori dell’apparato digerente

Studi caso - controllo

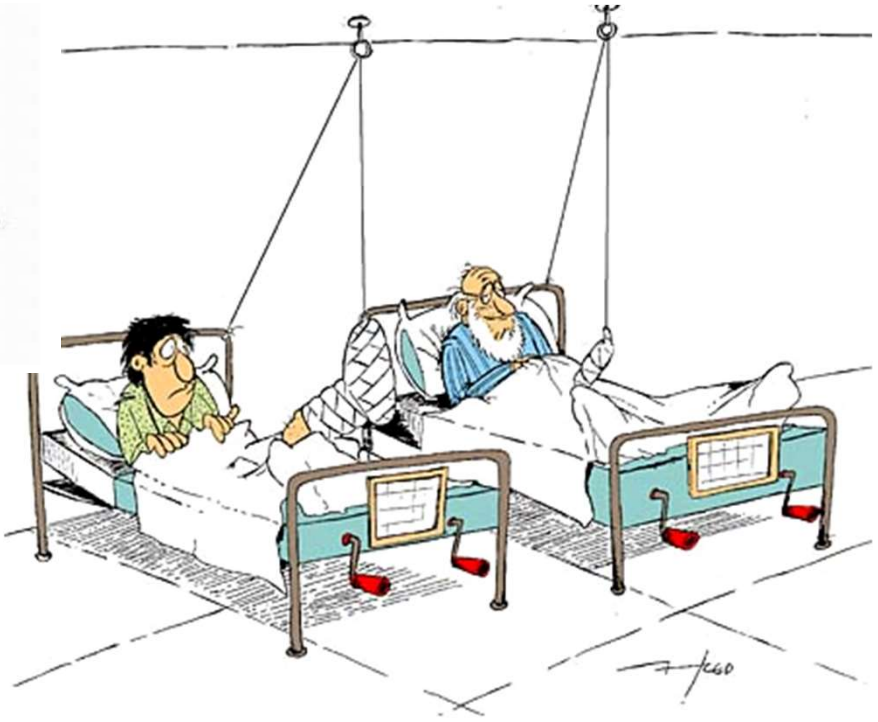
CASO MALATO



Intervista mediante questionario

Prelievo di sangue

CONTROLLO SANO



Rete nazionale per gli studi caso-controllo

- Ist. Ricerche Farmacologiche IRCCS, “Mario Negri”
- University of Milan

National Cancer Institute
Genoa

CRO Aviano
National Cancer Institute
Pordenone

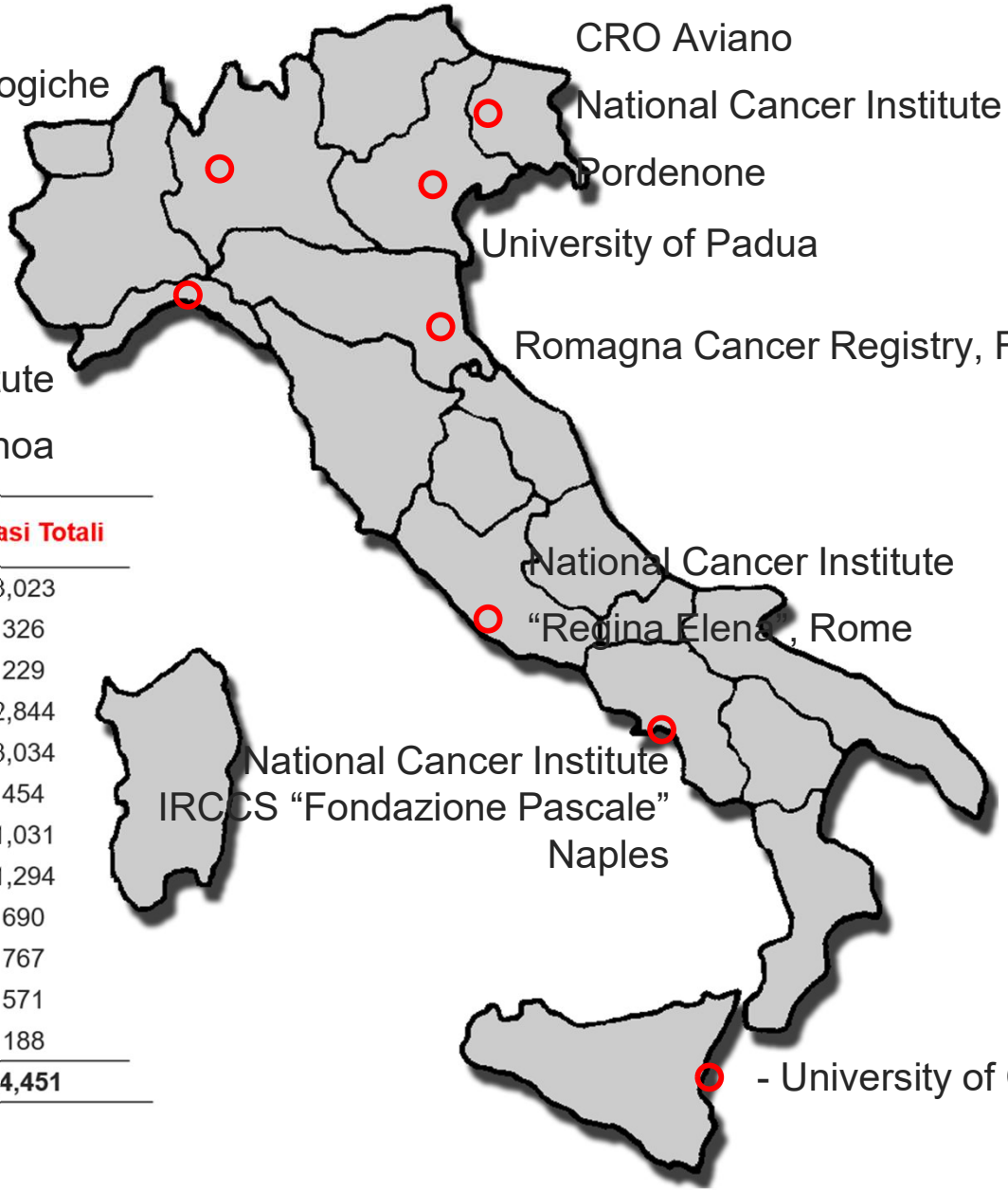
University of Padua

Romagna Cancer Registry, Forlì

National Cancer Institute
“Regina Elena”, Rome

National Cancer Institute
IRCCS “Fondazione Pascale”
Naples

- University of Catania



Tumori per sede	N. Casi Totali
Alte vie aero digestive	3,023
Pancreas	326
Fegato	229
Colon-rectum	2,844
Mammella	3,034
Endometrio	454
Ovaio	1,031
Prostata	1,294
Vescica	690
Rene	767
Non-Hodgkin lymphoma	571
Hodgkin lymphoma	188
Totale	**14,451**

PubMed®

"Mediterranean Diet" and "Cancer"

Search

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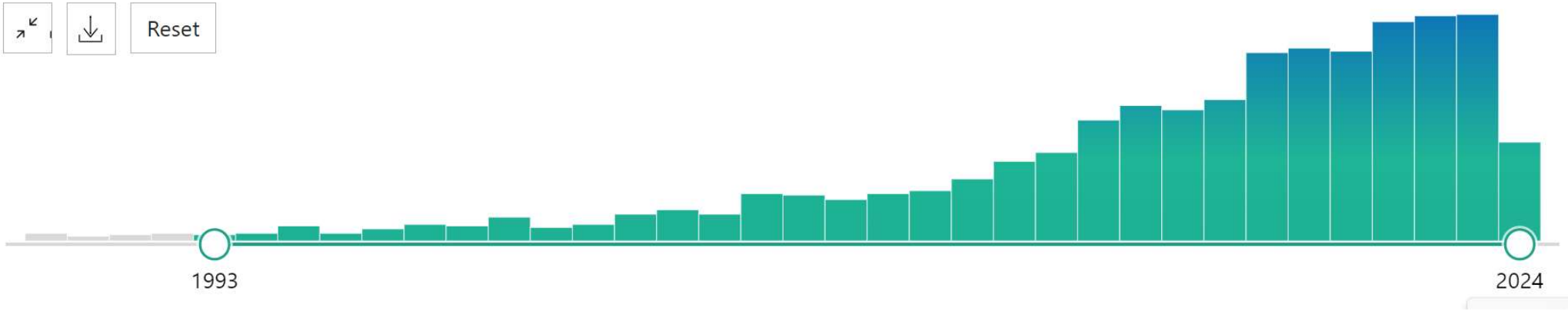
RESULTS BY YEAR

1,434 results

Page 1 of 144

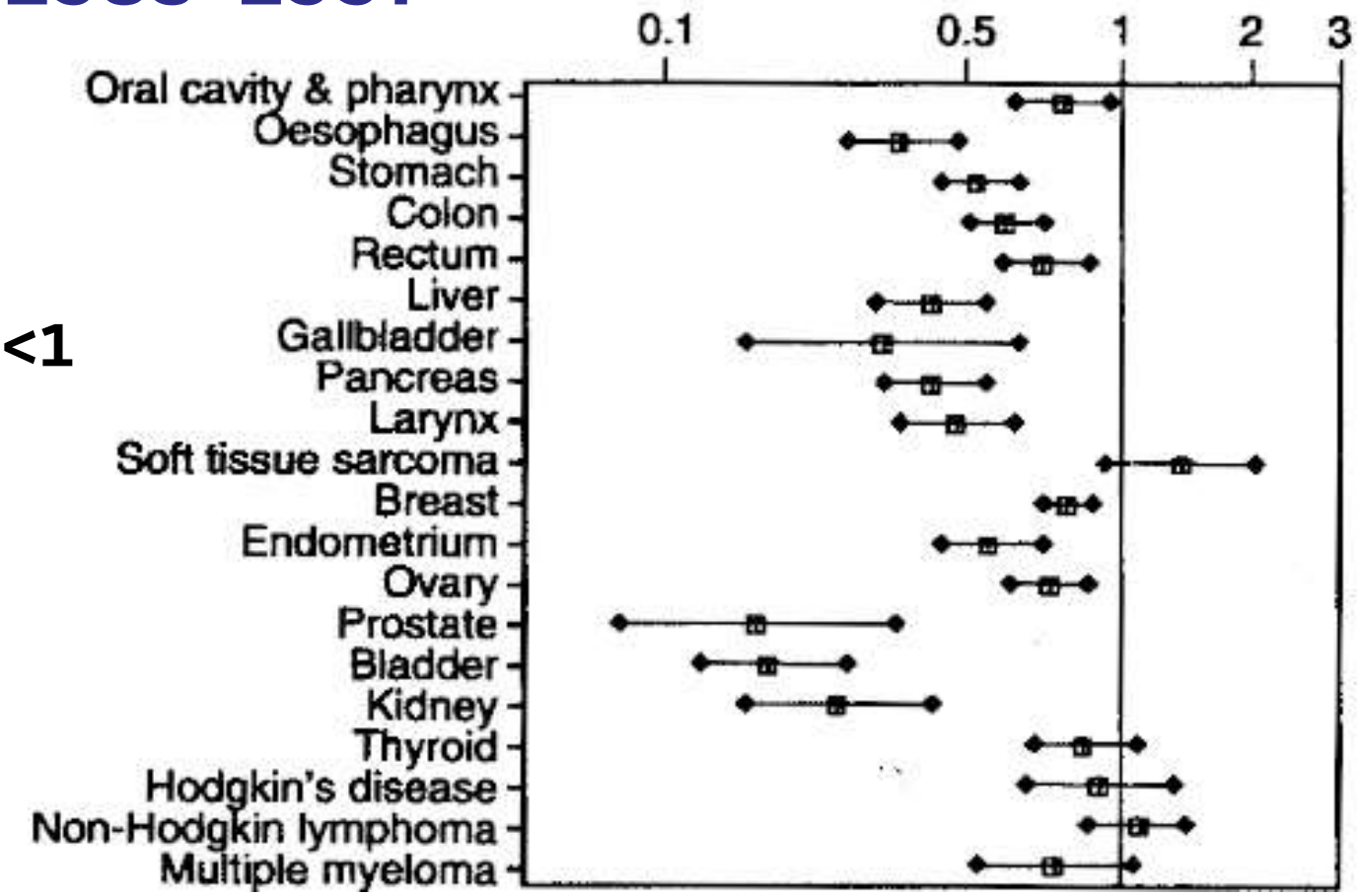
Reset



Verdura - Rischio relativo per alcuni tumori. Italia, 1983-1997

Rischio >1

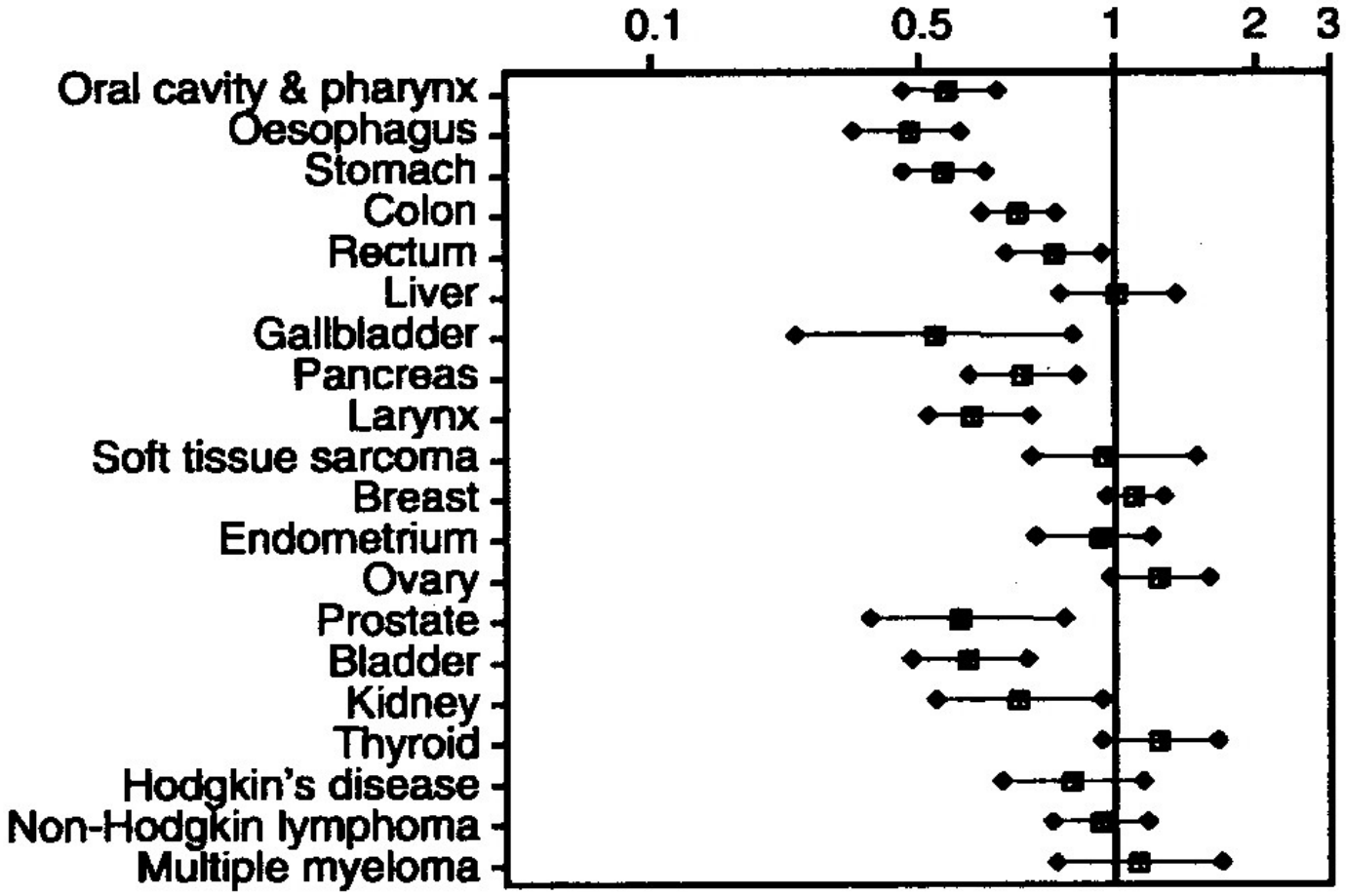
Protezione <1



Coloro che hanno un elevato consumo di verdura sono protetti (RR: 0.30 e 0.70) dal rischio di sviluppare **tumori del tratto digerente** rispetto a coloro che hanno un basso consumo

(Pelucchi et al, Nutr Cancer 2009)

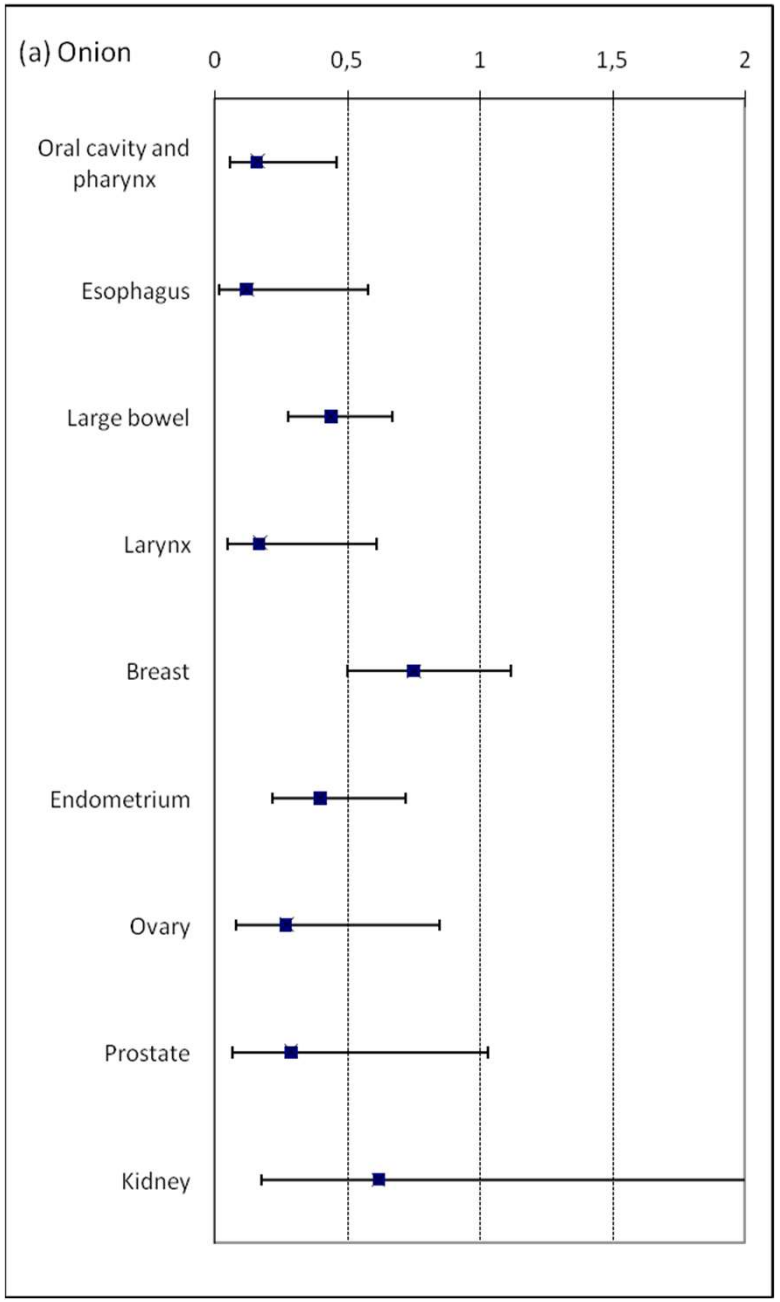
Frutta - Rischio relativo per alcuni tumori. Italia, 1983-1997



(Pelucchi et al, Nutr Cancer 2009)

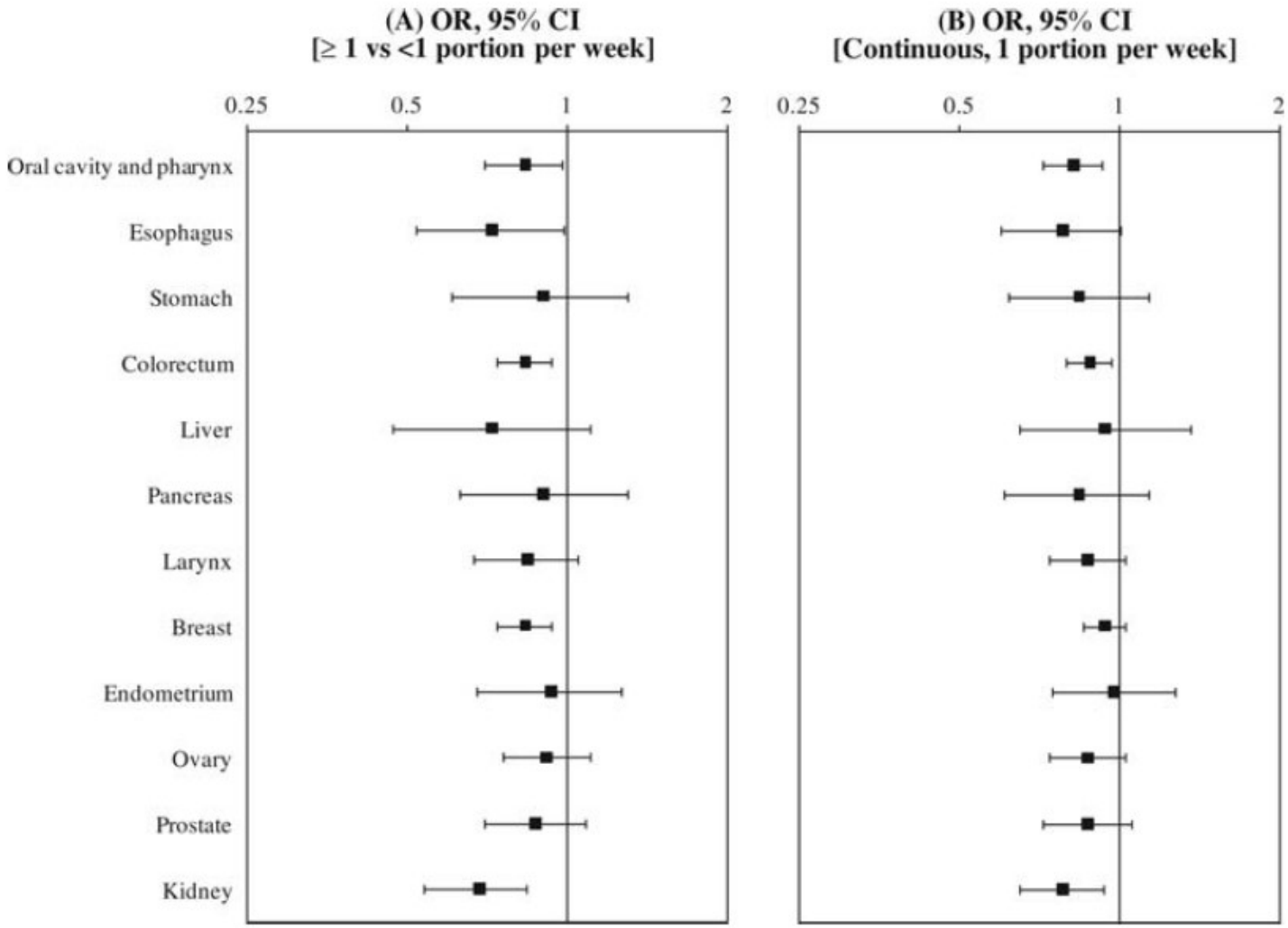
CIPOLLA

Odds ratios per tumori selezionati
Italia, 1992-2005



(Galeone et al, 2006)

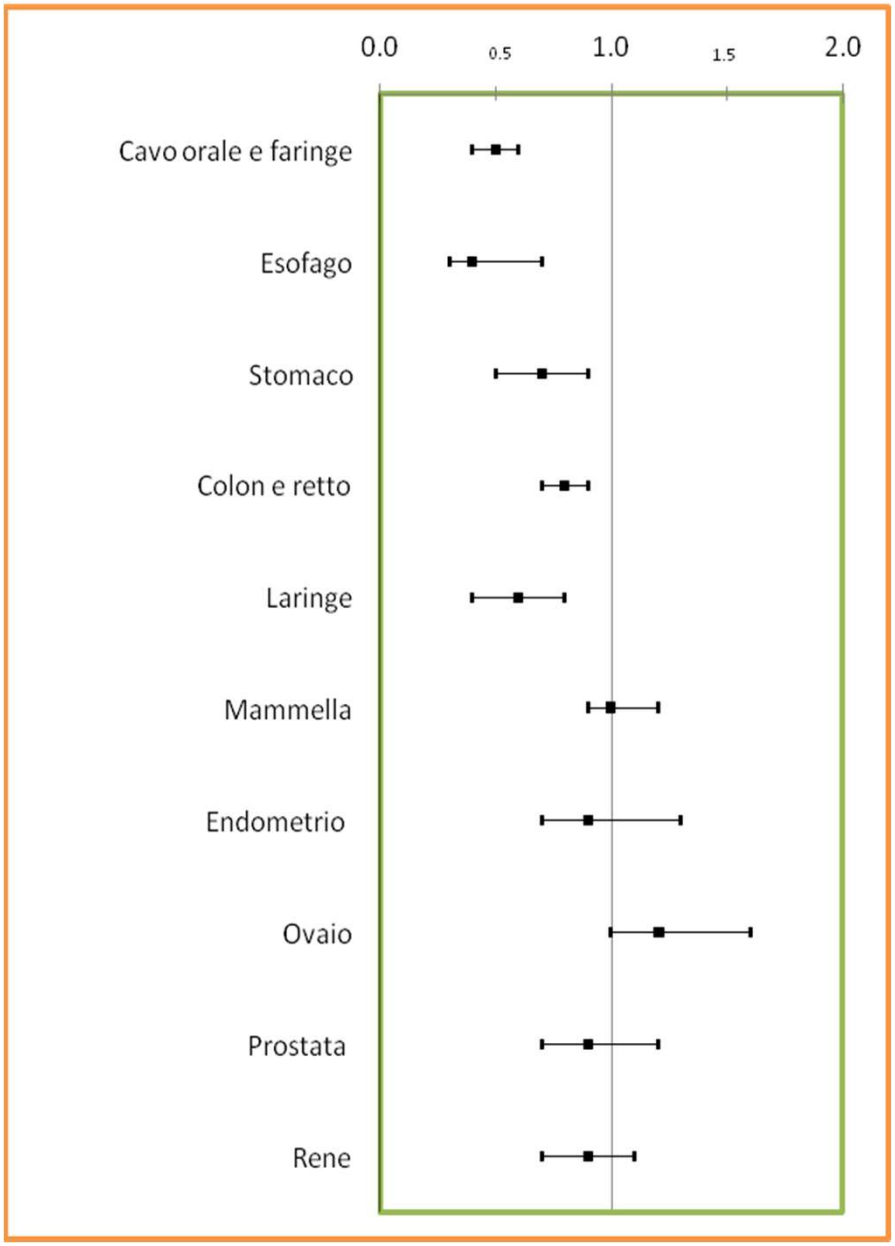
Crucifere e rischio di tumore



(Bosetti et al., 2012)

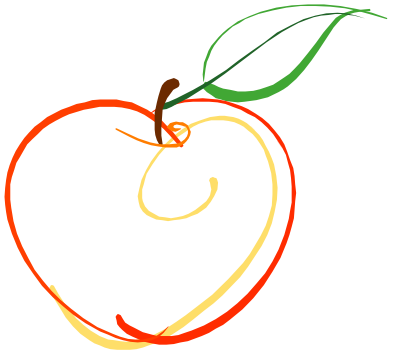
Consumo di **agrumi**

Rischio relativo per alcuni tumori. Italia, 1992-2007



(Foschi et al, CCC 2010)

Una mela al giorno...



I soggetti che mangiavano almeno una mela al giorno avevano rischi ridotti di tumore:

- ✓ cavo orale e faringe (RR=0.74)
- ✓ esofago (RR=0.70)
- ✓ coloretto (RR=0.88)
- ✓ laringe (RR=0.53)
- ✓ mammella (RR=0.84)
- ✓ ovaio (0.84)

(Gallus et al, Ann Oncol 2005)

Frutta e Verdura

Raccomandazione di mangiare almeno 5 porzioni (circa 400 gr) di frutta/verdura al giorno

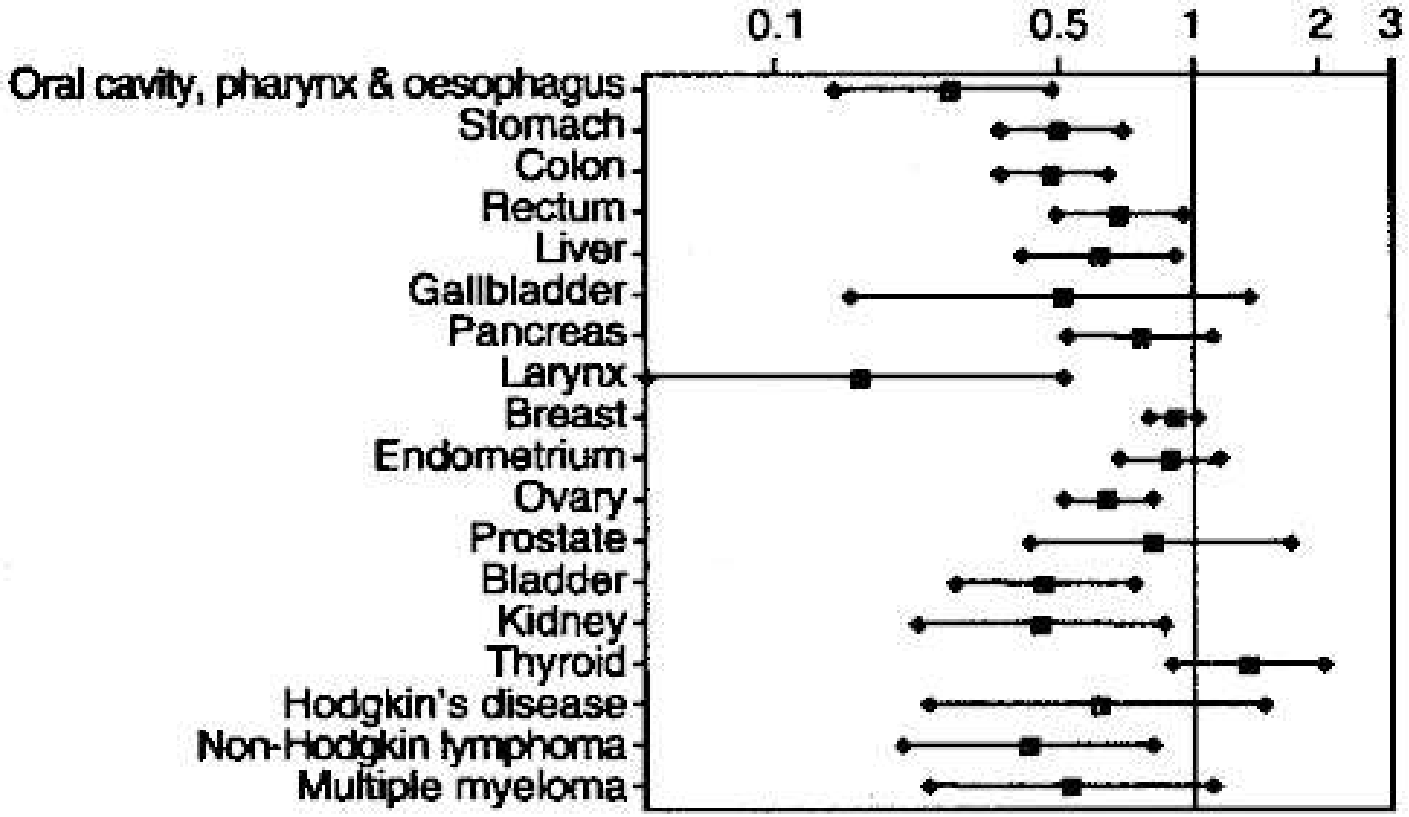
Dal 20 al 40% dei tumori del tratto digerente in Italia sono attribuibili al **basso consumo di frutta e verdura**.

Per la maggior parte dei tumori, **l'aggiunta di una porzione di frutta o verdura giornaliera** comporta una **diminuzione del rischio relativo dell'ordine del 10-20%.**

Cereali Integrali

I cereali integrali hanno un effetto protettivo sul rischio di tumore del colon retto, ma anche di altri distretti

Cereali integrali - Rischio relativo per alcuni tumori. Italia, 1983-1997



(*La Vecchia et al., Proc Nutr Soc 2003*)

Fibre - Tumori del colon retto

Rischio relativo in relazione al consumo di fibre alimentari, tra 1953 casi e 4154 controlli Italiani.

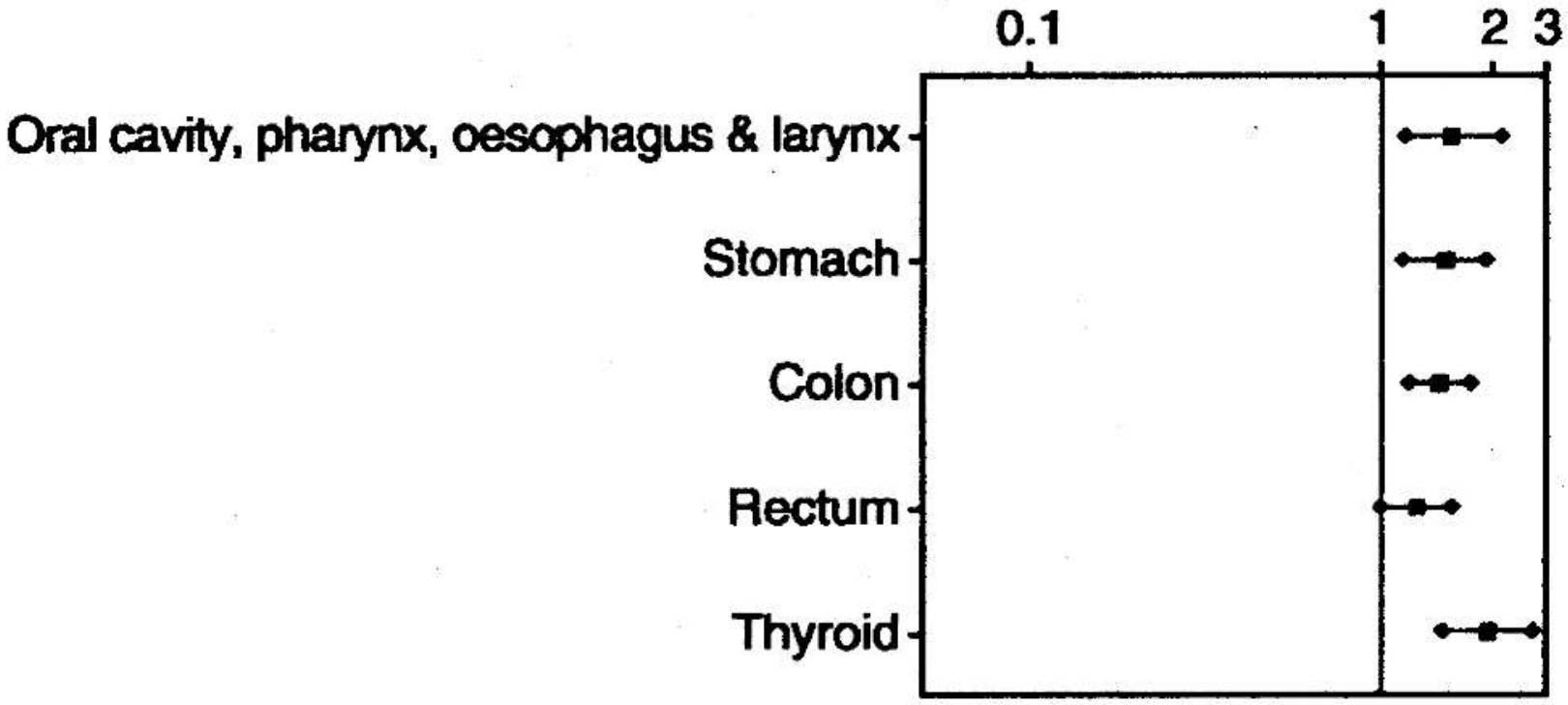
Type of fibre	Quintile of intake, OR (95% CI)[a]	
	Men	Women
Cellulose	0.65 (0.55-0.76)	0.66 (0.55-0.79)
Insoluble NCP	0.81 (0.69-0.94)	0.81 (0.67-0.97)
Total insoluble fibre	0.69 (0.59-0.82)	0.69 (0.58-0.62)
Soluble NCP	0.64 (0.52-0.77)	0.66 (0.54-0.82)
Total (Englyst) fibre	0.66 (0.54-0.79)	0.67 (0.55-0.82)
Lignin	0.84 (0.70-1.02)	0.90 (0.72-1.12)

(Negri et al, CEBP 1998)

Cereali raffinati

Cereali raffinati sono associati a un **aumento di rischio dei tumori** dello stomaco, del colon retto e del tratto digerente superiore come dimostrato da studi condotti in popolazioni dell'area Mediterranea

Cereali raffinati - Rischio relativo per alcuni tumori. Italia, 1983-1997



(*Chatenoud et al., Am J Clin Nutr 1999*)

Cereali Raffinati – Insulina

Cereali raffinati e gli zuccheri possono produrre:

- Sovraccarico glicemico
- Resistenza insulinica

Questo può condurre alla promozione di crescita cellulare attraverso l'azione di specifici ormoni e fattori della crescita

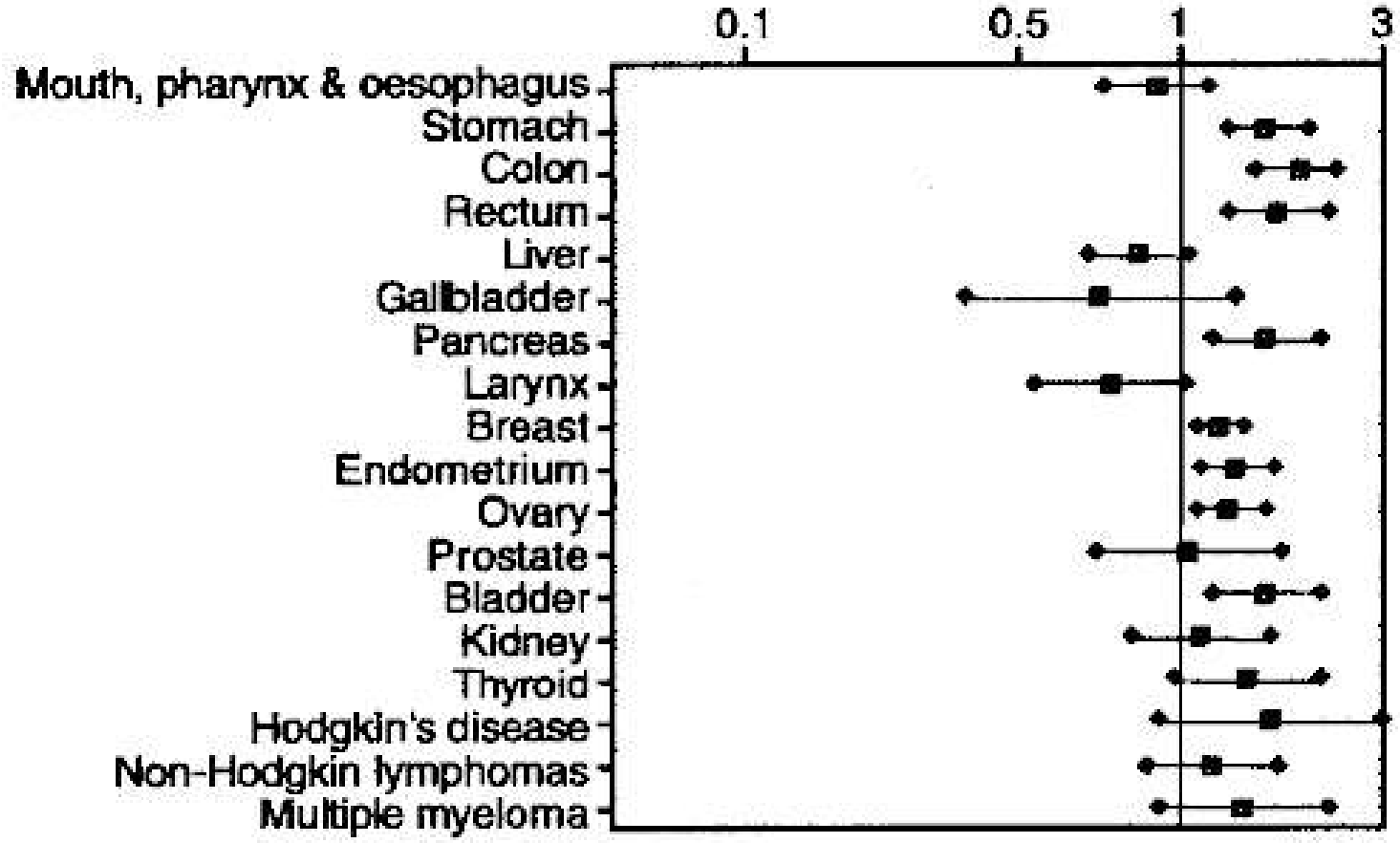
Carne e pesce

Il consumo frequente di **carne** (in particolare rossa) è associato ad un aumentato rischio di sviluppo di tumore

Il consumo frequente di **pesce** è inversamente correlato allo sviluppo di molti tumori

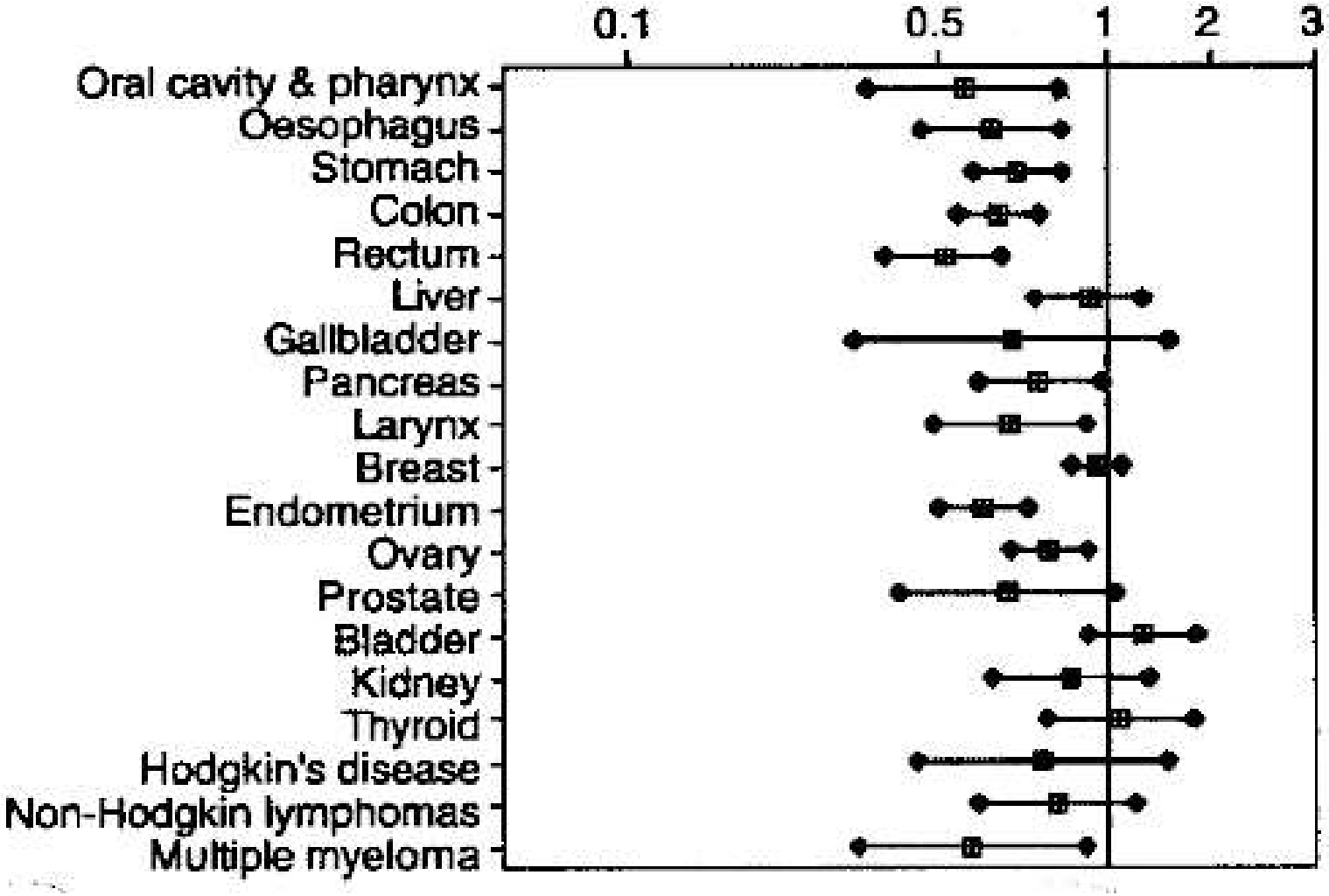
Carne rossa - Rischio relativo per alcuni tumori. Italia, 1983-1997

RR dell'ordine di 1.5-2.00



(*Tavani et al., Int J Cancer 2000*)

Pesce - Rischio relativo per alcuni tumori. Italia, 1983-1997



(*Fernandez et al., Am J Clin Nutr 1999*)

Olio d’oliva

Ampi studi multricentrici condotti in Italia hanno mostrato che il consumo dell’olio d’oliva è protettivo per i tumori della mammella, colonretto, e in particolare dell’alto tratto digerente e respiratorio

Olio d'oliva
Tumori alto tratto digerente e respiratorio

Cancer	Quintile of intake, RR (95% CI)[a]				χ^2 trend
	2	3	4	5	
Oral/pharyngeal					
Olive oil	0.6 (0.4-0.9)	0.7 (0.5-1.1)	0.7 (0.5-1.1)	0.4 (0.3-0.7)	7.15
Mixed seed oils	0.7 (0.5-1.1)	1.0 (0.7-1.4)	0.9 (0.6-1.3)	1.1 (0.7-1.7)	0.12
Butter	1.2 (0.8-1.8)	1.3 (0.8-1.9)	1.8 (1.2-2.7)	2.3 (1.6-3.5)	22.32
Esophageal					
Olive oil	0.3 (0.2-0.6)	0.3 (0.5-1.2)	0.3 (0.4-1.0)	0.3 (0.3-0.7)	9.98
Mixed seed oils	0.7 (0.4-1.2)	0.8 (0.5-1.3)	0.8 (0.5-1.4)	0.4 (0.2-0.8)	1.41
Butter	1.6 (0.9-2.7)	1.7 (1.0-2.9)	1.5 (0.9-2.6)	2.2 (1.3-3.7)	4.66
Laryngeal					
Olive oil	0.6 (0.4-0.9)	0.8 (0.5-1.2)	0.6 (0.4-1.0)	0.4 (0.3-0.7)	8.62
Mixed seed oils	1.3 (0.8-2.1)	1.8 (1.1-2.9)	2.6 (1.6-4.1)	2.2 (1.3-3.5)	16.16
Butter	1.4 (0.9-2.2)	1.0 (0.6-1.5)	1.4 (0.9-2.1)	0.9 (0.6-1.4)	0.33

(Franceschi et al, 1999; Bosetti et al, 2000; Bosetti et al 2002)

CONCLUSIONI - PARTE I

Una dieta a basso rischio di tumore dovrebbe essere:

RICCA di frutta e verdura; di olio d'oliva, al posto dei grassi animali

POVERA di cereali raffinati, di carne rossa e di grassi

Bundesarchiv, Bild 101I-468-1419-17A
Foto: Büschgens | o.Dat.

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CARBOIDRATI

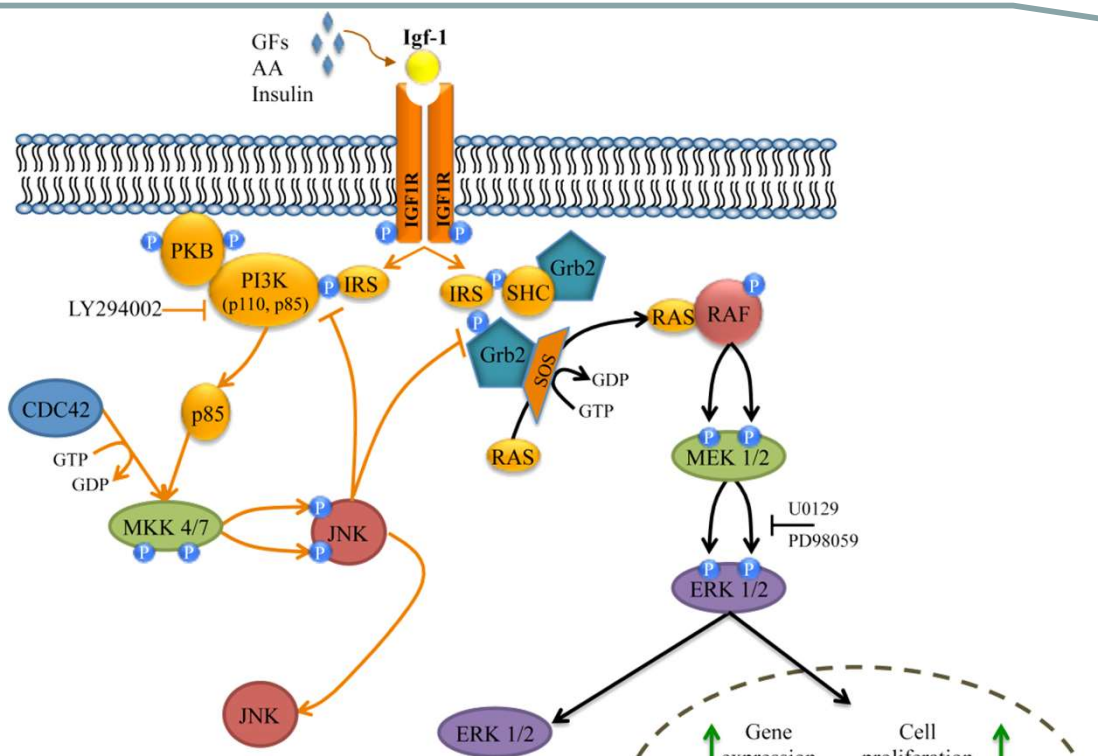
GRASSI

↑ INSULINA ← TESSUTO ADIPOSO

↑ IGF

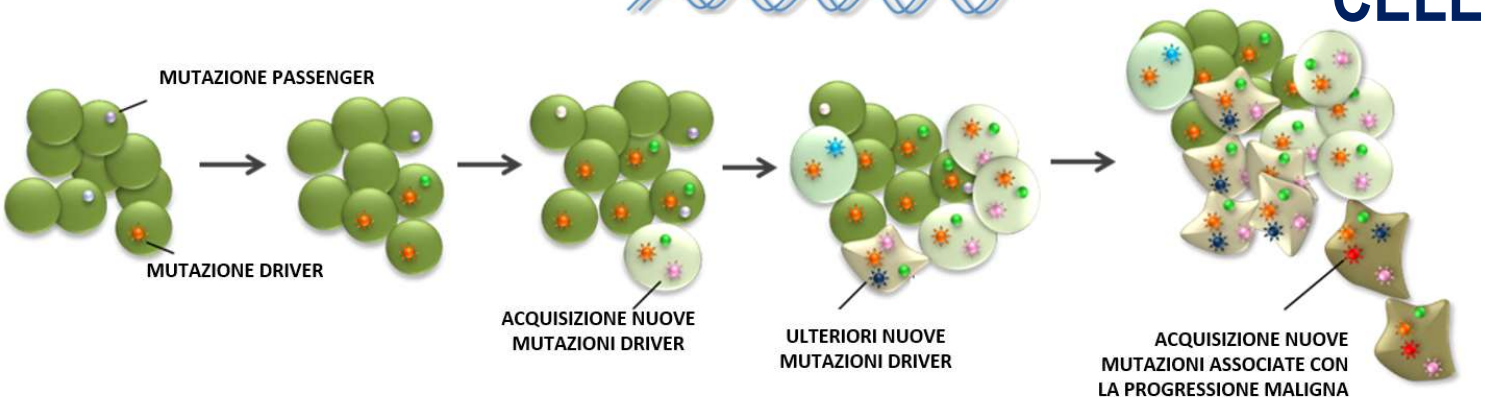
INFIAMMAZIONE CRONICA

L'**IGF-1** si lega al suo recettore e attiva l'attività tirosin chinasica stimolando l'attività di network intracellulari che regolano la proliferazione cellulare e la sopravvivenza cellulare. Questi network comprendono le vie di trasduzione PI3K–AKT–TOR e RAF–MAPK.



APOPTOSI

AUMENTO DELLA CRESCITA CELLULARE

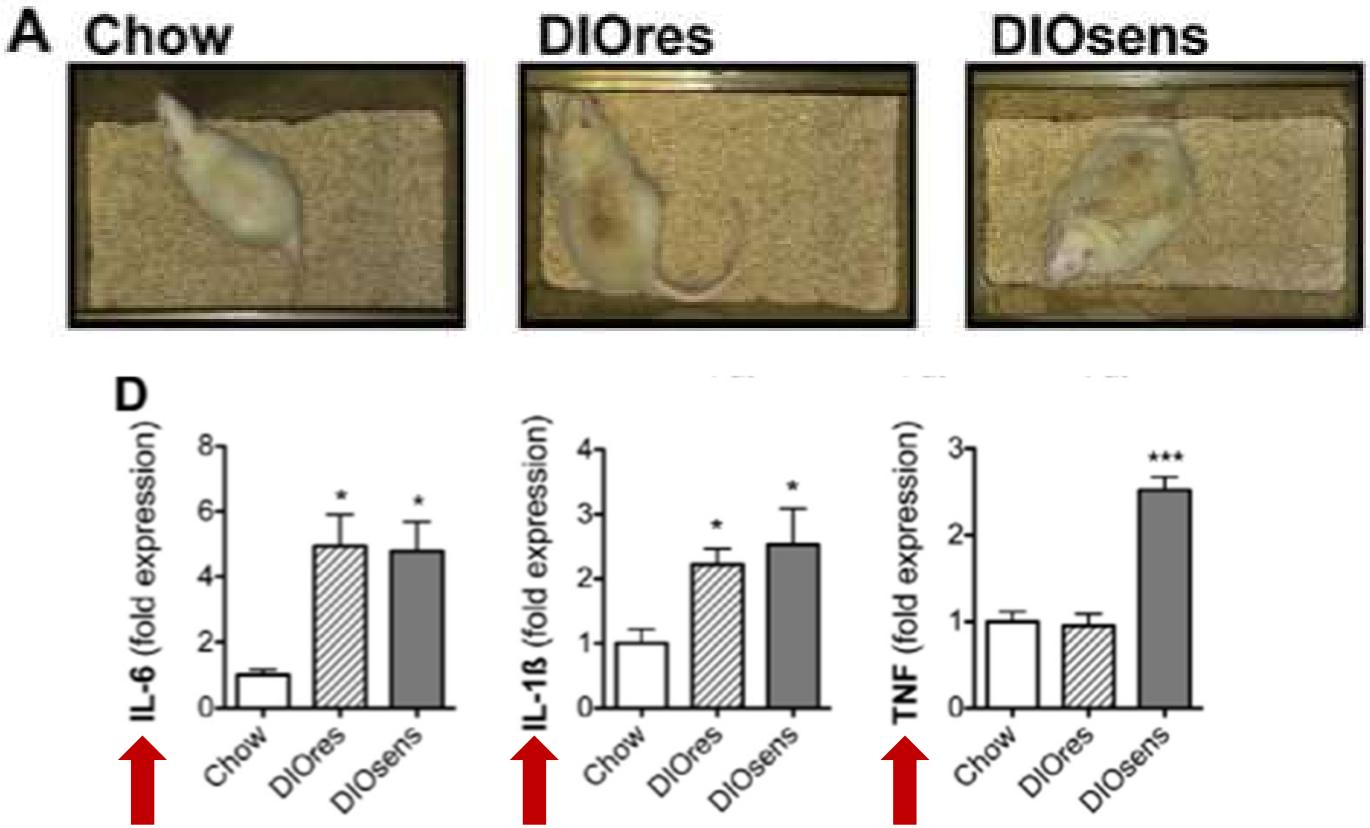


Disease Models & Mechanisms 5, 627-635 (2012) doi:10.1242/dmm.009407

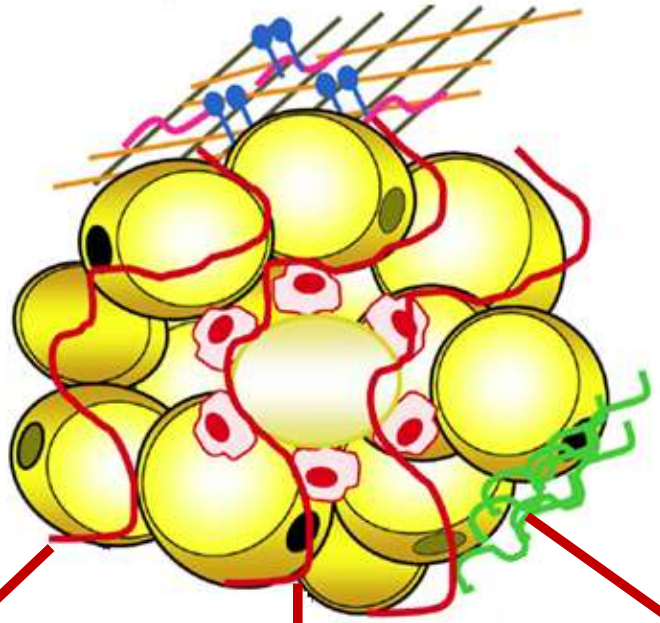
RESEARCH ARTICLE

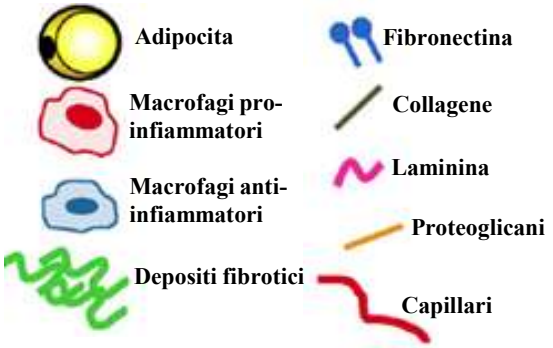
High-fat-diet-induced obesity causes an inflammatory and tumor-promoting microenvironment in the rat kidney

Kerstin Stemmer[1,2,*], Diego Perez-Tilve[1], Gayathri Ananthakrishnan[1], Anja Bort[1,3], Randy J. Seeley[1], Matthias H. Tschöp[2], Daniel R. Dietrich[3] and Paul T. Pfluger[2]



IL TESSUTO ADIPOSO RAPPRESENTA UN MICROAMBIENTE FAVOREVOLE PER LO SVILUPPO DEL TUMORE





INFIAMMAZIONE

PCR – IL-6
OPN – TNF-α

AUMENTO DELL'ESPRESSIONE DI INSULINA
AUMENTO DELL'ESPRESSIONE DI IGF

MMPs
TGF-β -
VEGF

ANGIOGENESI E RIMODELLAMENTO DELLA MATRICE EXTRACELLULARE

Pérez-Hernández AI, Front Endocrinol 2014

Public Health Nutrition: 17(8), 1689–1696

Designing and developing a literature-derived, population-based dietary inflammatory index

Nitin Shivappa[1,2], Susan E Steck[1,2], Thomas G Hurley[1], James R Hussey[2] and James R Hébert[1,2,*]

Indice Infiammatorio dietetico (DDI) calcolato sulla base dell'associazione tra alimenti e marcatori pro-infiammatori

Inflammatory markers

IL-1β
IL-4
IL-6
TNF-α
C-Reactive Protein

Food parameters

Foods
Macro-nutrients
Micro-nutrients

Shivappa N et al, 2013

HIGH INFLAMMATORY INDEX FOOD

LOW INFLAMMATORY INDEX FOOD

Published in final edited form as:
Urology. 2017 February ; 100: 84–89. doi:10.1016/j.urology.2016.09.026.

Dietary inflammatory index and risk of bladder cancer in a large Italian case-control study

Nitin Shivappa[1,2,3], **James R. Hébert**[1,2,3,4], **Valentina Rosato**[5], **Marta Rossi**[5], **Massimo Libra**[6], **Maurizio Montella**[7], **Diego Serraino**[8], and **Carlo La Vecchia**[5]

[1] Cancer Prevention and Control Program, University of South Carolina, Columbia, SC 29208, USA

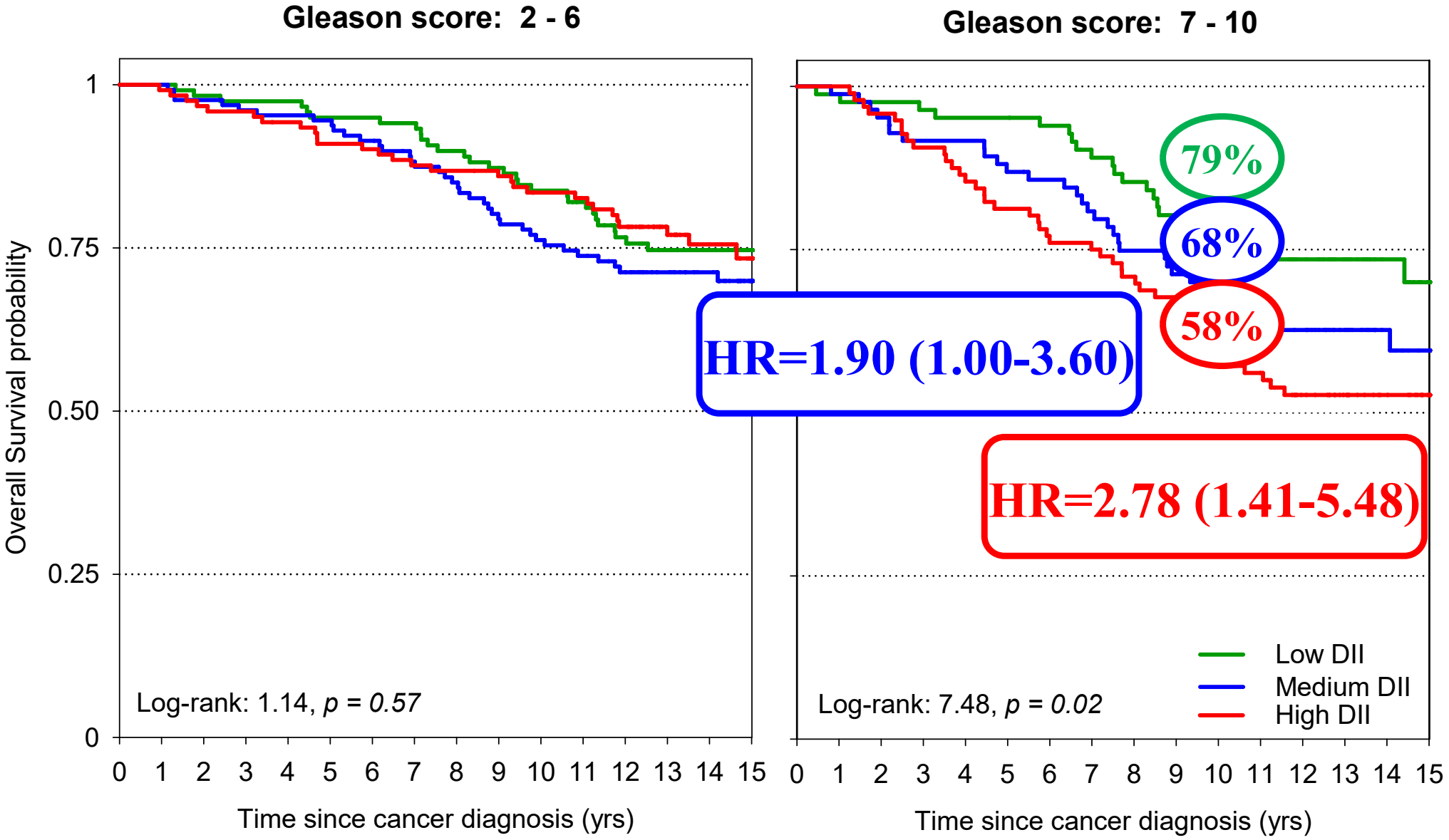
NUTRITION AND CANCER
2016, VOL. 68, NO. 7, 1123–1130
http://dx.doi.org/10.1080/01635581.2016.1216137

Increased Risk of Nasopharyngeal Carcinoma with Increasing Levels of Diet-Associated Inflammation in an Italian Case–Control Study

Nitin Shivappa[a,b,c], James R. Hébert[a,b,c], Antonella Zucchetto[d], Maurizio Montella[e], Massimo Libra[f], Werner Garavello[g], Marta Rossi[h], Carlo La Vecchia[h], and Diego Serraino[d]

[a]South Carolina Statewide Cancer Prevention and Control Program, University of South Carolina, Columbia, South Carolina, USA; [b]Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA; [c]Connecting Health Innovations LLC, Columbia, South Carolina, USA; [d]Epidemiology and Biostatistics Unit, CRO Aviano National Cancer Institute, Aviano, Italy; [e]Department of Epidemiology, 'Fondazione G. Pascale', Istituto Nazionale Tumori, Naples, Italy; [f]Department of Biomedical and Biotechnological Sciences, University of Catania, Catania, Italy; [g]Department of Surgery and Translational Medicine, University of Milano-Bicocca, Milan, Italy; [h]Department of Clinical Sciences and Community Health, Università degli Studi di Milano, Milan, Italy

DIETARY INFLAMMATORY INDEX
as prognostic indicator in prostate cancer




Please switch off
my inflammation!

Table II. Cardiovascular protective effects of pomegranate derivatives and its phytochemicals.

Disease model	Study typology	Pomegranate derivatives/phytochemicals	Effects	(Refs.)
N/A	Clinical trial (healthy volunteers)	Pomegranate extract	↓: Diastolic blood pressure	(69)
Obesity	*In vivo* (mouse)	Pomegranate juice	↓: Serum cholesterol levels ↑: PON1	(70)
Obesity/diabetes	*In vitro* (3T3-L1 cells)	Pomegranate juice, ellagic acid, punicalagin, urolithin A	↓: Lipase, α-GLU, DPP-4, adipocyte differentiation, triglyceride accumulation, adiponectin, PPARγ, GLUT4, FABP4	(75)

α-GLU, α glucosidase; DPP-4, dipeptidyl peptidase 4; FABP4, fatty acid binding protein 4; GLUT4, glucose transporter type 4; N/A, not applicable; PON1, paraoxonase 1; PPARγ, peroxisome proliferator-activated receptor γ.

Table III. Anticancer effects of pomegranate derivatives and its phytochemicals.

Tumor model	Study typology	Pomegranate derivatives/phytochemicals	Effects	(Refs.)
Breast	*In vivo* (rat)	Pomegranate emulsion	↓: ER-α, ER-β, β-catenin, cyclin D1	(97)
Lung	*In vitro* (A549, H1299, LL/2 cells)	Pomegranate leaves extract	↓: ROS, ΔΨm, MMP-2, MMP-9; arrest of cell cycle in G2/M phase	(98)
Prostate	*In vitro* (DU145, PC3, TRAMP-C1 cells)	Pomegranate peel extract	↓: Bcl2, MMP-2, MMP-9 ↑: Bax	(99)
Colorectal	*In vitro* (HCT 116 cells)	Punicalagin	↓: Cell viability of tumor cells in S phase of cell cycle, Anx-A1	(100)

Anx-A1, Annexin A1; Bax, BCL2-associated X protein; Bcl2, B-cell lymphoma 2; ΔΨm, mitochondrial membrane potential; ER-α, estrogen receptor α; ER-β, estrogen receptor β; MMP-2, matrix metallopeptidase 2; MMP-9, matrix metallopeptidase 9; ROS, reactive oxygen species.

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DOI 10.1186/s12885-017-3064-4

BMC Cancer

STUDY PROTOCOL Open Access

Low glycemic index diet, exercise and vitamin D to reduce breast cancer recurrence (DEDiCa): design of a clinical trial

Livia S.A. Augustin[1,2*], Massimo Libra[3], Anna Crispo[1], Maria Grimaldi[1], Michele De Laurentiis[1], Massimo Rinaldo[1], Massimiliano D'Aiuto[1], Francesca Catalano[4], Giuseppe Banna[4], Francesco Ferrau'[5], Rosalba Rossello[5], Diego Serraino[6], Ettore Bidoli[6], Samuele Massarut[6], Guglielmo Thomas[7,8], Davide Gatti[9], Ernesta Cavalcanti[1], Monica Pinto[1], Gabriele Riccardi[10], Edward Vidgen[11], Cyril W.C. Kendall[2,11,12], David J.A. Jenkins[2,11,13,14], Gennaro Ciliberto[1,15] and Maurizio Montella[1]

Ministero della Salute
Programma di ricerca finalizzata 2013
PE-2013-02358099

Trial Clinico DEDiCa

Mediterranean Diet

Vitamin D

Physical Activity

È uno studio randomizzato rivolto a 517 donne di età compresa tra 30 e 74 anni con diagnosi istologica di carcinoma mammario di stadio I-III e sottoposte a intervento chirurgico di resezione almeno 12 mesi prima del loro arruolamento.

Obiettivi dello studio:

- Ridurre il rischio di recidiva tumorale e migliorare la prognosi (DFS)
- Migliorare la qualità di vita delle pazienti
- Indurre modulazioni epigenetiche positive nei livelli di espressione di microRNA

High Intensity Program Treatment (HIT)

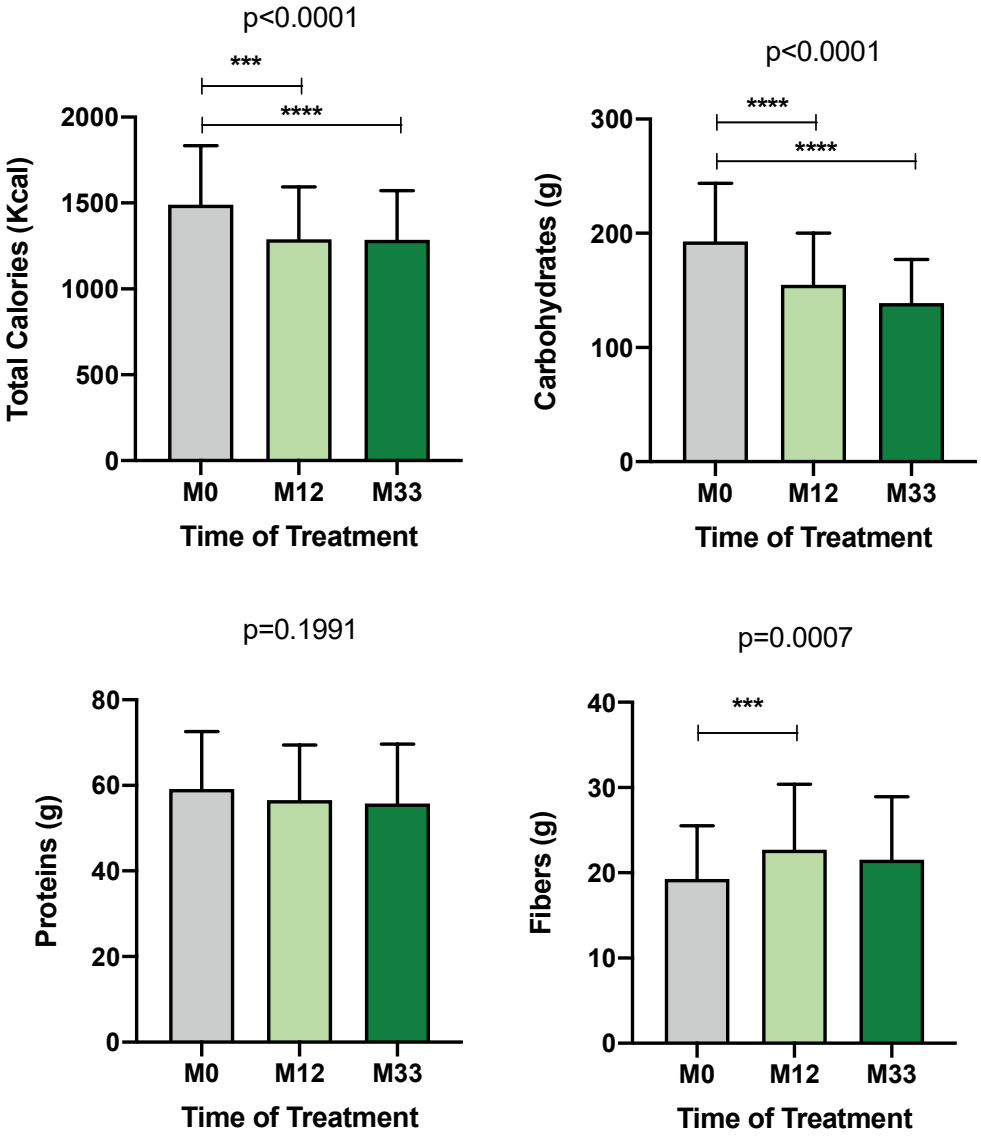
- **Dieta rigida a basso indice glicemico**
- **30 minuti di esercizio fisico giornaliero (> 5000 passi)**
- **Somministrazione di 4000 UI/die di Vit D (fino al raggiungimento dei livelli ematici di Vit D pari a 60 ng/mL)**

Low Intensity Program Treatment (LITE)

- **Aderenza a una dieta libera basata sull'assunzione di cibi salutari**
- **Nessun obbligo di esercizio fisico, che tuttavia viene consigliato**
- **Somministrazione di Vitamina D soltanto in pazienti con avitaminosi (fino al raggiungimento dei livelli ematici di Vit D pari a 30 ng/mL)**

Modulation of nutrients induced by DEDiCa interventions

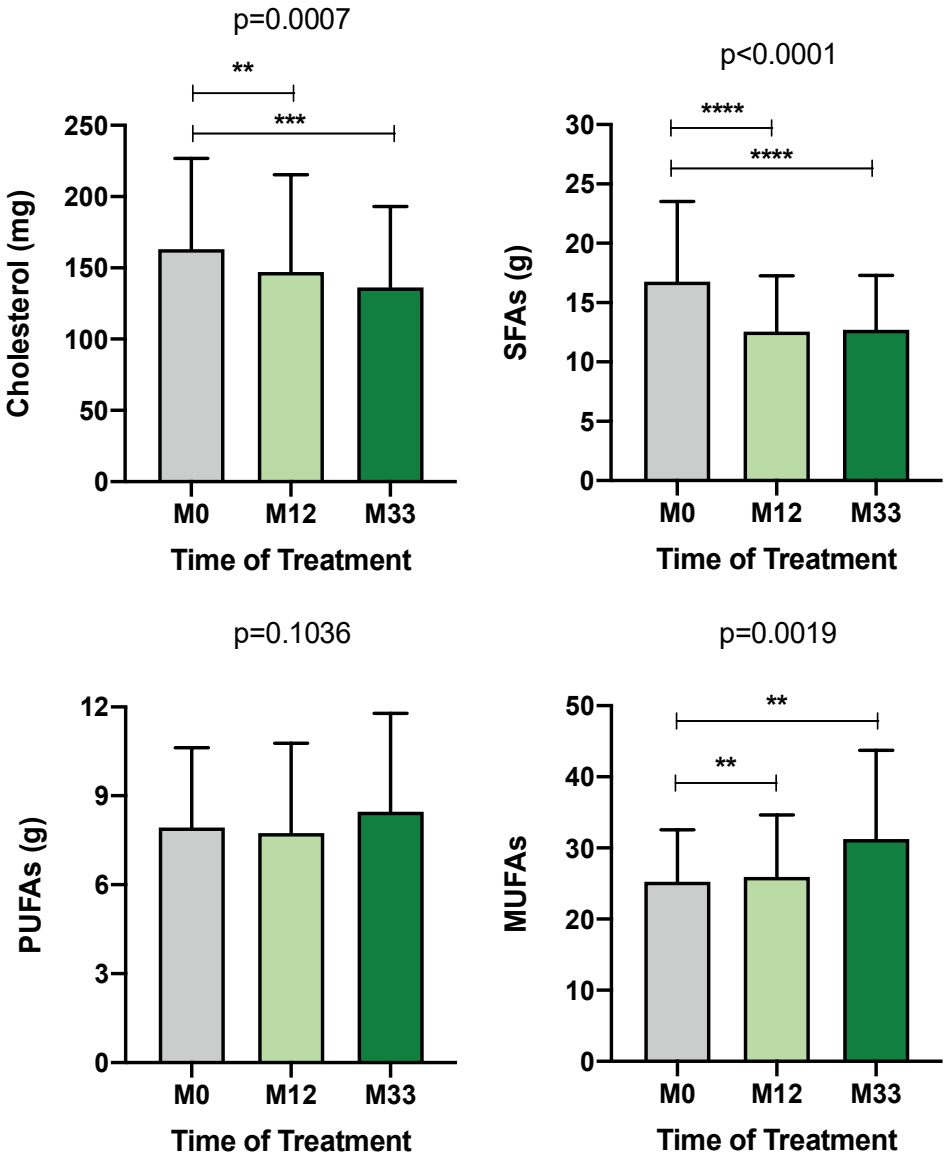
- Time-dependent **reduction of total calories** due to a **lower carbohydrate intake** in all breast cancer patients.
- Greater reductions were observed at the end of the study, after 33 months of dietary and lifestyle interventions.
- An **increase in fibers consumption** was observed after 12 months of treatment due to the increased consumption of fruits and vegetables.



Modulation of metabolic parameters by DEDiCa interventions

- By evaluating micronutrients, a significant reduction of cholesterol and saturated fatty acids intake was observed after 12 and 33 months of treatment.

- Conversely, intake increments were observed for poly-unsaturated and mono-unsatured fatty acids during DEDiCa treatments.



Secondary Endpoint:
Improvement of women's quality of life

nutrients

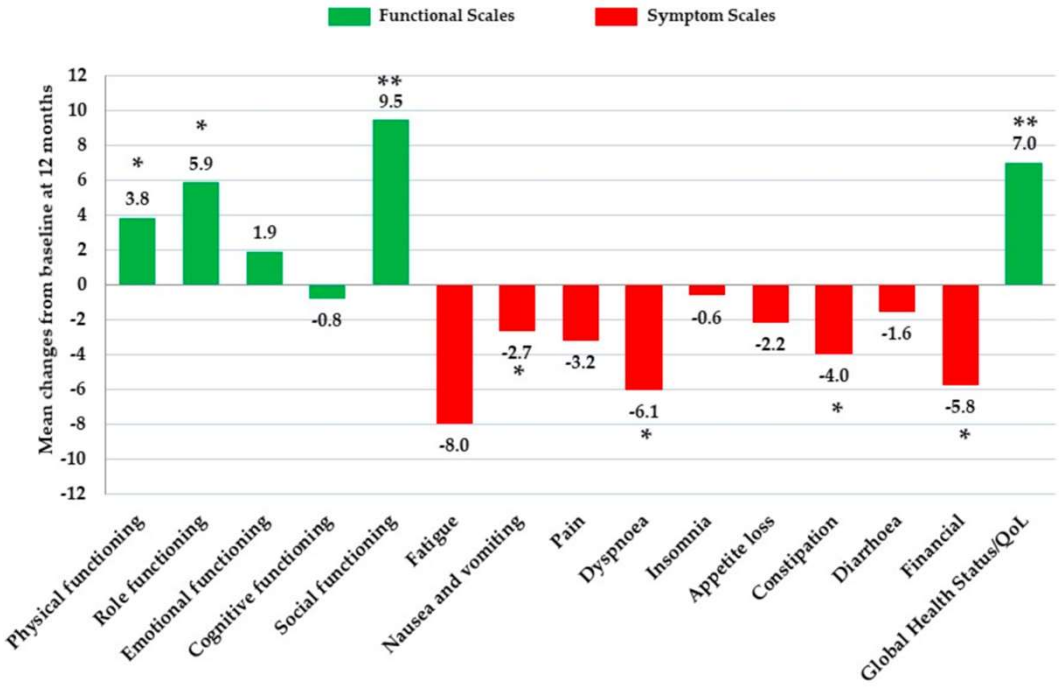
Nutrients 2021, 13, 136.

Article

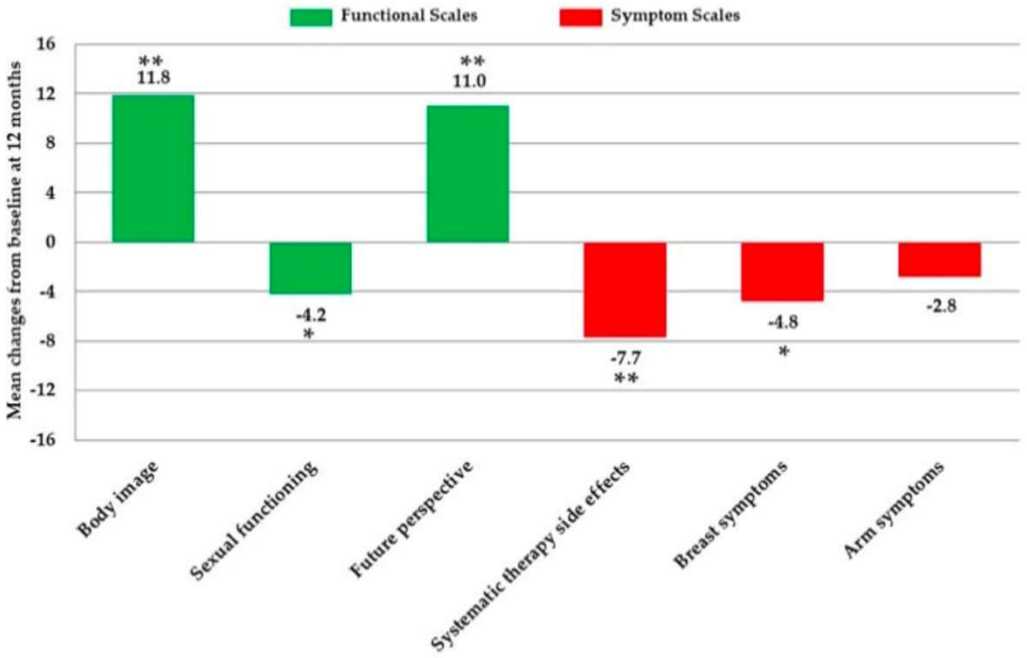
Quality of Life in Women Diagnosed with Breast Cancer after a 12-Month Treatment of Lifestyle Modifications

Concetta Montagnese [1], Giuseppe Porciello [1,*], Sara Vitale [1], Elvira Palumbo [1], Anna Crispo [1], Maria Grimaldi [1], Ilaria Calabrese [2], Rosa Pica [1], Melania Prete [1], Luca Falzone [1], Massimo Libra [3], Serena Cubisino [4], Luigina Poletto [5], Valentina Martinuzzo [5], Sergio Coluccia [1], Nadia Esindi [6], Flavia Nocerino [1], Anita Minopoli [7], Bruna Grilli [7], Pasqualina C. Fiorillo [7], Marco Cuomo [7], Ernesta Cavalcanti [7], Guglielmo Thomas [8], Daniela Cianniello [9], Monica Pinto [10], Michelino De Laurentiis [9], Carmen Pacilio [9], Massimo Rinaldo [9], Massimiliano D'Aiuto [11], Diego Serraino [5], Samuele Massarut [5], Laura Caggiari [12], Chiara Evangelista [12], Agostino Steffan [12], Francesca Catalano [4], Giuseppe L. Banna [4], Giuseppa Scandurra [4], Francesco Ferraù [13], Rosalba Rossello [13], Giovanna Antonelli [13], Gennaro Guerra [14], Amalia Farina [14], Francesco Messina [14], Gabriele Riccardi [2], Davide Gatti [15], David J. A. Jenkins [16,17,18], Egidio Celentano [1], Gerardo Botti [19] and Livia S. A. Augustin [1]

Secondary Endpoint: Improvement of women's quality of life (EQ-5D-3L and EORTC QLQ-C30)



- Improvement of physical, role and social functioning ($p<0.01$) and reduction of symptoms including nausea, dyspnea, constipation and fatigue. Overall improvement of QoL.



- Improvement of body image perception and future expectation. It was also observed a reduction of drug-related side effects and breast pain and symptoms

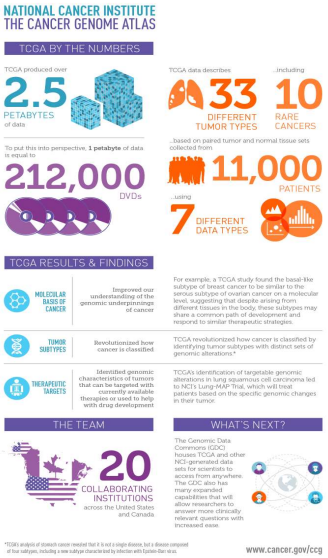
Third Endpoint: Epigenetic modification induced by DEDiCa treatments

Through the computational analysis of miRNA expression data contained in GEO DataSets and TCGA BRCA databases we identified a set of miRNAs strongly associated with the development and progression of breast cancer and positively modulated by vitamin D and lifestyle interventions

Database Analysis

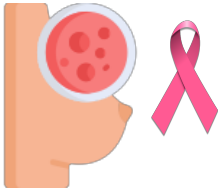
Gene Expression Omnibus

The Cancer Genome Atlas

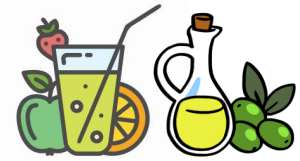


Datasets Selection

8 Breast Cancer datasets



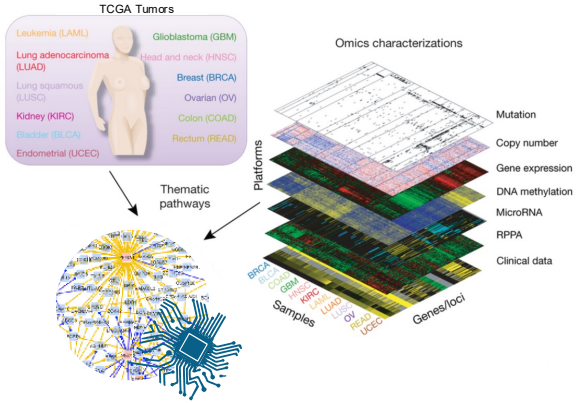
3 Healthy Diet datasets



7 Exercise datasets

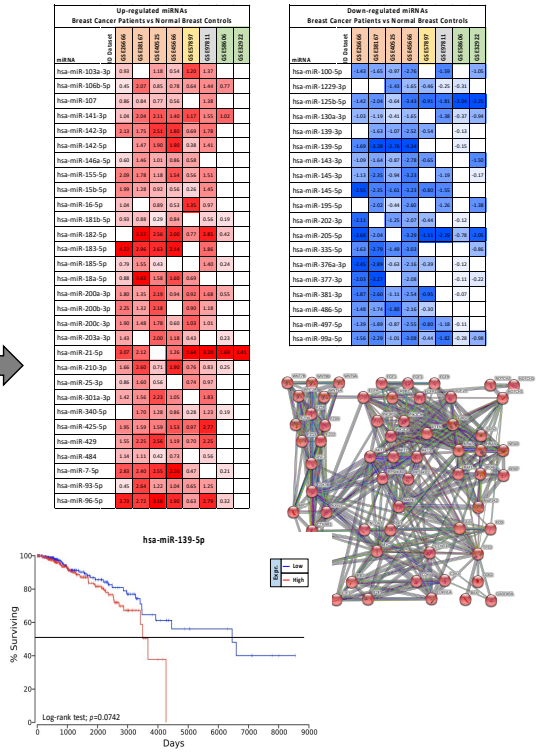
Computational analysis of Data

Genetic and Epigenetic Data



Clinical-Pathological Data

Identification of miRN As associated breast cancer, diet and exercise



Falzone L et al, Cancers 2020

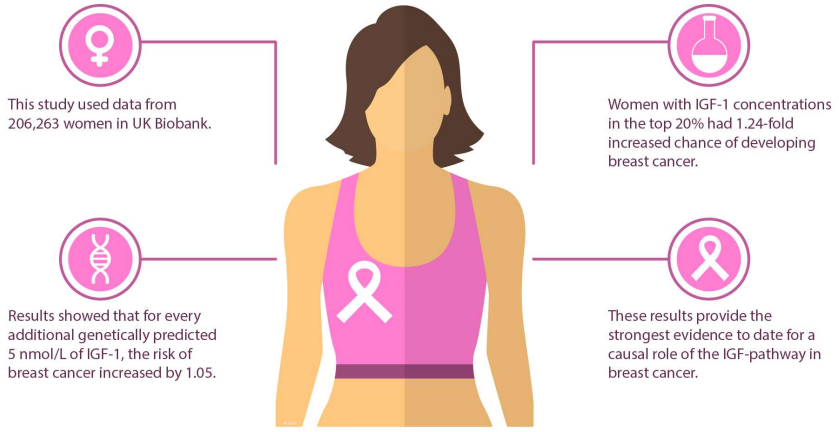
Identification of diet- and exercise-modulated microRNAs

The integration of miRNA expression data with the main clinical-pathological characteristics of patients with BC allowed the identification of 5 miRNAs modulated by diet and exercise and involved in the regulation of tumor promoting proteins

↑ hsa-miR-21-5p
hsa-miR-7-5p

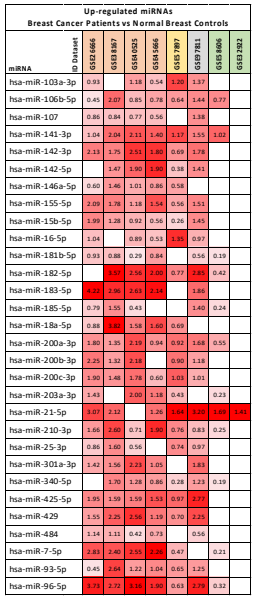
↓ hsa-miR-125b-5p
hsa-miR-486-5p
hsa-miR-139-5p

→



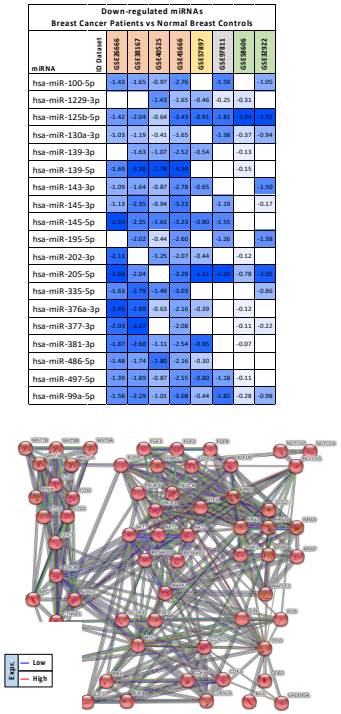
Clinical Validation of the 5 BC microRNAs modulated by diet and exercise

Identification of miRNAs associated breast cancer, diet and exercise



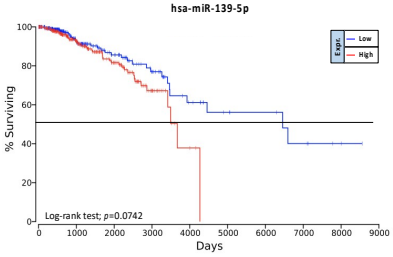
Up-regulated miRNAs
Breast Cancer Patients vs Normal Breast Controls

miRNA	ID Dataset	GSE6666	GSE19387	GSE43925	GSE45666	GSE57897	GSE97811	GSE58606	GSE23302
hsa-miR-103a-3p	0.93		1.18	0.54	1.20	1.37			
hsa-miR-106b-5p	0.45	2.07	0.85	0.78	0.64	1.44	0.77		
hsa-miR-107	0.86	0.84	0.77	0.56		1.38			
hsa-miR-141-3p	1.04	2.04	2.11	1.40	1.17	1.55	1.02		
hsa-miR-142-3p	2.13	1.75	2.51	1.80	0.69	1.78			
hsa-miR-142-5p		1.47	1.90	1.90	0.38	1.41			
hsa-miR-146a-5p	0.60	1.46	1.01	0.86	0.58				
hsa-miR-155-5p	2.09	1.78	1.18	1.54	0.56	1.51			
hsa-miR-15b-5p	1.99	1.28	0.92	0.56	0.26	1.45			
hsa-miR-16-5p	1.04		0.89	0.53	1.35	0.97			
hsa-miR-181b-5p	0.93	0.88	0.29	0.84		0.56	0.19		
hsa-miR-182-5p		3.47	2.56	2.40	0.77	2.83	0.42		
hsa-miR-183-5p	4.27	2.96	2.63	2.73		1.86			
hsa-miR-185-5p	0.79	1.55	0.43			1.40	0.24		
hsa-miR-18a-5p	0.88	3.40	1.58	1.60	0.69				
hsa-miR-200a-3p	1.80	1.35	2.19	0.94	0.92	1.68	0.55		
hsa-miR-200b-3p	2.25	1.32	2.18		0.90	1.18			
hsa-miR-200c-3p	1.90	1.48	1.78	0.60	1.03	1.01			
hsa-miR-203a-3p	1.43		2.00	1.18	0.43		0.23		
hsa-miR-21-5p	3.07	2.12		1.26	1.64	3.23	1.69	1.43	
hsa-miR-210-3p	1.66	2.60	0.71	1.90	0.76	0.83	0.25		
hsa-miR-25-3p	0.86	1.60	0.56		0.74	0.97			
hsa-miR-301a-3p	1.42	1.56	2.23	1.05		1.83			
hsa-miR-340-5p		1.70	1.28	0.86	0.28	1.23	0.19		
hsa-miR-425-5p	1.95	1.59	1.59	1.51	0.97	2.27			
hsa-miR-429	1.55	2.25	2.56	1.19	0.70	2.23			
hsa-miR-484	1.14	1.11	0.42	0.73		0.56			
hsa-miR-7-5p	2.83	2.40	2.55	2.20	0.47		0.21		
hsa-miR-93-5p	0.45	2.04	1.22	1.04	0.65	1.25			
hsa-miR-96-5p	3.73	2.72	3.18	1.90	0.63	2.73	0.32		



Down-regulated miRNAs
Breast Cancer Patients vs Normal Breast Controls

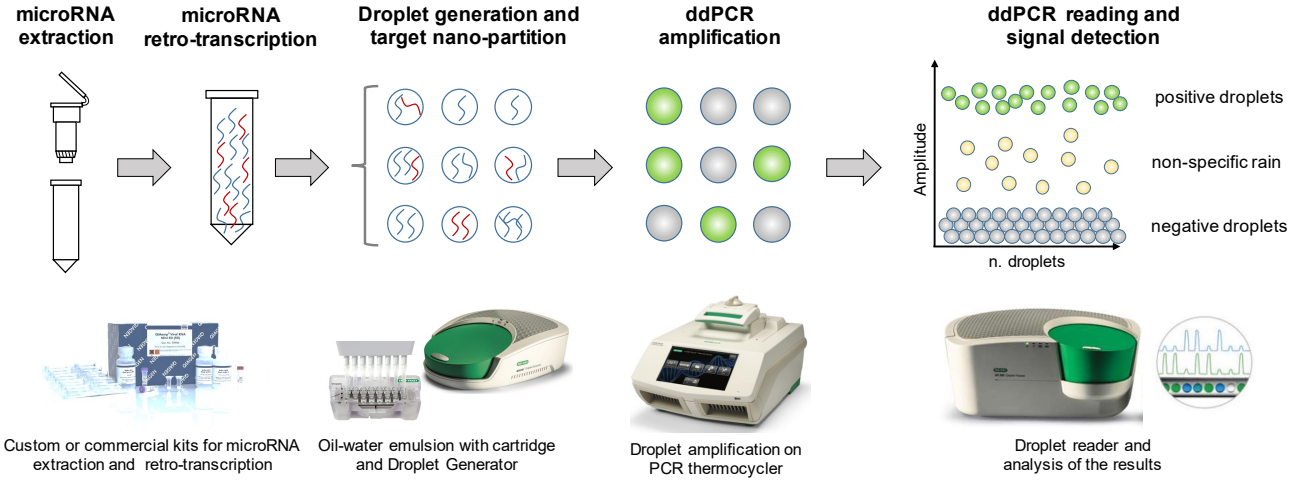
miRNA	ID Dataset	GSE6666	GSE38167	GSE43925	GSE45666	GSE57897	GSE97811	GSE58606	GSE23302
hsa-miR-100-5p	-1.43	-1.65	-0.97	-2.76		-1.59		-1.05	
hsa-miR-1229-3p			-1.43	-1.65	-0.46	-0.25	-0.31		
hsa-miR-125b-5p	-1.42	-2.04	-0.64	-3.43	-0.91	-1.81	-2.04	-2.25	
hsa-miR-130a-3p	-1.03	-1.19	-0.41	-1.65		-1.18	-0.37	-0.94	
hsa-miR-139-3p		-1.63	-1.07	-2.52	-0.56		-0.13		
hsa-miR-139-5p	-1.69	-3.28	-2.76	-4.34			-0.15		
hsa-miR-143-3p	-1.09	-1.64	-0.87	-2.78	-0.63			-1.50	
hsa-miR-145-3p	-1.13	-2.35	-0.94	-3.23		-1.19		-0.17	
hsa-miR-145-5p	-2.52	-2.35	-1.61	-3.23	-0.80	-1.55			
hsa-miR-195-5p		-2.02	-0.44	-2.60		-1.26		-1.38	
hsa-miR-202-3p	-2.11		-1.25	-2.07	-0.43		-0.12		
hsa-miR-205-5p	-2.62	-2.04		-3.29	-1.13	-2.29	-0.78	-2.15	
hsa-miR-335-5p	-1.61	-2.79	-1.49	-3.03				-0.86	
hsa-miR-376a-3p	-2.45	-2.89	-0.63	-2.16	-0.39		-0.12		
hsa-miR-377-3p	-2.03	-3.27		-2.08			-0.11	-0.22	
hsa-miR-381-3p	-1.87	-2.60	-1.13	-2.54	-0.92		-0.07		
hsa-miR-486-5p	-1.46	-1.74	-1.80	-2.16	-0.30				
hsa-miR-497-5p	-1.39	-1.89	-0.87	-2.55	-0.80	-1.18	-0.11		
hsa-miR-99a-5p	-1.56	-2.29	-1.01	-3.08	-0.44	-1.82	-0.28	-0.98	



The 5 BC-associated miRNAs modulated by vitamin D, diet and exercise were selected to be validated in liquid biopsy samples obtained from DEDiCa patients at different time-points by using a custom droplet digital PCR protocol

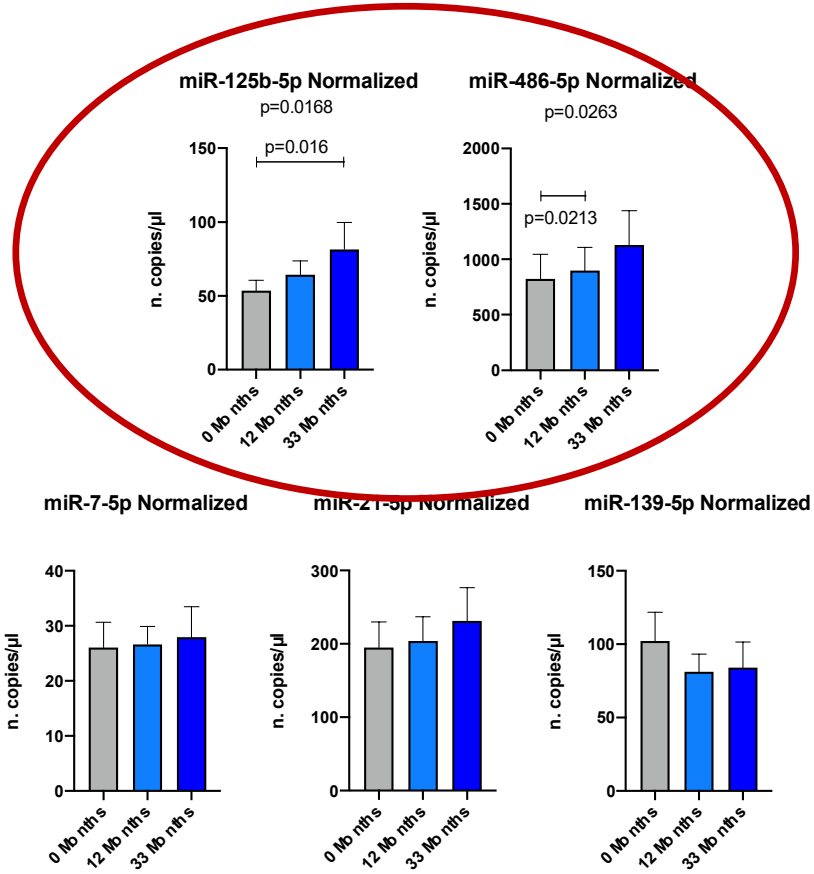
↑ hsa-miR-21-5p
hsa-miR-7-5p

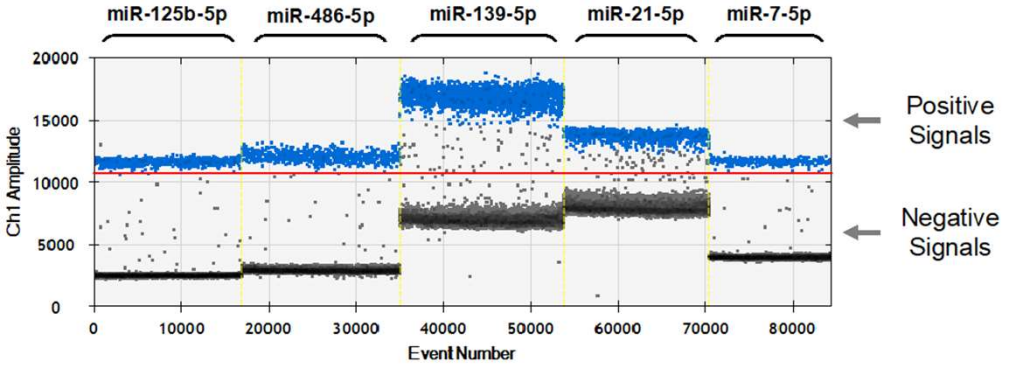
↓ hsa-miR-125b-5p
hsa-miR-486-5p
hsa-miR-139-5p



Significant modulation of the expression levels of miR-125b and miR-486 after DEDiCa interventions

- For all selected miRNAs it was possible to determine the expression levels by using the ddPCR protocol

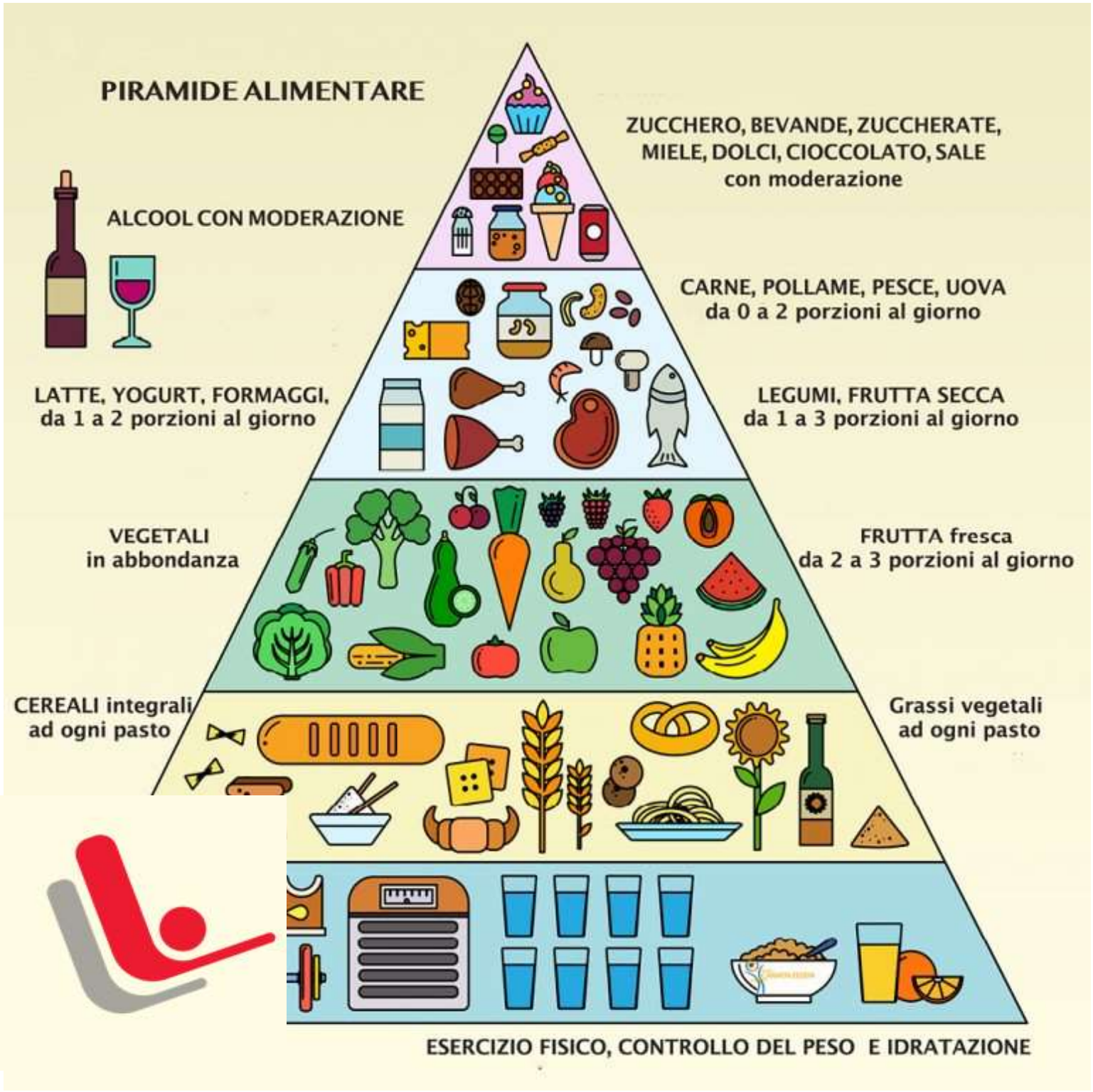


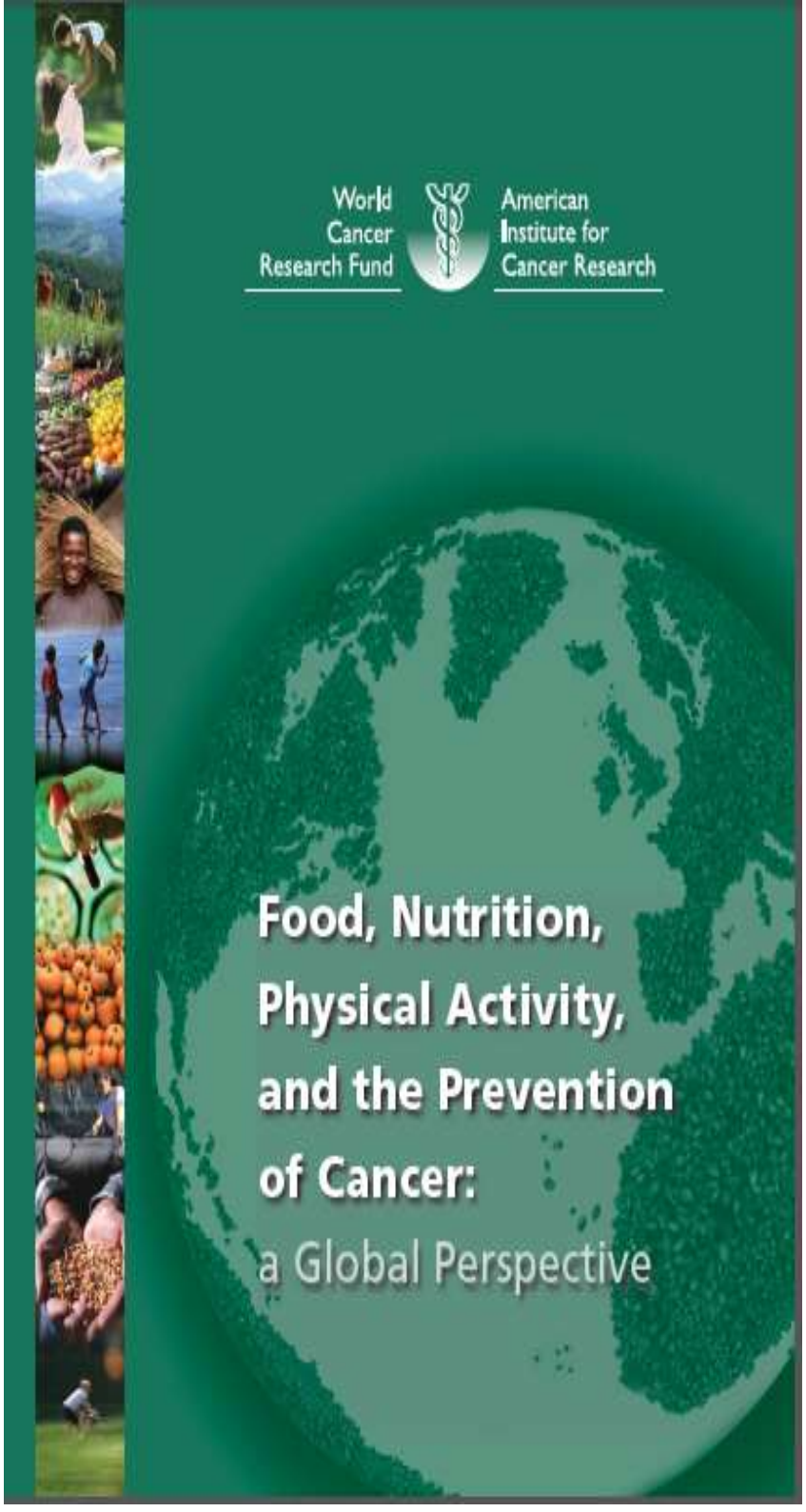


The expression levels of the two predicted down-regulated miRNAs hsa-miR-125b-5p and hsa-miR-486-5p were significantly increased in a time-dependent manner in all the DEDiCa patients. Overall, both HIT and LITE treatments positively modulate the expression levels of these two miRNAs

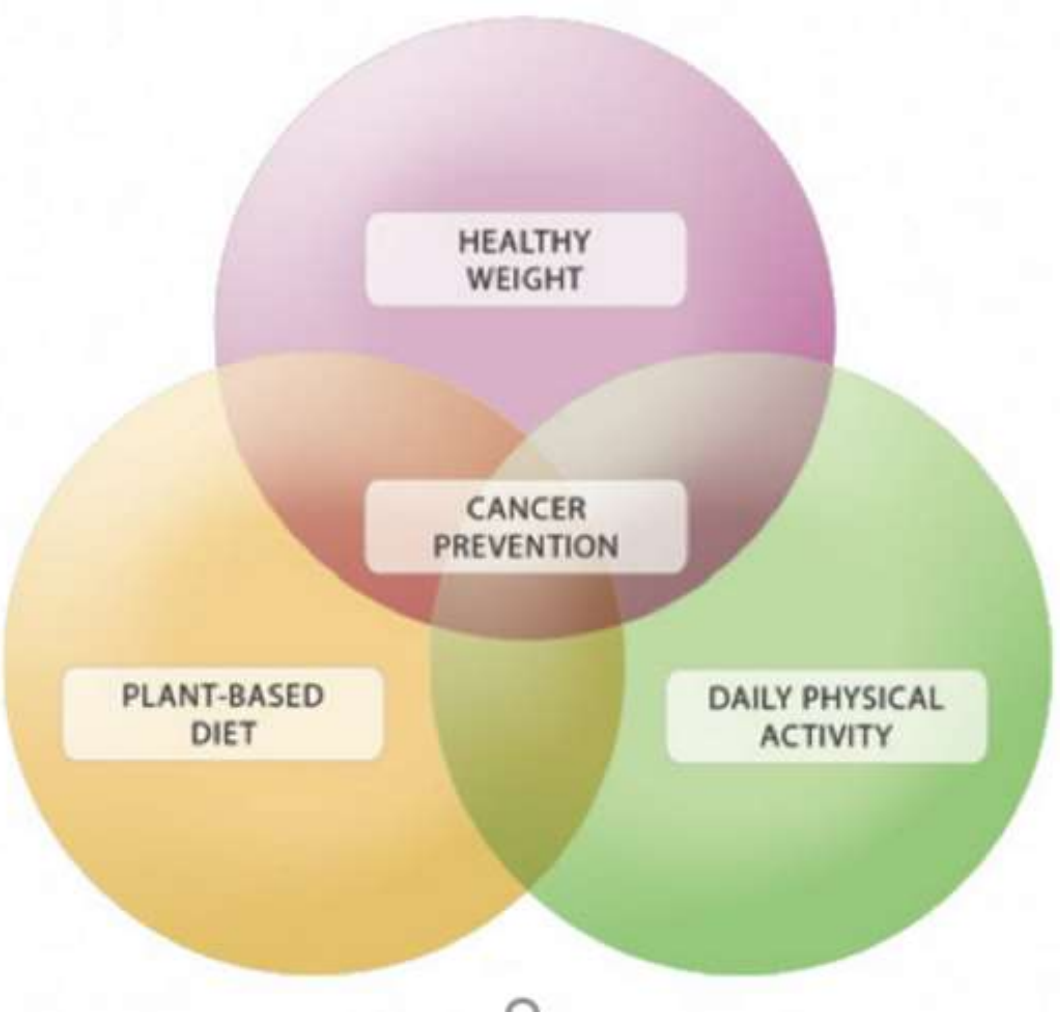
CONCLUSIONI – PARTE II

- L'elevato inidice infiammatorio dietetico è un fattore di rischio per lo sviluppo dei tumori e un fattore prognostico sfavorevole per I pazienti con diagnosi di tumore
- L'intervento teraputico dietetico DEDICa contribuisce a un miglioramento dei parametri antropometrici e metabolici delle donne con cancro della mammella nonchè della loro qualità di vita
- I trattamenti DEDiCa inducono una modulazione positiva dei livelli di espressione di microRNA tumor suppressor in grado di contrastare la progressione tumorale
- Trattamenti integrati basati sulla somministrazione di dieta a basso indice glicemico, esercizio fisico e somministrazione di vitamina D migliorano la prognosi e la qualità di vita delle pazienti


PIRAMIDE ALIMENTARE
ZUCCHERO, BEVANDE, ZUCCHERATE,
MIELE, DOLCI, CIOCCOLATO, SALE
con moderazione
ALCOOL CON MODERAZIONE
CARNE, POLLAME, PESCE, UOVA
da 0 a 2 porzioni al giorno
LATTE, YOGURT, FORMAGGI,
da 1 a 2 porzioni al giorno
LEGUMI, FRUTTA SECCA
da 1 a 3 porzioni al giorno
VEGETALI
in abbondanza
FRUTTA fresca
da 2 a 3 porzioni al giorno
CEREALI integrali
ad ogni pasto
Grassi vegetali
ad ogni pasto
ESERCIZIO FISICO, CONTROLLO DEL PESO E IDRATAZIONE



Choose predominantly **plant-based diets** rich in a variety of **vegetables and fruits**, **legumes** and minimally processed **starchy foods**



COMUNICATI STAMPA, NOTIZIE LILT

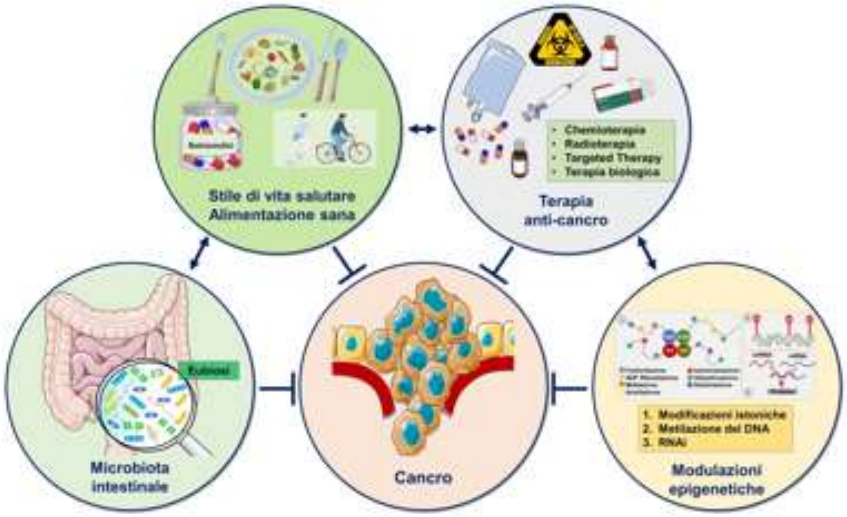
Catania. Inaugurati i nuovi locali Lilt presso il Policlinico "Morgagni"

PUBBLICATO IL 2 DICEMBRE 2023 DA LILT CATANIA

02
Dic

ALIMENTAZIONE IN ONCOLOGIA

Aspetti bioetici, legislativi, molecolari e clinici



A cura di:

M. Libra - A. Sapuppo - L. Falzone

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