Evaluating reproductive, clinical history, anthropometric measures and lifestyles in the large ANDROMEDA screening cohort, exploring the association with breast cancer onset.

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Background

✓ Several **breast cancer (BC) risk stratification models** are currently available, assessing the impact of well-known <u>non-modifiable</u> (e.g. familiarity, prior biopsies, reproductive history, etc.) and <u>potentially modifiable risk factors</u> (e.g. body mass index - BMI, physical activity - PA, alcohol use, etc.).

✓ In recent years, **additional polygenic factors** have been included in these comprehensive models.

✓ Limited evidence quantifying **the impact of single parameters** is available, especially considering the effect of modifiable risk factors.

The Andromeda study

AIM:

✓ To estimate the **predictive positive values for breast cancer** - BC of model-based estimates of absolute risk, breast density, and life-styles **among a large perspective cohort** of **women attending BC screening**.

✓ To evaluate the accuracy of selected circulating microRNAs and SNPs in a nested case-control study.

Recruitment setting: Biella and Turin BC screening centres

Study period: from July 2015 to December 2017

Study methodology

ELIGIBILITY CRITERIA

✓ Women aged **46-69 years**

✓ Women attending **BC screening** examinations in the cities of **Turin and Biella**, two Northern Italian cities in Piedmont.

Women who agreed to participate in Andromeda were asked to fill-in a **short risk questionnaire (SRQ)** on general BC risk factors, immediately at the enrolment desk.

In addition, they were asked to:

- Complete a longer **lifestyle questionnaire (LSQ);**

- Undergo **anthropometric measurements** (height, weight, body composition, and waist circumference);

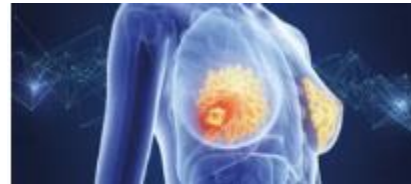- Provide a **blood sample** for serum, plasma and buffy-coat storing.
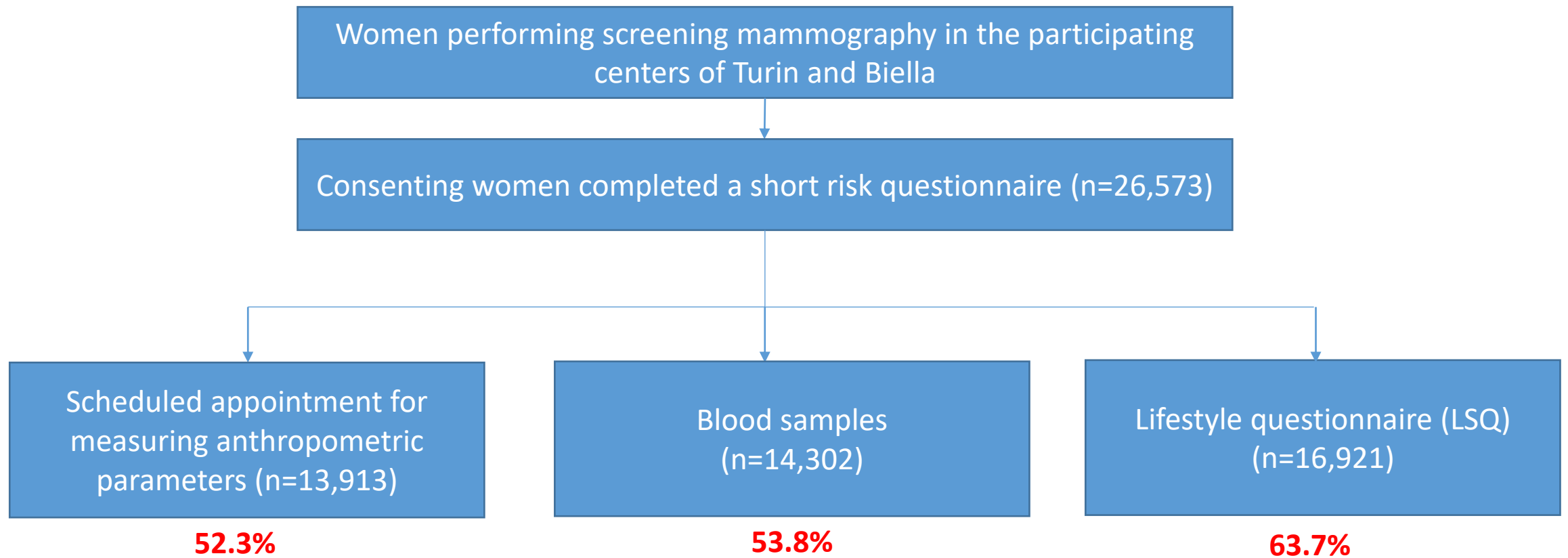
Definition of a comprehensive lifestyle score

Computation of a score based on **World Cancer Research Fund and the American Institute for Cancer Research (WCRF/AICR) guidelines for Breast Cancer**

Is concordance with World Cancer Research Fund/American Institute for Cancer Research guidelines for cancer prevention related to subsequent risk of cancer? Results from the EPIC study[1-4]

Dora Romaguera, Anne-Claire Vergnaud, Petra H Peeters, Carla H van Gils, Doris SM Chan, Pietro Ferrari, Isabelle Romieu, Mazda Jenab, Nadia Slimani, Françoise Clavel-Chapelon, Guy Fagherazzi, Florence Perquier, Rudolf Kaaks, Birgit Teucher, Heiner Boeing, Anne von Rüsten, Anne Tjønneland, Anja Olsen, Christina C Dahm, Kim Overvad, José Ramón Quirós, Carlos A Gonzalez, María José Sánchez, Carmen Navarro, Aurelio Barricarte, Miren Dorronsoro, Kay-Tee Khaw, Nicholas J Wareham, Francesca L Crowe, Timothy J Key, Antonia Trichopoulou, Pagona Lagiou, Christina Bamia, Giovanna Masala, Paolo Vineis, Rosario Tumino, Sabina Sieri, Salvatore Panico, Anne M May, H Bas Bueno-de-Mesquita, Frederike L Büchner, Elisabet Wirfält, Jonas Manjer, Ingegerd Johansson, Göran Hallmans, Guri Skeie, Kristin Benjaminsen Borch, Christine L Parr, Elio Riboli, and Teresa Norat

REVIEW

A systematic review and meta-analysis of the 2007 WCRF/AICR score in relation to cancer-related health outcomes

M. Solans[1,2], D. S. M. Chan[3], P. Mitrou[4], T. Norat[3] & D. Romaguera[5,6,1]*

Range: 0-8
Categorization in 4-groups (from the least to the more compliant to WCRF recommendations).

Recommendation	Scoring
1) Body fatness. Be as lean as possible without becoming underweight.	BMI (in kg/m2) 18.5–24.9: 1 25–29.9: 0.5 <18.5 or ≥30: 0
2) Physical activity. Be physically active as part of your everyday life.	Manual job, or >2 h/wk of vigorous PA, or >30 min/die of cycling/sports: 1 15–30 min/d of cycling/sports: 0.5 <15 min/d of cycling/sports: 0
3) Limit consumption of energy-dense foods; avoid sugary drinks	ED intake (kcal/100 g/die): ≤125: 1 125-175: 0.5 >175 kcal: 0 Sugary drink intake (g/die): Never: 1 ≤250: 0.5 >250: 0
4) Eat mostly foods of plant origin	Fruit and Vegetables (g/die) ≥400: 1 200-400: 0.5 <200 g/d: 0 Dietary fiber intake (g/die): ≥25: 1 12.5-25: 0.5 <12.5: 0
5) Limit intake of red and avoid processed meat	Red meat <500 g/wk and processed meat <3 g/d: 1 Red meat <500 g/wk and processed intake 3-<50 g/d: 0.5 Red meat ≥500 g/wk or processed meat intake ≥50 g/d: 0
6) Limit alcoholic drinks	Ethanol intake (g/die): ≤10: 1 10–20: 0.5 >20: 0
7) Breastfeeding	Cumulative breastfeeding: ≥6 months: 1 0-6 months: 0.5 Never: 0

Andromeda population (N=26,573)

At August 2022, **508** Breast Cancer cases occurred among the cohort

> ✓ **84.3%** as **invasive lesions** and the remaining were in situ.

No differences in **crude ORs** emerged for any socio-demographic feature based on cancer occurrence, except for:

- **Age:** OR 1.03 (CI: 1.01-1.04)
- **Recruitment seat:**
  - Turin: ref.
  - Biella: OR 0.69 (CI: 0.54-0.88)

Participants general characteristics at baseline

		N=26,640 (%)
Age		57.7±6.1
Recruitment seat:		
	Turin	20,996 (79.0)
	Biella	5,577 (21.0)
Marital status:		
	Married	11,689 (69.9)
	Single	1,421 (8.5)
	Divorced	2,619 (15.7)
	Widow	990 (5.9)
Years of study		
	<7	1,284 (5.2)
	7-12	17,737 (71.6)
	≥12	5,754 (23.2)

Short questionnaire within Andromeda cohort

Questionnaire structure

➢ General information

➢ Personal **clinical history** (familiarity of BC, prior biopsies, current/previous hormonal replacement therapy, contraceptive history)

➢ Hormonal and reproductive history (age at menarche, age at first child, menopause)

➢ Habits at 30-39 years (working and leisure PA, alcohol intake)

SHORT RISK QUESTIONNAIRE
(to be filled on the tablet device)

		N (%)
Familiarity	1	3,172 (12.6)
	2 or more	475 (1.9)
	None	21,236 (84.7)
	Not remember	185 (0.7)
Prior biopsies	0	21,736 (81.6)
	1	2,618 (9.8)
	2+	2,286 (8.6)
Age at first child	≤19 years	1,456 (7.4)
	20-24	5,814 (29.4)
	25-29	6,207 (31.3)
	≥30	6,319 (31.9)
Age at menarche	≤11 years	6,228 (24.8)
	12-13	12,611 (50.30)
	≥14	6,074 (24.2)
Menopause	No	3,902 (15.6)
	Yes	19,852 (79.2)
	Perimenopause	1,317 (5.2)
Hormonal Replacement Therapy	No	22,276 (95.8)
	Yes	979 (4.2)
Hormonal contraceptive	No	7,169 (43.11)
	Yes	9,459 (56.9)

Model considering the non-modifiable risk factors

A logistic regression was performed accounted exclusively for non-modifiable risk factors gathered from the brief questionnaire (completed by all participants).

caso	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
familiarity	1.334278	.2096034	1.84	0.066	.9806858	1.815359
biopsies	1.768308	.2699277	3.73	0.000	1.311065	2.385018
menarche						
1	1.173837	.1771643	1.06	0.288	.8732492	1.577893
2	1.19935	.1800089	1.21	0.226	.8936972	1.60954
menopause	1.2538	.1319876	2.15	0.032	1.020051	1.541112
age_first_~d						
1	.8781493	.1520361	-0.75	0.453	.6254574	1.232931
2	1.106134	.1855726	0.60	0.548	.7961673	1.536778
3	1.120901	.2090457	0.61	0.541	.7777144	1.615529
HRT_c	1.381952	.3767811	1.19	0.235	.809875	2.358132
antic	1.022872	.1317044	0.18	0.861	.7947322	1.316502
age	1.045937	.0139688	3.36	0.001	1.018914	1.073677
_cons	.0009861	.0008321	-8.20	0.000	.0001886	.0051546

Anthropometric parameters

✓ **13,913 (52.2%)** women performed the anthropometric assessment performing a **Bioelectrical Impedance Analysis** using a digital scale (_Tanita_).

✓ No differences in the anthropometric assessment uptake emerged by BC occurrence (p=0.51)

Anthropometric status in the cohort

	N=13,913 (%)
BMI	25.5±5.2
Waist circumference	86.5±13.0
Fat mass (as %)	
Healthy	8,189 (59.7)
Overfat	3,130 (22.8)
Obese	2,383 (17.4)
Visceral fat*	
Healthy	6,628 (88.8)
At-risk	840 (11.2)

*Visceral fat was automatically measured by Tanita, available only for Turin participants (n=7,468)

Crude ORs for the association with BC occurrence:
BMI: 1.00 (CI: 0.99-1.02)
Waist circumference: 1.02 (CI: 1.01-1.03)
Fat mass composition: 1.04 (CI: 1.01-1.06)
Visceral fat: 1.71 (CI: 1.12-2.59)

Long questionnaire on lifestyles

Lifestyles among the cohort

✓ **16,921 (63.5%)** women returned the paper questionnaire (at least partial completion) or completed it online.

✓ Completion rate did not vary by cancer occurrence (p=0.687)

✓ Assessed lifestyles: PA, diet, alcohol intake, breastfeeding, and concomitant diseases.

✓ No single lifestyle was associated to BC → definition of a combined score (**lifestyle pattern**)

QUESTIONNAIRE ON LIFE STYLE HABITS

Studio ANDROMEDA

		N (%)
Occupational PA level	Low	12,566 (74.4)
	Intermediate	2,965 (17.5)
	High	1,365 (8.1)
Leisure weekly PA	h/week	8.1±6.0
Vigorous PA (by week)	<2/h	11,141 (67.1)
	≥2/h	5,472 (32.94)
Fruits and vegetables daily intake	<200/g	1,042 (6.4)
	200-400 g	4,041 (24.9)
	≥ 400 g	11,180 (68.7)
Total daily fiber intake	<12.5 g	2,279 (13.4)
	12.5-25 g	9,773 (57.5)
	≥25g	4,952 (29.1)
Weekly red and processed meat intake	Red ≥500 g or processed ≥ 50 g	1,360 (8.9)
	Red <500 g & processed 3-50 g	9,782 (63.9)
	Red <500 g & processed <3 g	4,165 (27.2)
Energy dense food intake (kcal/g/week)	>175	4,253 (25.0)
	125-175	8,077 (47.5)
	≤125	4,675 (27.5)
Sugary drinks (g/week)	>250	650 (3.9)
	0-250	11,603 (69.0)
	Never	4,552 (27.1)
Alcohol intake (g/die)	>20	3,357 (19.9)
	10-20	3,367 (19.9)
	≤10	10,169 (60.2)
Breastfeeding	Never	3,940 (28.9)
	0-6 months	3,392 (24.9)
	≥6 months	6,305 (46.2)
Smoking	Never	8,055 (49.3)
	Former	4,531 (27.7)
	Current	3,756 (23.0)

Score WCRF in the Andromeda cohort

Mean total score: 5.4±1.1

➢ **4-group categorization** (0-3)

➢ Women within the highest categories of the score were more likely to:

  ✓ Be in **pre-menopausal status**
  ✓ Have a **higher educational level**
  ✓ Be **non-smokers**

✓ No difference in score distribution by age or center of recruitment.

	N (%)
0	5,162 (30.3)
1	4,493 (26.4)
2	3,123 (18.3)
3	4,255 (25.0)

Association between WCRF score and BC occurrence

```
Logistic regression                          Number of obs   =      17,033
                                             LR chi2(4)      =       14.75
                                             Prob > chi2     =      0.0053
Log likelihood = -1601.2079                  Pseudo R2       =      0.0046
```

caso	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
WCRF2_cat						
1	1.020164	.1446795	0.14	0.888	.7725964	1.347061
2	.870953	.1440134	-0.84	0.403	.6298647	1.204321
3	.7187317	.1144037	-2.07	0.038	.5261109	.9818753
eta_mx	1.027243	.0094912	2.91	0.004	1.008808	1.046015
_cons	.0044584	.0024601	-9.81	0.000	.0015119	.0131479

Testing a comprehensive model

Including in the model non-modifiable and modifiable risk factors emerging from previous uni-variate analyses. N=12,337

		aOR	95%CI
Age (year)		1.04	1.01-1.07
Familiarity			
	None	Ref.	
	One or more first degree family members affected	1.36	1.04-1.78
Previous breast biopsies			
	No	Ref.	
	Yes	1.92	1.40-2.66
Menopause			
	Yes	Ref.	
	No	1.27	1.00-1.60
Waist circumference			
	<88 cm	Ref.	
	≥88 cm	1.44	1.10-1.94
WCRF score (points)		0.95	0.93-1.23

Discussion and conclusions

- General characteristics of the cohort considering modifiable factors underlined a **large space of improvement** in terms of primary prevention.

  - **BMI:** 28.2% overweight, 17.0% obese
  - **Waist circumference:** 24.3% 80-88 cm; 43.0% 88+
  - **WCRF score:** 56.7% of women in the least two compliant groups.
  - **Smoking:** 19.3% current smokers

Cancer screening can represent an ideal setting for intercepting women and tackle their at risk behaviors

Discussion and conclusions

✓ **Lifestyles** as well as **anthropometric measures (modifiable risk factors)** were variably associated to BC, besides the classical non-modifiable risk factors considered (e.g. familiarity, previous biopsies, age).

✓ From univariate analysis the protective role of **WCRF compliance** emerged, especially considering the category with the highest compliance to WCRF recommendations, even if this effect was not evident at multivariate analysis.

✓ The strong association between BC and **waist circumference** was maintained at multivariable analysis, especially for women with a circumference ≥88 cm.

✓ **Visceral fat** (as measured with bio-impedance) was available exclusively for women recruited in Turin. However, it emerged both at univariate and at multivariable analysis for its strong association with BC.

Discussion and conclusions

STRENGHTS
Prospective study design
Use a detailed questionnaire for investigati...
current lifestyles (PA and diet).
Definition of **comprehensive lifestyle pattern**
the compliance to WCRF recommendations

LIMITATIONS
Constrained **completeness** of the entire long-
questionnaire (around 60% of initial
participants)

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The Journal of Nutrition
Nutritional Epidemiology
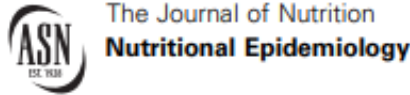
A Priori–Defined Dietary Patterns Are Associated with Reduced Risk of Stroke in a Large Italian Cohort[1-3]

Claudia Agnoli,[4] Vittorio Krogh,[4*] Sara Grioni,[4] Sabina Sieri,[4] Domenico Palli,[6] Giovanna Masala,[6]
...ote,[7,8] Paolo Vineis,[9,10] Rosario Tumino,[11,12] Graziella Frasca,[11] Valeria Pala,[4]
[5] Paolo Chiodini[13] Amalia Mattiello,[14] and Salvatore Panico[14]

cases, other incident cancers or non-communicable

classifications (e.g. Italian Mediterranean index,

Annals of Medicine and Surgery 47 (2019) 44–46

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journal homepage: www.elsevier.com/locate/amsu

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A novel dietary inflammatory index reflecting for inflammatory ageing: Technical note

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THANKS FOR YOUR ATTENTION!!!

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