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Longevity and Biological Ageing: Enhancing Health into Advanced Age



SESSION 6

Dr. Nina Fuller – Shavel

Integrative Oncology and Systems Biology of Cancer Prevention

4:15-5:00pm



An event by:  Nutritional Medicine Institute

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DR. NINA
FULLER-SHAVEL

Integrative Oncology and
Systems Biology of Cancer
Prevention

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Global SIO Ambassador to the UK and Chair of the SIO Global Committee

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Affiliations and Declaration of Interest

Affiliations

- Director, **Synthesis Clinic** (private integrative cancer care), UK
- CEO, **NCIO**, Registered Charity 1210476; Co-Founder, **Oncio CIC**
- Global Society for Integrative Oncology (SIO) IO Ambassador to the UK; Chair, SIO Global Committee
- CPD and postgraduate educator; WHO Europe collaborating expert on TCIM

Declarations of Interest

- Synthesis Clinic offers a range of diagnostic tests; no advisory relationships with test providers.
- Travel support: Helixor Heilmittel GmbH. NCIO support: Daiichi Sankyo (nursing workshops)


Synthesis Clinic



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Integrative
Oncology®

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2

Today's path

A
The state of cancer
Rising, younger, and partly preventable

B
Cancer as a systemic disease
Hallmarks, ageing and the Systems Approach

C
Eight systems
Behaviours and markers linked to risk

D
Emerging screening
PRS, MCED and whole-body MRI

E
Summary
What to do on Monday morning

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A. The state of cancer

More cancer, younger cancer, and how much of it could we prevent?

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The global cancer burden



Globally prevention targeting **smoking, excess weight and infection** could avert millions of future diagnoses, with major economic and societal dividends.

UK: **1 in 2** people in Britain born since 1960 will be diagnosed with cancer in their lifetime.

Bray F, et al. CA Cancer J Clin. 2024;74(3):229-263. Ahmad AS, et al. Br J Cancer. 2015;112(5):943-947.

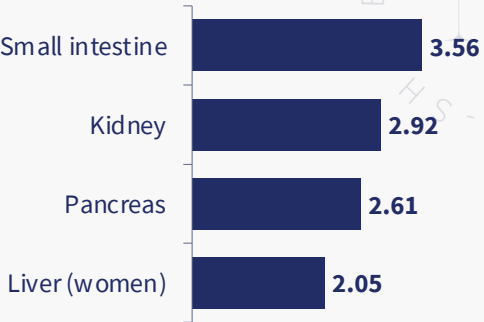
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Cancer is getting younger

- Early-onset (<50 y) cancer incidence rose **79.1%** and deaths **27.7%** worldwide, 1990 to 2019
- **17 of 34** cancers are rising in successively younger US birth cohorts
- Early-onset colorectal cancer is rising in **27 of 50** countries; England is among the fastest **(+3.6% per year)**

Incidence rate ratio, 1990 vs 1955 US birth cohort



Zhao J, et al. BMJ Oncol. 2023;2(1):e000049. Sung H, et al. Lancet Public Health. 2024;9(8):e583-e593. Sung H, et al. Lancet Oncol. 2025;26(1):51-63.

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England: what is driving the rise?

- 2001–2019, adults 20–49: **16 of 22** cancers rose in women and **11 of 21** in men
- Most also rose in older adults; colorectal and ovarian rose only in the young
- Smoking, alcohol, meat, low fibre and inactivity were stable or falling; only obesity rose
- Early-onset colorectal cancer rose with and without excess BMI (APC 4.3% vs 3.2%, women)

Known behaviours explain part of the burden; emerging and early-life exposures need urgent study.

WCRF analysis, 2026

Significant rises under 50 in England include **colorectal, breast, uterine, kidney, liver and pancreatic cancers**

Likely drivers: known risk factors (in part), environment and the gut microbiome, and better detection

Garcia-Closas M, et al. *BMJ Oncol.* 2026;5(1):e000966. Gordon-Dseagu V. Are more young people getting cancer? *World Cancer Research Fund International*; 6 Oct 2026.

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A real rise, more diagnosis, or both?

Signals of a genuine increase

- Birth-cohort effects across many sites, including cancers with no screening programme
- Mortality rising with incidence for colorectal and uterine cancers
- Exposure signatures in tumour genomes

Signals of increased detection

- 8 fastest-rising early-onset cancers doubled since 1992; aggregate mortality flat
- Thyroid: overdiagnosis dominant, yet larger, advanced tumours are also rising
- Early-onset breast cancer mortality roughly halved

Both are true: need to prevent the real increase and avoid creating disease through over-investigation.

Ugai T, et al. *Nat Rev Clin Oncol.* 2022;19(10):656-673. Sung H, et al. *Lancet Public Health.* 2024;9(8):e583-e593. Díaz-Gay M, et al. *Nature.* 2025;643(8070):230-240. Patel VR, et al. *JAMA Intern Med.* 2025;185(11):1370-1374. Druszcz M, et al. *Cancers (Basel).* 2026;18(14):2193.

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The exposome has shifted across generations

- Multigenerational change in **diet, lifestyle, obesity, environment and the microbiome**, interacting with genetic susceptibility
- Dietary risks, alcohol and tobacco are the leading attributable risk factors for early-onset cancer globally
 - UPFs are a double hit of 'food like substances' + microplastics
- Exposures in early life and young adulthood appear to play a key role

Case study: colibactin

- 981 colorectal cancer genomes, 11 countries
- Colibactin signatures (SBS88, ID18) **3.3 times** more common when diagnosed under 40 than over 70
- Imprinted early in tumour development; about 25% of APC driver indels in colibactin-positive cases

Ugai T, et al. Nat Rev Clin Oncol. 2022;19(10):656-673. Zhao J, et al. BMJ Oncol. 2023;2(1):e000049. Kuang X, et al. Carcinogenesis. 2026;47(3). Bailey AM, Hofseth LJ. Carcinogenesis. 2026;47(3). Díaz-Gay M, et al. Nature. 2025;643(8070):230-240.

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Early-onset colorectal cancer: a life-course disease

- Rising across countries and birth cohorts; distal colon and rectum predominate; most cases are sporadic
- Implicated: obesity, metabolic dysfunction, western diets, early-life exposures, microbial disruption and colibactin
- Long-term or recurrent antibiotic use in early life: early-onset adenoma OR 1.40; cancer OR 1.48 (UK Biobank)

Clinical message

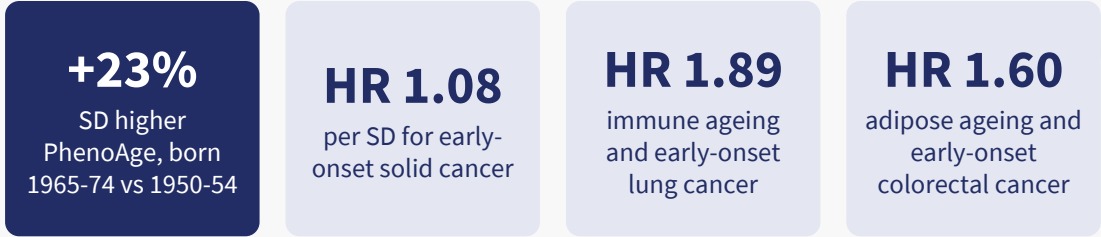
- Often symptomatic, yet diagnosis is delayed
- Rectal bleeding, abdominal pain, altered bowel habit or anaemia: investigate at any age
- Screening from 45 is necessary but insufficient

Grześkiewicz-Szostak M, et al. Curr Oncol Rep. 2026;28(1). Jiang F, et al. Int J Cancer. 2023;153(9):1602-1611.

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Biological ageing: the bridge to longevity

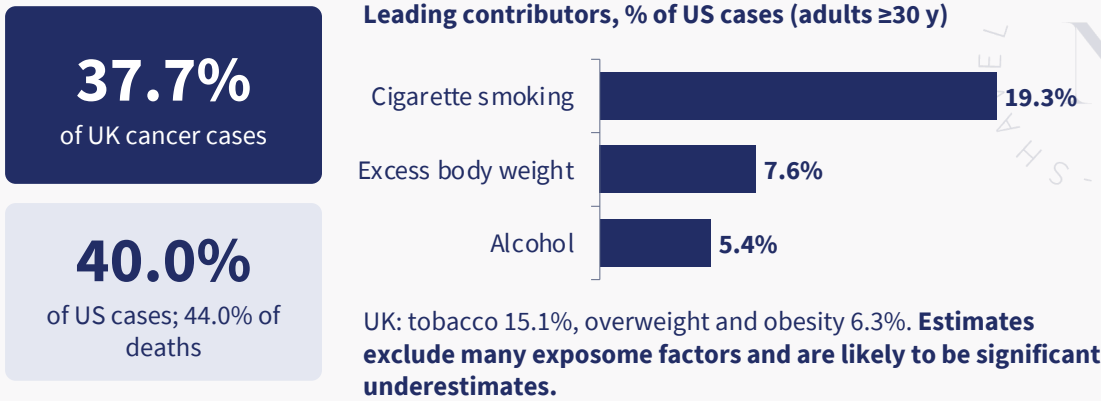


- UK Biobank, 154,169 young adults; independent of genetic risk; partly validated in All of Us (n = 10,262)
- Biological age integrates a lifetime of exposures and can be estimated from **routine blood tests**

Tian R, et al. Nat Med. 2026;32(8):2983-2990.

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Around 4 in 10 cancers are potentially preventable (likely far more if we look at complex exposures!)



Brown KF, et al. Br J Cancer. 2018;118(8):1130-1141. Islami F, et al. CA Cancer J Clin. 2024;74(5):405-432.

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B. Cancer as a systemic disease

From the cancer cell to the whole person, across a lifetime

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Hallmarks of cancer: from the cell to the system

New dimensions (2022)

- Phenotypic plasticity
- Non-mutational epigenetic reprogramming
- Polymorphic microbiomes
- Senescent cells

Hallmarks of systemic disease (2024)

- Tumour initiation and promotion; immune macro-environment
- Ageing; metabolism and obesity; cachexia
- Circadian rhythms; nervous system interactions
- Tumour-related thrombosis; the microbiome

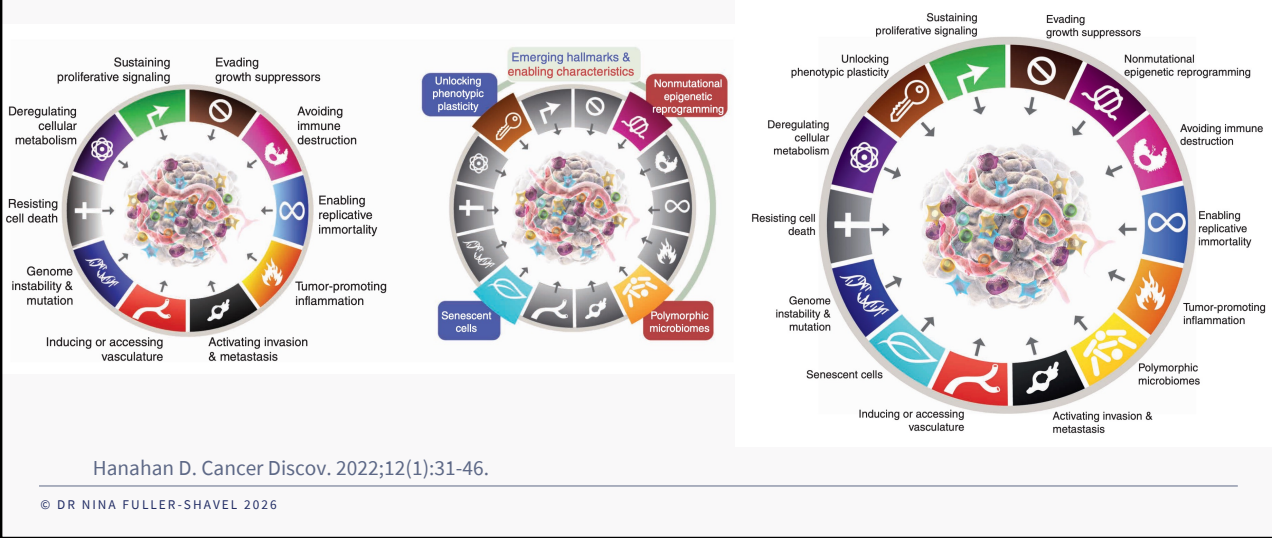
Host physiology and gene–environment interaction become the target: a synthesis Swanton and colleagues describe as “primed to prevent cancers”.

Hanahan D. Cancer Discov. 2022;12(1):31-46. Swanton C, et al. Cell. 2024;187(7):1589-1616.

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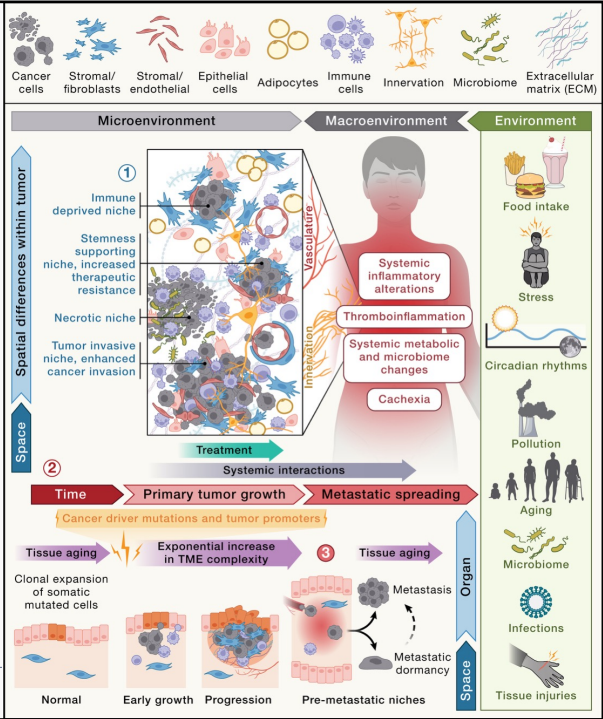
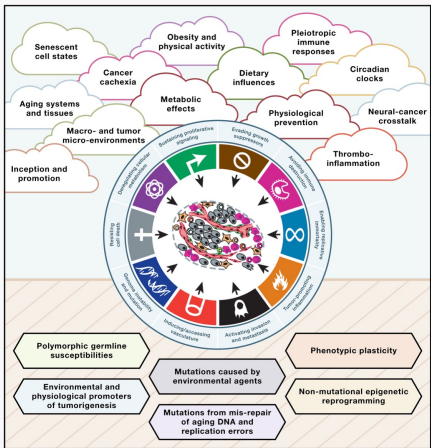
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Hallmarks of cancer – the evolution



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Zooming out!



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Ageing and cancer share their roots

Shared meta-hallmarks

- Genomic instability
- Epigenetic alterations
- Chronic inflammation
- Dysbiosis

Context-dependent

- Disabled macroautophagy
- Cellular senescence
- Nutrient sensing and metabolism

Largely antagonistic

- Telomere attrition
- Stem cell exhaustion

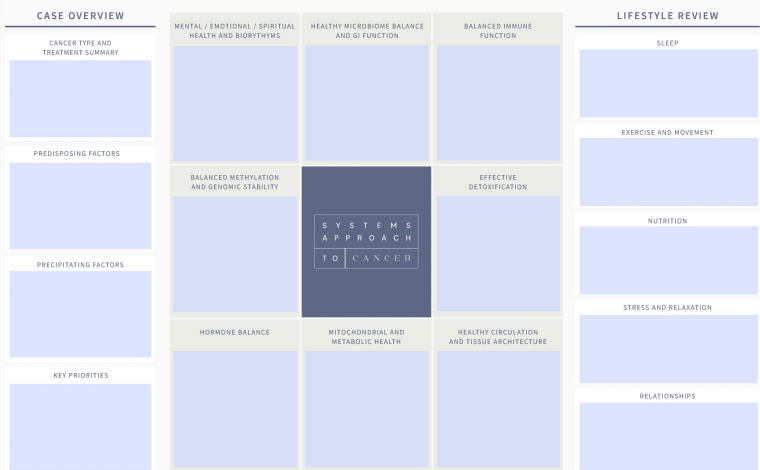
Prevention, longevity medicine and integrative oncology may act on the same biology.

López-Otín C, et al. Cell Metab. 2023;35(1):12-35.

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The Systems Approach to Cancer Framework



- Eight interlinked physiological domains**
- Assessed alongside the lifestyle medicine pillars
 - Predisposing and precipitating factors recorded
 - Used from prevention through survivorship

Fuller-Shavel N, Watts L, Derakshan N. Front Oncol. 2026;16:1870158.

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How the framework was built and is used

A four-way synthesis

- 1 Six lifestyle medicine pillars (ACLM; MASCC-endorsed toolkit)
- 2 Whole-person integrative oncology (SIO definition; SIO-ASCO guidelines)
- 3 Functional medicine inspiration alongside systems hubs of chronic non-communicable disease
- 4 Contemporary hallmarks, including the hallmarks of systemic disease

Three assessment layers

- Detailed history, including predisposing and precipitating factors
 - Lifestyle medicine review: strengths, modifiable factors, priorities
 - Eight-domain physiological systems assessment
- A personalised, dynamically revised care programme delivered by a multidisciplinary team

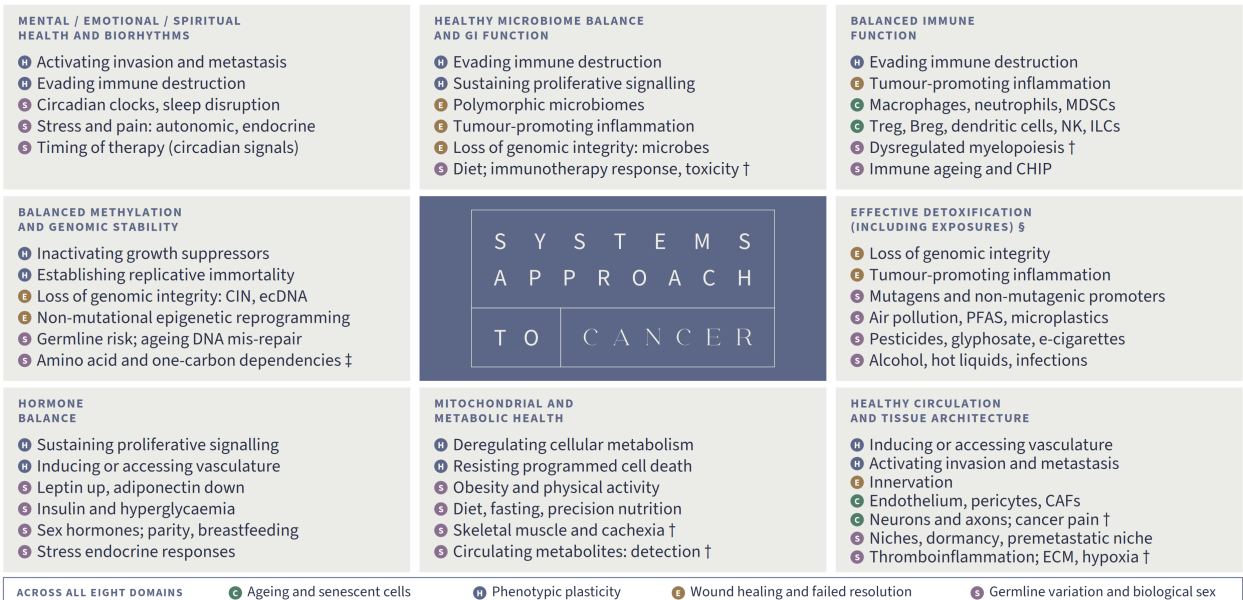
Fuller-Shavel N, Watts L, Derakshan N. Front Oncol. 2026;16:1870158.

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Systems Approach to Cancer mapped to the Hallmarks of Cancer

Exposome meeting genome and epigenome: bidirectional systems relationships in cancer initiation, progression and spread

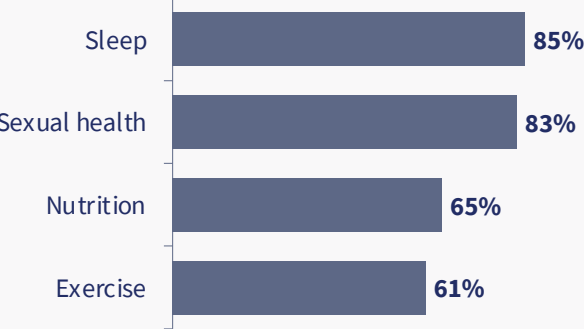
- H Hallmark capability
- C Hallmark-conveying TME cells
- E Enabling characteristic
- S Systemic and host factors



† Tumour-to-host effects: these relationships run in both directions. ‡ Not drawn from the two cited papers; separate evidence base.
§ Sources address exposure and tumour promotion; host clearance capacity is not covered by either paper.
1. Hanahan D. Hallmarks of cancer — then and now, and beyond. Cell. 2022;189:2254–77. 2. Swanton C, Bernard E, Abbosh C, André F, Auwerx J, Balmain A, et al. Embracing cancer complexity: hallmarks of systemic disease. Cell. 2024;187:1589–616.

The domains that drive risk are the least supported in people with active cancer

Unmet need in standard UK breast cancer care, %
(n = 211)



0% unmet need
in the majority of domains with integrative care

Largest within-patient reductions
Nutrition –91, sleep –86, exercise –71 percentage points
Descriptive; small, self-selected cohort

Fuller-Shavel N, Watts L, Derakshan N. Front Oncol. 2026;16:1870158.

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Previvorship: prevention for people at elevated risk

Who are previvors?

- Carriers of pathogenic germline variants, e.g. BRCA1/2, Lynch syndrome
- Strong family history of cancer
- High multifactorial or polygenic risk
- Precancerous conditions under surveillance

What a systems-based plan can add

- Personalised integrative care across the eight domains
- Coordination with NHS surveillance and genetics and additional testing and surveillance options as needed
- Psychological support around risk and risk-reducing decisions
- Support for families and carers

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C. Eight systems: behaviours and markers

For each system: what may shift risk and what is worth measuring

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Chronic adversity: adverse childhood experiences

1 What shifts risk

- **4 or more ACEs:** cancer OR 2.17; 2–3 ACEs: OR 1.35 (18 studies, 406,210 people)
- Abuse, witnessing domestic violence and family financial hardship each linked to later cancer
- UK 1958 birth cohort: 2+ ACEs doubled the odds of cancer before 50 in women (OR 2.1), after adjusting for adult factors
- ACEs also cluster with smoking and heavy drinking (OR 2–3): behavioural and biological pathways

Markers worth knowing

- ACE history, asked with a trauma-informed approach
- Current distress: PHQ-9, GAD-7
- Downstream behaviours: tobacco, alcohol, diet
- Screening engagement
- Protective factors and support

Hu Z, et al. Child Abuse Negl. 2021;117:105088. Kelly-Irving M, et al. BMC Public Health. 2013;13:767. Hughes K, et al. Lancet Public Health. 2017;2(8):e356-e366.

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Chronic stress: biology and evidence

1 Chronic, early and severe adversity matters more than everyday stressors

Mechanisms

- Persistent sympathetic and HPA activation: catecholamines and glucocorticoids
- Inflammation, angiogenesis and immune suppression
- Nervous system interactions are a hallmark of systemic disease

Mostly preclinical and cancer progression data

Human incidence evidence

- Stress-prone coping and negative emotional responses: higher incidence
- Discrete life events: no association
- Job strain: no association (HR 0.97; 116,056 workers)

Ma C, et al. Cancer Commun (Lond). 2026;46:0053. Swanton C, et al. Cell. 2024;187(7):1589-1616. Chida Y, et al. Nat Clin Pract Oncol. 2008;5(8):466-475. Heikkilä K, et al. BMJ. 2013;346:f165.

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Shift work and circadian disruption

1 What shifts risk

- Night shift work: IARC **Group 2A**; light at night suppresses melatonin and misaligns body clocks
- Signals concentrate in **persistent** night work: frequent nights, many years, early start
- Timing: morning chronotype protective in Mendelian randomisation (breast OR 0.88); supper 2+ hours before sleep: OR 0.80 (case-control)

Markers worth knowing

- Shift pattern: frequency, years, age started
- Chronotype and social jet lag
- Sleep timing, duration and regularity
- Meal timing and overnight fast
- Evening light exposure

IARC Monographs Vol 124 Group. Lancet Oncol. 2019;20(8):1058-1059. Travis RC, et al. J Natl Cancer Inst. 2016;108(12):djw169. Schwingl P, et al. Occup Environ Med. 2019;76(Suppl 1):A70. Richmond RC, et al. BMJ. 2019;365:l2327. Kogevinas M, et al. Int J Cancer. 2018;143(10):2380-2389.

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Meal timing: when you eat matters

1.48 / 2.20

HR breast / prostate cancer, eating after 9.30 pm

OR 1.18

per hour later breakfast (premenopausal breast)

OR 0.80

supper 2+ hours before sleep (case-control)

HR 0.47

type 2 diabetes: 13+ h fast with breakfast by 8 am

- Fasting duration alone was not linked to cancer once meal timing was taken into account
- Breast cancer survivors: nightly fast under 13 h linked to recurrence (HR 1.36)
- All observational: chronotype, sleep and shift work may confound
- In practice: earlier breakfast, last meal 2+ h before sleep and before 9pm (practically we usually aim for a 14h overnight fast)

Srouf B, et al. Int J Cancer. 2018;143(10):2369-2379. Palomar-Cros A, et al. Front Nutr. 2022;9:941477. Kogevinas M, et al. Int J Cancer. 2018;143(10):2380-2389. Palomar-Cros A, et al. Int J Epidemiol. 2023;52(5):1486-1497. Marinac CR, et al. JAMA Oncol. 2016;2(8):1049-1055.

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Microbiome balance and GI function

2 What shifts risk

- Mayo cohort (1,364 patients): early-onset colorectal cancer linked to higher lactate and *Veillonella parvula*
- **H. pylori**: 810,000 cancers in 2018; eradication lowered gastric cancer incidence in RCTs (RR 0.54; mainly East Asian)
- Fibre: 15–30% lower colorectal cancer incidence, highest vs lowest intake; benefit greatest at 25–29 g/day
- Each 10% more ultra-processed food: 12% higher cancer risk
- Lynch syndrome: aspirin 100 mg plus resistant starch 30 g daily could mean around **40%** fewer Lynch cancers (modelled from CAPP2 and CaPP3). Aspirin protects the bowel; resistant starch protects other sites.

Markers worth knowing

- Fibre (g/day) and plant diversity
- Antibiotic history, including early life
- H. pylori test and treat where indicated
- Bowel screening uptake
- Stool metagenomics: research-grade

Yang L, et al. Cell. 2026. de Martel C, et al. Lancet Glob Health. 2020;8(2):e180-e190. Ford AC, et al. Gut. 2020;69(12):2113-2121. Reynolds A, et al. Lancet. 2019;393(10170):434-445. Fiolet T, et al. BMJ. 2018;360:k322. Burn J, et al. Lancet. 2020;395(10240):1855-1863. Burn J, et al. Lancet Gastroenterol Hepatol. 2026;11(9):760-774. Mathers JC, et al. Cancer Prev Res (Phila). 2022;15(9):623-634.

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Food patterns: cohorts and trials

Evidence

- Fruit and vegetables: total cancer RR 0.97 per 200 g/day, plateau at about 600 g/day; cruciferous inverse
- Nuts: total cancer RR 0.85 per 28 g/day; PREDIMED with EVOO: breast cancer HR 0.32 (35 cases)
- Processed meat IARC Group 1, red meat 2A; processed meat: colorectal +18%, breast +6%
- Sugary drinks: overall cancer sHR 1.18 per 100 mL/day; high glycaemic index: colorectal RR 1.20
- Organic food: HR 0.75, absolute reduction 0.6% (observational)
- Beta-carotene supplements raised lung cancer in smokers (RR 1.28); very hot drinks IARC 2A

In practice

- Mostly plants: 400–600 g vegetables with smaller amount of low GL fruit daily
- Nuts and EVOO as everyday fats
- Red meat within WCRF limits; no processed meat
- Let hot drinks cool; avoid sugar or sweetener-laden drinks
- Food first: no high-dose beta-carotene in smokers

Aune D, et al. Int J Epidemiol. 2017;46(3):1029-1056. Aune D, et al. BMC Med. 2016;14(1):207. Toledo E, et al. JAMA Intern Med. 2015;175(11):1752-1760. Bouvard V, et al. Lancet Oncol. 2015;16(16):1599-1600. Farvid MS, et al. Eur J Epidemiol. 2021;36(9):937-951. Chazelas E, et al. BMJ. 2019;366:l2408. Turati F, et al. Nutrients. 2019;11(10):2342. Baudry J, et al. JAMA Intern Med. 2018;178(12):1597-1606. Omenn GS, et al. N Engl J Med. 1996;334(18):1150-1155. Loomis D, et al. Lancet Oncol. 2016;17(7):877-878. Shams-White MM, et al. Nutrients. 2019;11(7):1572.

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Immune function (1): infection

3 What shifts risk

- **2.2 million** cancers in 2018 were attributable to infection, led by *H. pylori*, HPV, HBV and HCV
- HPV vaccination before 17: invasive cervical cancer **88% lower** (IRR 0.12)
- Infection-related cancers are among the most preventable

Markers worth knowing

- Vaccination status
- HBV and HCV serology if at risk
- Cervical screening uptake
- *H. pylori* where indicated

de Martel C, et al. Lancet Glob Health. 2020;8(2):e180-e190. Lei J, et al. N Engl J Med. 2020;383(14):1340-1348.

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Immune function (2): inflammation and vitamin D

3 What shifts risk

- Blood-count indices (SII, NLR, PLR) linked to **7 of 17** cancers in UK Biobank; strongest just before diagnosis, so may flag occult disease
- Autoimmunity raises site-specific risk: Sjögren's (lymphoma OR 6.5), lupus (lymphoma OR 2.7), coeliac disease (small bowel RR 4.2), ulcerative colitis (colorectal HR 1.66), pernicious anaemia (gastric OR 2.75)
- Immune ageing linked to early-onset lung cancer (HR 1.89)
- Vitamin D RCTs: no overall effect on incidence; **daily** dosing lowered cancer mortality (RR 0.87); large boluses did not

Markers worth knowing

- FBC with NLR/PLR and SII, tracked over time
- hsCRP
- 25(OH)D, with daily repletion when low
- Autoimmune history, organ involved and treatment; disease-specific surveillance
- Unexplained change: investigate, do not just treat

Nøst TH, et al. Eur J Epidemiol. 2021;36(8):841-848. Ekström Smedby K, et al. Blood. 2008;111(8):4029-4038. Reizner J, et al. EClinicalMedicine. 2025;87:103410. Olén O, et al. Lancet. 2020;395(10218):123-131. Murphy JD, et al. Br J Cancer. 2024;131(1):138-148. Tian R, et al. Nat Med. 2026;32(8):2983-2990. Keum N, et al. Br J Cancer. 2022;127(5):872-878.

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Combining interventions: DO-HEALTH

-61%
invasive cancer
with all three
combined (HR 0.39)

0.70-0.76
hazard ratios for
each alone (not
significant)

2.9-3.8 mo
slower epigenetic
ageing over 3 years

2,157
healthy, active
adults aged 70+;
3-year RCT

- 2×2×2 factorial RCT: **vitamin D 2,000 IU/day, omega-3 1 g/day, home strength exercise 3 × 30 min/week**
- Any two combined: HR 0.52-0.56; all three: HR 0.39 (4 vs 12 cases; 81 invasive cancers in total)
- Epigenetic clocks (777 participants): omega-3 slowed PhenoAge, GrimAge2 and DunedinPACE; all three additive on PhenoAge
- Single agents alone are often null (VITAL omega-3: HR 1.03) – look at the combination (complex problems need multimodal solutions)

Bischoff-Ferrari HA, et al. Front Aging. 2022;3:852643. Bischoff-Ferrari HA, et al. Nat Aging. 2025;5(3):376-385. Manson JE, et al. N Engl J Med. 2019;380(1):23-32.

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Detoxification (1): alcohol, air and tobacco

4 What shifts risk

- Alcohol: **741,300** cancers (4.1%) in 2020; drinking under 20 g/day still accounted for 103,100
- PM2.5 air pollution promotes lung cancer in never-smokers by expanding pre-existing EGFR-mutant cells.
- Breast cancer: Long-term exposure to air pollution is linked to a small rise in breast cancer risk, even at the relatively low levels found in Europe. The risk rises 6% per 5 µg/m³ of PM2.5 and 3% per 10 µg/m³ of NO₂.
- PFOA: IARC **Group 1**; PFOS: Group 2B
- Tobacco remains the largest attributable factor (UK 15.1%)

Markers worth knowing

- Alcohol: units and AUDIT-C
- Smoking and vaping history
- Occupational, home and air exposures
- LFTs for context
- Urinary biomonitoring: limited clinical validation

Rumgay H, et al. Lancet Oncol. 2021;22(8):1071-1080. Hill W, et al. Nature. 2023;616:159-167. Hvidtfeldt UA, et al. Cancer Epidemiol Biomarkers Prev. 2023;32(1):105-113. Zahm S, et al. Lancet Oncol. 2024;25(1):16-17. Brown KF, et al. Br J Cancer. 2018;118(8):1130-1141.

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Detoxification (2): endocrine disruptors and plastics

4 What shifts risk

- 131 studies: some EDCs (pesticides, BPA, phthalates, PFAS, parabens) may raise breast cancer risk; food and packaging are key routes
- Mendelian randomisation: a paraben linked to luminal A, a phthalate to TNBC (exploratory)
- Microplastics: found in blood, placenta and tumours; plastic output 2 Mt (1950) to >450 Mt (2022)
- Plausible mechanisms; not IARC-classified; no human risk estimates yet

Practical exposure reduction

- Glass or steel for hot food and drinks
- Tap over bottled water
- Fresher, less packaged food
- Personal care product review
- Biomonitoring: limited clinical validity currently but little harm, provided there is sensible handling of results

Wan MLY, et al. Crit Rev Food Sci Nutr. 2022;62(24):6549-6576. Song N, et al. Ecotoxicol Environ Saf. 2025;291:117791. Bailey AM, Hofseth LJ. Carcinogenesis. 2026;47(3).

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Ultra-processed food in the exposome

4 What shifts risk

- Each 10% more UPF: 12% higher cancer risk, 11% higher breast cancer risk (NutriNet-Santé)
- Proposed pathways: metabolic dysregulation, endocrine disruption, microbiome change, oxidative stress, additives and packaging contaminants
- Rising early-onset breast cancer coincides with rising UPF intake from early life (hypothesis)

In practice

- Avoid or at least minimise UPF share of the diet
- Cooking from whole foods
- Fibre 30 g/day
- Less processed meat and sugary drinks

Fiolet T, et al. BMJ. 2018;360:k322. Kuang X, et al. Carcinogenesis. 2026;47(3). Reynolds A, et al. Lancet. 2019;393(10170):434-445. Shams-White MM, et al. Nutrients. 2019;11(7):1572.

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Healthy circulation and tissue architecture

5 What shifts risk

- High vs low leisure-time activity: lower risk of **13 of 26** cancers in 1.44 million adults (colon HR 0.84, breast HR 0.90)
 - 10 of the 13 associations held after adjusting for BMI
- Tumour-related thrombosis and tissue remodelling feature in systemic disease
- Fascia and tissue mechanics: 10 minutes of daily gentle stretching shrank mouse mammary tumours by 30–52%, shearing fascial layers and realigning collagen at the tumour edge (preclinical only)
- Mammographic density: a strong breast cancer risk factor that also masks tumours

Markers worth knowing

- Weekly activity minutes and strength sessions vs guidelines
- Sedentary time
- Cardiorespiratory fitness
- Breast density, where reported

Moore SC, et al. JAMA Intern Med. 2016;176(6):816-825. Swanton C, et al. Cell. 2024;187(7):1589-1616. Berrueta L, et al. Sci Rep. 2018;8(1):7864. Berrueta L, et al. BMC Biol. 2026;24(1). Boyd NF, et al. N Engl J Med. 2007;356(3):227-236.

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Movement: dose, intensity and strength

13 of 26
cancers lower with high vs low leisure-time activity

30–60 min
strength work weekly: 10–17% lower total cancer

HR 0.80
about 4.5 min/day of vigorous bursts (VILPA) in non-exercisers

HR 0.72
disease-free survival: structured exercise after colon cancer (RCT)

- Pooled 1.44 million adults: colon HR 0.84, breast 0.90, endometrial 0.79; 10 of 13 held after BMI adjustment
 - Not universal: melanoma HR 1.27 with higher activity
- CHALLENGE (889 patients): overall survival HR 0.63; more musculoskeletal events (18.5% vs 11.5%)
- Exercise was one of three additive arms in DO-HEALTH; minimal VILPA dose 3.4 min/day (HR 0.83)

Moore SC, et al. JAMA Intern Med. 2016;176(6):816-825. Momma H, et al. Br J Sports Med. 2022;56(13):755-763. Stamatakis E, et al. JAMA Oncol. 2023;9(9):1255-1259. Courneya KS, et al. N Engl J Med. 2025;393(1):13-25. Bischoff-Ferrari HA, et al. Front Aging. 2022;3:852643.

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Mitochondrial and metabolic health

6

What shifts risk

- Body fatness: sufficient evidence for **13** cancer sites
- IGF-1: breast cancer HR 1.11 per 5 nmol/L; Mendelian randomisation supports causality
- Adipose tissue ageing linked to early-onset colorectal cancer (HR 1.60)
- GLP-1 receptor agonists vs insulin: lower risk of 10 of 13 obesity-associated cancers (retrospective, type 2 diabetes)
- MASLD drives liver cancer. MASLD affects 30–40% of adults worldwide. In Sweden, 39% of MASLD-related HCCs arose without cirrhosis, outside standard surveillance.
- GDF-15 is associated with future cancer: HR 1.31 per SD for any cancer and 1.94 for colorectal cancer (non-specific, research-grade).

Markers worth knowing

- Waist-to-height ratio and body composition
- HbA1c, fasting glucose and insulin (HOMA-IR)
- Lipids, ALT and liver fat
- IGF-1, interpreted in context

Lauby-Secretan B, et al. N Engl J Med. 2016;375(8):794-798. Murphy N, et al. Ann Oncol. 2020;31(5):641-649. Tian R, et al. Nat Med. 2026;32(8):2983-2990. Wang L, et al. JAMA Netw Open. 2024;7(7):e2421305. Tilg H, et al. JAMA. 2026;335(2):163-174. Vaz J, et al. Int J Cancer. 2025;156(1):40-51. Jovani M, et al. Cardiovasc Res. 2022;118(10):2317-2328. Srouf B, et al. Eur J Epidemiol. 2022;37(1):49-65.

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Hormone balance

7 What shifts risk

- Menopausal hormone therapy: some excess breast cancer risk with all types except vaginal oestrogens; higher with oestrogen-progestogen
- Five years of oestrogen plus daily progestagen from 50: about **1 extra breast cancer per 50 users** by age 69
- Alcohol: 98,300 breast cancers attributable in 2020
 - Women who regularly drank 35–44 g a day had a **32% higher breast cancer risk** than non-drinkers (RR 1.32, 95% CI 1.19 to 1.45).
- Endocrine disruptors: prenatal and early-life DDT/DDE linked to up to 3.7-fold breast cancer risk.

Markers worth knowing

- Reproductive and MHT history (type, duration) – choose formulations wisely
- SHBG, oestradiol and testosterone in context
- Thyroid and adrenal axes as indicated
- Breast density
- Endocrine disruptor exposures

Collaborative Group on Hormonal Factors in Breast Cancer. Lancet. 2019;394(10204):1159-1168. Rumgay H, et al. Lancet Oncol. 2021;22(8):1071-1080. Hamajima N, et al. Br J Cancer. 2002;87(11):1234-1245. Baroutis D, et al. Diagnostics (Basel). 2026;16(13):2116.

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Methylation and genomic stability

8 What shifts risk

- Genomic instability and epigenetic alteration are shared meta-hallmarks of ageing and cancer
- Pathogenic germline variants (e.g. BRCA1/2, Lynch syndrome) are actionable through family history and testing criteria
- Clonal haematopoiesis (CHIP): myeloid HR 9.56, lung HR 1.61; risk amplified when biologically older
- B vitamins follow a Goldilocks pattern: low B6 and folate are linked to higher cancer risk, while high-dose folic acid, B6 and B12 supplements show no benefit and some signals of harm. **Unexplained high B12 warrants investigation.**
- Raised homocysteine flags methylation strain and is linked to GI cancers (OR 1.27), but Mendelian randomisation is largely null. Investigate the cause; don't chase the number.

Markers worth knowing

- Three-generation family history
- Germline testing per national criteria
- B12 and folate adequacy
- Epigenetic clocks and CHIP: research-grade

López-Otín C, et al. Cell Metab. 2023. Wang L, et al. J Natl Cancer Inst. 2026. Larsson SC, et al. JAMA. 2010. Khalighi Sikaroudi M, et al. Heliyon. 2024. Vollset SE, et al. Lancet. 2013. Ebbing M, et al. JAMA. 2009. Brasky TM, et al. J Clin Oncol. 2017. Fanidi A, et al. Int J Cancer. 2019. Arendt JF, et al. J Natl Cancer Inst. 2013. Xu J, et al. J Oncol. 2018. Zhou F, et al. Adv Nutr. 2025. Full details in the reference list.

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Markers worth knowing: summary (1 of 2)

System	Core clinical markers	Research-grade
Mental health and biorhythms	ACE history; distress screens; shift pattern; chronotype; sleep	Epigenetic clocks
Microbiome and GI	Fibre; UPF share; antibiotic history; H. pylori; bowel screening	Stool metagenomics
Immune function	Vaccinations; HBV/HCV; FBC indices; hsCRP; 25(OH)D; autoimmune history	Immune ageing clocks
Detoxification	Alcohol; tobacco; plastics and EDCs; occupational exposures	Urinary biomonitoring

Synthesis of sources cited on the preceding system slides.

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Markers worth knowing: summary (2 of 2)

System	Core clinical markers	Research-grade
Circulation and tissue	Activity; sedentary time; fitness; breast density	Device-measured activity (accelerometry)
Metabolic health	Waist; HbA1c; insulin; lipids; liver fat; IGF-1	GDF-15
Hormone balance	Reproductive and MHT history; SHBG; sex hormones	EDC biomonitoring
Genomic stability	Family history; germline testing; B12, folate	Epigenetic clocks; CHIP

Synthesis of sources cited on the preceding system slides.

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D. Emerging approaches in screening

Promise, evidence, and the risk of harm

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Screening can harm as well as help

Overdiagnosis

Detecting cancers that would never have caused harm, followed by treatment that cannot benefit

False positives

Anxiety, invasive work-up and complications from investigating findings that are not cancer

False reassurance

A negative result may lower attention to symptoms and to proven prevention

South Korea: opportunistic thyroid screening drove an approximately 15-fold rise in diagnoses, 1993 to 2011, while thyroid cancer mortality did not change.

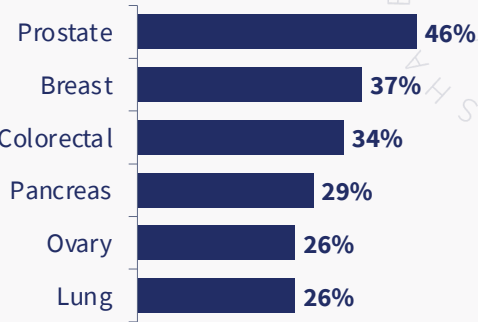
Ahn HS, Kim HJ, Welch HG. N Engl J Med. 2014;371(19):1765-1767. Druszcz M, et al. Cancers (Basel). 2026;18(14):2193. Patel VR, et al. JAMA Intern Med. 2025;185(11):1370-1374.

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Polygenic risk scores: an early warning system?

- A PRS sums many common variants, each with a small effect
- Breast PRS313: OR **1.61** per SD; AUC 0.63; top 1% lifetime risk **32.6%**
- Most cancers still arise outside the high-risk group
- Accuracy is lower in non-European ancestry groups

% of UK cases captured by the PRS top quintile (modelled)



Mavaddat N, et al. Am J Hum Genet. 2019;104(1):21-34. Huntley C, et al. Lancet Oncol. 2023;24(6):658-668. Roberts E, et al. Breast. 2023;67:71-77.

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PRS in practice: implementation evidence

Supportive data

- Estonia: clinical-grade 2,803-SNP breast PRS, C-index 0.656; 2,637 clinical tests; 5.7% of women at >2-fold risk
- FinnGen (n = 117,252): high PRS, PPV 39.5% after a positive screen; interval cancer HR 2.78 at age 50

Limits

- Alone, breast PRS may help detect about 10% of cases at a 5% false-positive rate
- Best used inside multifactorial models (CanRisk/BOADICEA or Tyrer-Cuzick) with family history, density and lifestyle
- Population use awaits UK trials (modelling shows modest gains)

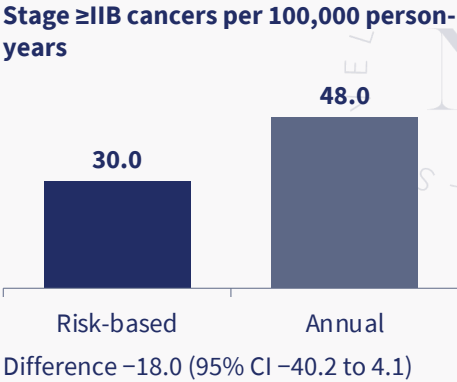
Padrik P, et al. Breast Cancer (Auckl). 2023;17:11782234231205700. Mars N, et al. J Clin Oncol. 2024;42(13):1477-1487. Hingorani AD, et al. BMJ Med. 2023;2(1):e000554. Lee A, et al. Genet Med. 2019;21(8):1708-1718. Evans DGR, et al. Breast Cancer Res Treat. 2019;176(1):141-148. Huntley C, et al. Lancet Oncol. 2023;24(6):658-668.

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WISDOM: randomised risk-based screening

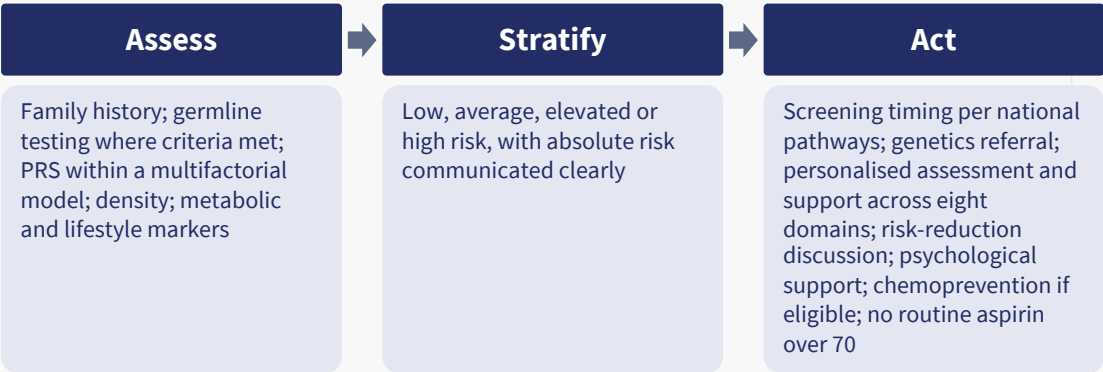
- 28,372 women aged 40–74, randomised to risk-based or annual screening; median follow-up 5.1 years
- Risk: 9-gene panel, PRS and a clinical model
- Stage IIB or worse: **noninferior**
- Fewer mammograms, but biopsies **not reduced**
- 89% of the observational cohort chose risk-based screening



Esserman LJ, et al. JAMA. 2026;335(9):763-774.

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Using risk well: risk-adjusted management



Risk information should change a decision; otherwise it only adds anxiety and cost.

Esserman LJ, et al. JAMA. 2026;335(9):763-774. Hingorani AD, et al. BMJ Med. 2023;2(1):e000554. Cuzick J, et al. Lancet. 2020;395(10218):117-122. McNeil JJ, et al. J Natl Cancer Inst. 2021;113(3):258-265.

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Multi-cancer early detection: NHS-Galleri

Not met

primary endpoint:
fewer stage III-IV

13.6%

of stage I cancers
detected (FDA
retesting)

1 in 2

positive results: no
cancer found (PPV
52%)

+7%

more cancers
diagnosed (3,637
vs 3,400)

- 142,942 adults aged 50–77; three annual tests on top of NHS screening; sponsor-funded
- No mortality or survival data; stage IV 14% lower (secondary, nominal); specificity 99.55%
- Episode sensitivity 30.7% (54.7% for 12 prespecified cancers): a negative result can falsely reassure
- Harms and costs: 48% of false positives had invasive work-up (US PATHFINDER 2); about \$950 per test, yearly

Swanton C, et al. NHS-Galleri. ASCO Annual Meeting; 30 May 2026. Abstract LBA100. American Society of Clinical Oncology. Press release, 30 May 2026 (NHS-Galleri, LBA100). Rosenfeld N. BJC Rep. 2026;4:40. US Food and Drug Administration. FDA Executive Summary: Galleri; 23 Sep 2026. McCartney M, Cohen D. BMJ. 2024;386:q1706.

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MCED: what we still do not know

Does it reduce cancer deaths? No mortality data yet

How many of the 237 extra diagnoses are overdiagnosed?

Stage I sensitivity 13.6%: does it find the cancers we can cure?

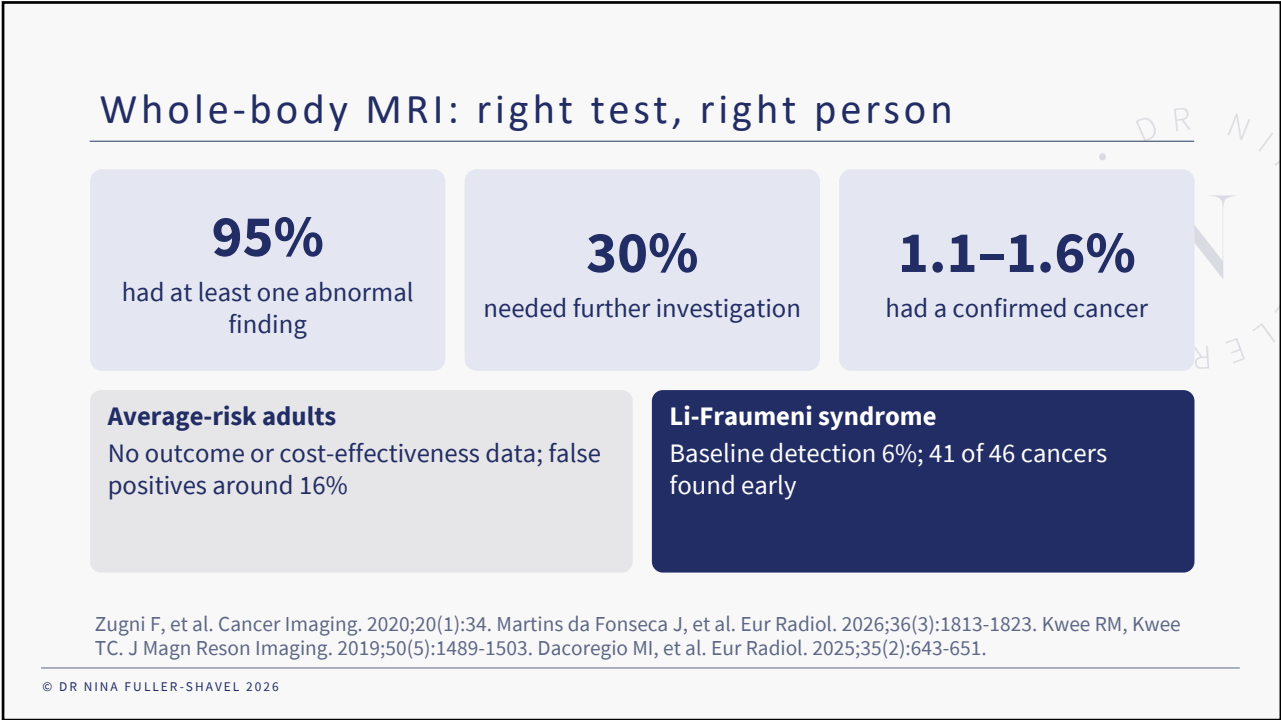
Who bears the cost of false positives? Invasive work-up in 48% (PATHFINDER 2)

Does it work across ancestries? (93% White)

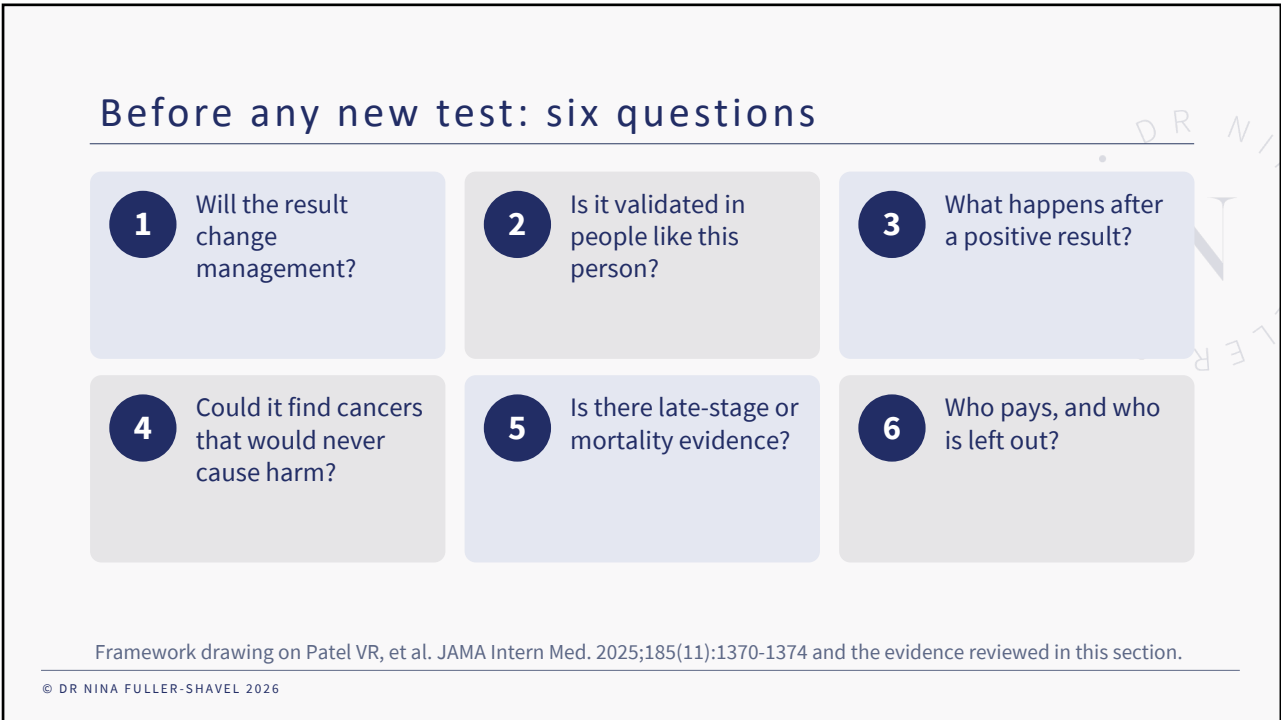
Does it divert people and funding from proven screening and prevention?

American Society of Clinical Oncology. Press release, 30 May 2026 (NHS-Galleri, LBA100). US Food and Drug Administration. FDA Executive Summary: Galleri; 23 Sep 2026. McCartney M, Cohen D. BMJ. 2024;386:q1706. Patel VR, et al. JAMA Intern Med. 2025;185(11):1370-1374.

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Summary

- 1 Cancer is rising and arriving earlier; obesity and detection contribute, and emerging exposures need urgent study
- 2 Cancer is a systemic disease: hallmarks now span metabolism, immunity, circadian, neural and microbial systems, and so should interventions, in prevention, on-treatment support and in survivorship.
- 3 The Systems Approach turns biology into eight assessable domains with practical markers
- 4 PRS belongs inside multifactorial models; MCED and whole-body MRI are not yet ready for average-risk screening. Do no harm must remain the principle.

Synthesis of sources cited on the preceding slides.

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Take-home: Monday morning

Assess

- Take a three-generation family history
- Ask about adversity and chronic shift work, with a trauma-informed approach
- Measure what matters from the Systems Assessment framework and **follow it over time**

Act

- WCRF/AICR is your baseline – personalise from there based on Systems Assessment framework
- Discuss any new test with explicit benefits and harms and stay within your scope of practice



Reynolds A, et al. Lancet. 2019;393(10170):434-445. Rumgay H, et al. Lancet Oncol. 2021;22(8):1071-1080. Moore SC, et al. JAMA Intern Med. 2016;176(6):816-825. Shams-White MM, et al. Nutrients. 2019;11(7):1572. Lee A, et al. Genet Med. 2019;21(8):1708-1718. Hu Z, et al. Child Abuse Negl. 2021;117:105088. IARC Monographs Vol 124 Group. Lancet Oncol. 2019;20(8):1058-1059.

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Take-home: building on WCRF/AICR

Eat

- Mostly vegetables (cruciferous, allium), low-GL fruit, EVOO and nuts
- Little red meat, no processed meat; avoid sugary drinks

Personalise

- Family history, germline results and clinical history
- Track relevant markers over time

Move and time

- 150 min aerobic plus 30–60 min strength each week
- Eat early: breakfast by about 8 am, last meal 2+h before sleep (13-14h overnight)

Combine

- Vitamin D + omega-3 + exercise: additive benefit (DO-HEALTH)
- Avoid beta-carotene supplements in smokers

Aune D, et al. Int J Epidemiol. 2017;46(3):1029-1056. Turati F, et al. Nutrients. 2019;11(10):2342. Toledo E, et al. JAMA Intern Med. 2015;175(11):1752-1760. Aune D, et al. BMC Med. 2016;14(1):207. Bouvard V, et al. Lancet Oncol. 2015;16(16):1599-1600. Chazelas E, et al. BMJ. 2019;366:l2408. Moore SC, et al. JAMA Intern Med. 2016;176(6):816-825. Momma H, et al. Br J Sports Med. 2022;56(13):755-763. Shams-White MM, et al. Nutrients. 2019;11(7):1572. Srour B, et al. Int J Cancer. 2018;143(10):2369-2379. Palomar-Cros A, et al. Int J Epidemiol. 2023;52(5):1486-1497. Kogevinas M, et al. Int J Cancer. 2018;143(10):2380-2389. Stamatakis E, et al. JAMA Oncol. 2023;9(9):1255-1259. Bischoff-Ferrari HA, et al. Front Aging. 2022;3:852643. Omenn GS, et al. N Engl J Med. 1996;334(18):1150-1155. Lee A, et al. Genet Med. 2019;21(8):1708-1718.

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Thank you for your
attention

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References (1 of 11)

Ahmad AS, Ormiston-Smith N, Sasieni PD. Trends in the lifetime risk of developing cancer in Great Britain: comparison of risk for those born from 1930 to 1960. *Br J Cancer*. 2015;112(5):943-947. doi:10.1038/bjc.2014.606

Ahn HS, Kim HJ, Welch HG. Korea's thyroid-cancer "epidemic": screening and overdiagnosis. *N Engl J Med*. 2014;371(19):1765-1767. doi:10.1056/NEJMp1409841

American Society of Clinical Oncology. Galleri early detection test may shift timing of cancer detection, reducing stage IV diagnoses [press release]. Alexandria (VA): ASCO; 30 May 2026.

Arendt JF, Pedersen L, Nexø E, Sørensen HT. Elevated plasma vitamin B12 levels as a marker for cancer: a population-based cohort study. *J Natl Cancer Inst*. 2013;105(23):1799-1805. doi:10.1093/jnci/djt315

Aune D, Giovannucci E, Boffetta P, et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality: a systematic review and dose-response meta-analysis of prospective studies. *Int J Epidemiol*. 2017;46(3):1029-1056. doi:10.1093/ije/dyw319

Aune D, Keum N, Giovannucci E, et al. Nut consumption and risk of cardiovascular disease, total cancer, all-cause and cause-specific mortality: a systematic review and dose-response meta-analysis of prospective studies. *BMC Med*. 2016;14(1):207. doi:10.1186/s12916-016-0730-3

Bailey AM, Hofseth LJ. Microplastics in early-onset carcinogenesis. *Carcinogenesis*. 2026;47(3). doi:10.1093/carcin/bgaf093

Baroutis D, Katsianou E, Koukounakis K, et al. Endocrine disruptors and gynecological malignancies. *Diagnostics (Basel)*. 2026;16(13):2116. doi:10.3390/diagnostics16132116

Baudry J, Assmann KE, Touvier M, et al. Association of frequency of organic food consumption with cancer risk: findings from the NutriNet-Santé prospective cohort study. *JAMA Intern Med*. 2018;178(12):1597-1606. doi:10.1001/jamainternmed.2018.4357

Berrueta L, Bergholz J, Munoz D, et al. Stretching reduces tumor growth in a mouse breast cancer model. *Sci Rep*. 2018;8(1):7864. doi:10.1038/s41598-018-26198-7

Berrueta L, Bhan C, He Y, et al. Stretching inhibits tumor growth in MMTV-PYMT via a direct mechanical effect. *BMC Biol*. 2026;24(1). doi:10.1186/s12915-026-02543-5

Bischoff-Ferrari HA, Gängler S, Wiecek M, et al. Individual and additive effects of vitamin D, omega-3 and exercise on DNA methylation clocks of biological aging in older adults from the DO-HEALTH trial. *Nat Aging*. 2025;5(3):376-385. doi:10.1038/s43587-024-00793-y

References (2 of 11)

Bischoff-Ferrari HA, Willett WC, Manson JE, et al. Combined vitamin D, omega-3 fatty acids, and a simple home exercise program may reduce cancer risk among active adults aged 70 and older: a randomized clinical trial. *Front Aging*. 2022;3:852643. doi:10.3389/fragi.2022.852643

Bouvard V, Loomis D, Guyton KZ, et al. Carcinogenicity of consumption of red and processed meat. *Lancet Oncol*. 2015;16(16):1599-1600. doi:10.1016/S1470-2045(15)00444-1

Boyd NF, Guo H, Martin LJ, et al. Mammographic density and the risk and detection of breast cancer. *N Engl J Med*. 2007;356(3):227-236. doi:10.1056/NEJMoa062790

Brasky TM, White E, Chen CL. Long-term, supplemental, one-carbon metabolism-related vitamin B use in relation to lung cancer risk in the Vitamins and Lifestyle (VITAL) cohort. *J Clin Oncol*. 2017;35(30):3440-3448. doi:10.1200/JCO.2017.72.7735

Bray F, Laversanne M, Sung H, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2024;74(3):229-263. doi:10.3322/caac.21834

Brown KF, Rumgay H, Dunlop C, et al. The fraction of cancer attributable to modifiable risk factors in England, Wales, Scotland, Northern Ireland, and the United Kingdom in 2015. *Br J Cancer*. 2018;118(8):1130-1141. doi:10.1038/s41416-018-0029-6

Burn J, Borthwick GM, Elliott F, et al. Aspirin for cancer prevention in individuals with Lynch syndrome: first results from the CaPP3 multicentre, randomised, double-blind, non-inferiority trial. *Lancet Gastroenterol Hepatol*. 2026;11(9):760-774. doi:10.1016/S2468-1253(26)00114-7

Burn J, Sheth H, Elliott F, et al. Cancer prevention with aspirin in hereditary colorectal cancer (Lynch syndrome), 10-year follow-up and registry-based 20-year data in the CaPP2 study: a double-blind, randomised, placebo-controlled trial. *Lancet*. 2020;395(10240):1855-1863. doi:10.1016/S0140-6736(20)30366-4

Chazelas E, Srour B, Desmetz E, et al. Sugary drink consumption and risk of cancer: results from NutriNet-Santé prospective cohort. *BMJ*. 2019;366:l2408. doi:10.1136/bmj.l2408

Chida Y, Hamer M, Wardle J, Steptoe A. Do stress-related psychosocial factors contribute to cancer incidence and survival? *Nat Clin Pract Oncol*. 2008;5(8):466-475. doi:10.1038/ncponc1134

Collaborative Group on Hormonal Factors in Breast Cancer. Type and timing of menopausal hormone therapy and breast cancer risk: individual participant meta-analysis of the worldwide epidemiological evidence. *Lancet*. 2019;394(10204):1159-1168. doi:10.1016/S0140-6736(19)31709-X

References (3 of 11)

Courneya KS, Vardy JL, O'Callaghan CJ, et al. Structured exercise after adjuvant chemotherapy for colon cancer. *N Engl J Med.* 2025;393(1):13-25. doi:10.1056/NEJMoa2502760

Cuzick J, Sestak I, Forbes JF, et al. Use of anastrozole for breast cancer prevention (IBIS-II): long-term results of a randomised controlled trial. *Lancet.* 2020;395(10218):117-122. doi:10.1016/S0140-6736(19)32955-1

Dacoregio MJ, Abrahão Reis PC, Gonçalves Celso DS, et al. Baseline surveillance in Li Fraumeni syndrome using whole-body MRI: a systematic review and updated meta-analysis. *Eur Radiol.* 2025;35(2):643-651. doi:10.1007/s00330-024-10983-2

de Martel C, Georges D, Bray F, Ferlay J, Clifford GM. Global burden of cancer attributable to infections in 2018: a worldwide incidence analysis. *Lancet Glob Health.* 2020;8(2):e180-e190. doi:10.1016/S2214-109X(19)30488-7

Díaz-Gay M, Dos Santos W, Moody S, et al. Geographic and age variations in mutational processes in colorectal cancer. *Nature.* 2025;643(8070):230-240. doi:10.1038/s41586-025-09025-8

Druszczyńska M, Łapińska J, Kusio I, et al. Beyond overdiagnosis: evaluating the drivers of increasing thyroid cancer incidence in the era of obesity, environmental exposure, and advanced diagnostics. *Cancers (Basel).* 2026;18(14):2193. doi:10.3390/cancers18142193

Ebbing M, Bønaa KH, Nygård O, et al. Cancer incidence and mortality after treatment with folic acid and vitamin B12. *JAMA.* 2009;302(19):2119-2126. doi:10.1001/jama.2009.1622

Ekström Smedby K, Vajdic CM, Falster M, et al. Autoimmune disorders and risk of non-Hodgkin lymphoma subtypes: a pooled analysis within the InterLymph Consortium. *Blood.* 2008;111(8):4029-4038. doi:10.1182/blood-2007-10-119974

Esserman LJ, Fiscali AS, Naeim A, et al. Risk-based vs annual breast cancer screening: the WISDOM randomized clinical trial. *JAMA.* 2026;335(9):763-774. doi:10.1001/jama.2025.24784

Evans DGR, Harkness EF, Brentnall AR, et al. Breast cancer pathology and stage are better predicted by risk stratification models that include mammographic density and common genetic variants. *Breast Cancer Res Treat.* 2019;176(1):141-148. doi:10.1007/s10549-019-05210-2

Fanidi A, Carreras-Torres R, Larose TL, et al. Is high vitamin B12 status a cause of lung cancer? *Int J Cancer.* 2019;145(6):1499-1503. doi:10.1002/ijc.32033

References (4 of 11)

Farvid MS, Sidahmed E, Spence ND, et al. Consumption of red meat and processed meat and cancer incidence: a systematic review and meta-analysis of prospective studies. *Eur J Epidemiol.* 2021;36(9):937-951. doi:10.1007/s10654-021-00741-9

Fiolet T, Srour B, Sellem L, et al. Consumption of ultra-processed foods and cancer risk: results from NutriNet-Santé prospective cohort. *BMJ.* 2018;360:k322. doi:10.1136/bmj.k322

Ford AC, Yuan Y, Moayyedi P. Helicobacter pylori eradication therapy to prevent gastric cancer: systematic review and meta-analysis. *Gut.* 2020;69(12):2113-2121. doi:10.1136/gutjnl-2020-320839

Fuller-Shavel N, Watts L, Derakshan N. Systems approach to integrative oncology in breast cancer care: service design, delivery and patient experiences from a UK center. *Front Oncol.* 2026;16:1870158. doi:10.3389/fonc.2026.1870158

Garcia-Closas M, Richards Z, Frost R, Gunter MJ, Berrington de Gonzalez A. Temporal trends in behavioural risk factors for cancers with rising incidence in younger adults: an analysis of population-based data in England. *BMJ Oncol.* 2026;5(1):e000966. doi:10.1136/bmjonc-2025-000966

Gordon-Dseagu V. Are more young people getting cancer? [Internet]. London: World Cancer Research Fund International; 2026 Oct 6 [cited 2026 Oct 7]. Available from: <https://www.wcrf.org/about-us/news-and-blogs/are-more-young-people-getting-cancer/>

Grześkiewicz-Szostak M, Gęca K, Skórzewska M. Early-onset colorectal cancer: from epidemiologic shift to life-course carcinogenesis and age-attuned care. *Curr Oncol Rep.* 2026;28(1). doi:10.1007/s11912-026-01815-1

Hamajima N, Hirose K, Tajima K, et al. Alcohol, tobacco and breast cancer: collaborative reanalysis of individual data from 53 epidemiological studies, including 58,515 women with breast cancer and 95,067 women without the disease. *Br J Cancer.* 2002;87(11):1234-1245. doi:10.1038/sj.bjc.6600596

Hanahan D. Hallmarks of cancer: new dimensions. *Cancer Discov.* 2022;12(1):31-46. doi:10.1158/2159-8290.CD-21-1059

Heikkilä K, Nyberg ST, Theorell T, et al. Work stress and risk of cancer: meta-analysis of 5700 incident cancer events in 116,000 European men and women. *BMJ.* 2013;346:f165. doi:10.1136/bmj.f165

Hill W, et al. Lung adenocarcinoma promotion by air pollutants. *Nature.* 2023;616:159-167. doi:10.1038/s41586-023-05874-3

References (5 of 11)

Hingorani AD, Gratton J, Finan C, et al. Performance of polygenic risk scores in screening, prediction, and risk stratification: secondary analysis of data in the Polygenic Score Catalog. *BMJ Med.* 2023;2(1):e000554. doi:10.1136/bmjmed-2023-000554

Hu Z, Kaminga AC, Yang J, Liu J, Xu H. Adverse childhood experiences and risk of cancer during adulthood: a systematic review and meta-analysis. *Child Abuse Negl.* 2021;117:105088. doi:10.1016/j.chiabu.2021.105088

Hughes K, Bellis MA, Hardcastle KA, et al. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health.* 2017;2(8):e356-e366. doi:10.1016/S2468-2667(17)30118-4

Huntley C, Torr B, Sud A, et al. Utility of polygenic risk scores in UK cancer screening: a modelling analysis. *Lancet Oncol.* 2023;24(6):658-668. doi:10.1016/S1470-2045(23)00156-0

Hvidtfeldt UA, Chen J, Rodopoulou S, et al. Breast cancer incidence in relation to long-term low-level exposure to air pollution in the ELAPSE pooled cohort. *Cancer Epidemiol Biomarkers Prev.* 2023;32(1):105-113. doi:10.1158/1055-9965.EPI-22-0720

IARC Monographs Vol 124 Group. Carcinogenicity of night shift work. *Lancet Oncol.* 2019;20(8):1058-1059. doi:10.1016/S1470-2045(19)30455-3

Islami F, Marlow EC, Thomson B, et al. Proportion and number of cancer cases and deaths attributable to potentially modifiable risk factors in the United States, 2019. *CA Cancer J Clin.* 2024;74(5):405-432. doi:10.3322/caac.21858

Jiang F, Boakye D, Sun J, et al. Association between antibiotic use during early life and early-onset colorectal cancer risk overall and according to polygenic risk and FUT2 genotypes. *Int J Cancer.* 2023;153(9):1602-1611. doi:10.1002/ijc.34648

Jovani M, Liu EE, Paniagua SM, et al. Cardiovascular disease related circulating biomarkers and cancer incidence and mortality: is there an association? *Cardiovasc Res.* 2022;118(10):2317-2328. doi:10.1093/cvr/cvab282

Kelly-Irving M, et al. Childhood adversity as a risk for cancer: findings from the 1958 British birth cohort study. *BMC Public Health.* 2013;13:767. doi:10.1186/1471-2458-13-767

Keum N, Chen QY, Lee DH, Manson JE, Giovannucci E. Vitamin D supplementation and total cancer incidence and mortality by daily vs. infrequent large-bolus dosing strategies: a meta-analysis of randomised controlled trials. *Br J Cancer.* 2022;127(5):872-878. doi:10.1038/s41416-022-01850-2

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References (6 of 11)

Khalighi Sikaroudi M, Soltani S, Kolahehdouz-Mohammadi R, et al. The association between dietary folate intake and risk of colorectal cancer incidence: a systematic review and dose-response meta-analysis of cohort studies. *Heliyon.* 2024;10(13):e33564. doi:10.1016/j.heliyon.2024.e33564

Kogevinas M, Espinosa A, Castelló A, et al. Effect of mistimed eating patterns on breast and prostate cancer risk (MCC-Spain Study). *Int J Cancer.* 2018;143(10):2380-2389. doi:10.1002/ijc.31649

Kuang X, Li Z, Zhang FF, Romanos-Nanclares A, Eliassen AH. Ultra-processed foods and breast cancer: epidemiology, mechanisms, and prognostic implications. *Carcinogenesis.* 2026;47(3). doi:10.1093/carcin/bgag062

Kwee RM, Kwee TC. Whole-body MRI for preventive health screening: a systematic review of the literature. *J Magn Reson Imaging.* 2019;50(5):1489-1503. doi:10.1002/jmri.26736

Larsson SC, Orsini N, Wolk A. Vitamin B6 and risk of colorectal cancer: a meta-analysis of prospective studies. *JAMA.* 2010;303(11):1077-1083. doi:10.1001/jama.2010.263

Lauby-Secretan B, Scoccianti C, Loomis D, et al. Body fatness and cancer: viewpoint of the IARC Working Group. *N Engl J Med.* 2016;375(8):794-798. doi:10.1056/NEJMs1606602

Lee A, Mavaddat N, Wilcox AN, et al. BOADICEA: a comprehensive breast cancer risk prediction model incorporating genetic and nongenetic risk factors. *Genet Med.* 2019;21(8):1708-1718. doi:10.1038/s41436-018-0406-9

Lei J, Ploner A, Elfström KM, et al. HPV vaccination and the risk of invasive cervical cancer. *N Engl J Med.* 2020;383(14):1340-1348. doi:10.1056/NEJMoa1917338

Loomis D, Guyton KZ, Grosse Y, et al. Carcinogenicity of drinking coffee, mate, and very hot beverages. *Lancet Oncol.* 2016;17(7):877-878. doi:10.1016/S1470-2045(16)30239-X

López-Otín C, Pietrocola F, Roiz-Valle D, Galluzzi L, Kroemer G. Meta-hallmarks of aging and cancer. *Cell Metab.* 2023;35(1):12-35. doi:10.1016/j.cmet.2022.11.001

Ma C, Ma Y, Xing X, et al. Stress biology in cancer: neuroendocrine-immune mechanisms linking tumor progression to translational interventions. *Cancer Commun (Lond).* 2026;46:0053. doi:10.34133/cancomm.0053

© DR NINA FULLER-SHAVEL 2026

References (7 of 11)

Manson JE, Cook NR, Lee IM, et al. Marine n-3 fatty acids and prevention of cardiovascular disease and cancer. *N Engl J Med.* 2019;380(1):23-32. doi:10.1056/NEJMoa1811403

Marinac CR, Nelson SH, Breen CI, et al. Prolonged nightly fasting and breast cancer prognosis. *JAMA Oncol.* 2016;2(8):1049-1055. doi:10.1001/jamaoncol.2016.0164

Mars N, Kerminen S, Tamlander M, et al. Comprehensive inherited risk estimation for risk-based breast cancer screening in women. *J Clin Oncol.* 2024;42(13):1477-1487. doi:10.1200/JCO.23.00295

Martins da Fonseca J, Trennepohl T, Pinheiro LG, et al. Whole-body MRI for opportunistic cancer detection in asymptomatic individuals: a systematic review and meta-analysis. *Eur Radiol.* 2026;36(3):1813-1823. doi:10.1007/s00330-025-11976-5

Mathers JC, Elliott F, Macrae F, et al. Cancer prevention with resistant starch in Lynch syndrome patients in the CAPP2-randomized placebo controlled trial: planned 10-year follow-up. *Cancer Prev Res (Phila).* 2022;15(9):623-634. doi:10.1158/1940-6207.CAPR-22-0044

Mavaddat N, et al. Polygenic risk scores for prediction of breast cancer and breast cancer subtypes. *Am J Hum Genet.* 2019;104(1):21-34. doi:10.1016/j.ajhg.2018.11.002

McCartney M, Cohen D. Galleri promises to detect multiple cancers, but new evidence casts doubt on this much hyped blood test. *BMJ.* 2024;386:q1706. doi:10.1136/bmj.q1706

McNeil JJ, Gibbs P, Orchard SG, et al. Effect of aspirin on cancer incidence and mortality in older adults. *J Natl Cancer Inst.* 2021;113(3):258-265. doi:10.1093/jnci/djaa114

Momma H, Kawakami R, Honda T, Sawada SS. Muscle-strengthening activities are associated with lower risk and mortality in major non-communicable diseases: a systematic review and meta-analysis of cohort studies. *Br J Sports Med.* 2022;56(13):755-763. doi:10.1136/bjsports-2021-105061

Moore SC, Lee IM, Weiderpass E, et al. Association of leisure-time physical activity with risk of 26 types of cancer in 1.44 million adults. *JAMA Intern Med.* 2016;176(6):816-825. doi:10.1001/jamainternmed.2016.1548

Murphy JD, Gadalla SM, Anderson LA, et al. Autoimmune conditions and gastric cancer risk in a population-based study in the United Kingdom. *Br J Cancer.* 2024;131(1):138-148. doi:10.1038/s41416-024-02714-7

References (8 of 11)

Murphy N, Knuppel A, Papadimitriou N, et al. Insulin-like growth factor-1, insulin-like growth factor-binding protein-3, and breast cancer risk: observational and Mendelian randomization analyses with ~430 000 women. *Ann Oncol.* 2020;31(5):641-649. doi:10.1016/j.annonc.2020.01.066

Nøst TH, Alcalá K, Urbarova I, et al. Systemic inflammation markers and cancer incidence in the UK Biobank. *Eur J Epidemiol.* 2021;36(8):841-848. doi:10.1007/s10654-021-00752-6

Olén O, Erichsen R, Sachs MC, et al. Colorectal cancer in ulcerative colitis: a Scandinavian population-based cohort study. *Lancet.* 2020;395(10218):123-131. doi:10.1016/S0140-6736(19)32545-0

Omenn GS, Goodman GE, Thornquist MD, et al. Effects of a combination of beta carotene and vitamin A on lung cancer and cardiovascular disease. *N Engl J Med.* 1996;334(18):1150-1155. doi:10.1056/NEJM199605023341802

Padrik P, Puustusmaa M, Tönnisson N, et al. Implementation of risk-stratified breast cancer prevention with a polygenic risk score test in clinical practice. *Breast Cancer (Auckl).* 2023;17:11782234231205700. doi:10.1177/11782234231205700

Palomar-Cros A, Harding BN, Espinosa A, et al. Association of time of breakfast and nighttime fasting duration with breast cancer risk in the multicase-control study in Spain. *Front Nutr.* 2022;9:941477. doi:10.3389/fnut.2022.941477

Palomar-Cros A, Srour B, Andreeva VA, et al. Associations of meal timing, number of eating occasions and night-time fasting duration with incidence of type 2 diabetes in the NutriNet-Santé cohort. *Int J Epidemiol.* 2023;52(5):1486-1497. doi:10.1093/ije/dyad081

Patel VR, Adamson AS, Welch HG. The rise in early-onset cancer in the US population: more apparent than real. *JAMA Intern Med.* 2025;185(11):1370-1374. doi:10.1001/jamainternmed.2025.4917

Reizner J, Fischer S, Linseisen J, Meisinger C, Freuer D. Evaluating the risk of digestive system cancer in autoimmune disease patients: a systematic review and meta-analysis focusing on bias assessment. *EClinicalMedicine.* 2025;87:103410. doi:10.1016/j.eclinm.2025.103410

Reynolds A, Mann J, Cummings J, et al. Carbohydrate quality and human health: a series of systematic reviews and meta-analyses. *Lancet.* 2019;393(10170):434-445. doi:10.1016/S0140-6736(18)31809-9

References (9 of 11)

Richmond RC, Anderson EL, Dashti HS, et al. Investigating causal relations between sleep traits and risk of breast cancer in women: mendelian randomisation study. *BMJ*. 2019;365:l2327. doi:10.1136/bmj.l2327

Roberts E, Howell S, Evans DG. Polygenic risk scores and breast cancer risk prediction. *Breast*. 2023;67:71-77. doi:10.1016/j.breast.2023.01.003

Rosenfeld N. Outcomes from the NHS-Galleri trial: the good, the bad, and the uncertain. *BJC Rep*. 2026;4:40. doi:10.1038/s44276-026-00243-9

Rumgay H, Shield K, Charvat H, et al. Global burden of cancer in 2020 attributable to alcohol consumption: a population-based study. *Lancet Oncol*. 2021;22(8):1071-1080. doi:10.1016/S1470-2045(21)00279-5

Schwingl P, Mehta S, Lunn RM. Breast cancer and persistent night shift work starting at an early age that causes circadian disruption. *Occup Environ Med*. 2019;76(Suppl 1):A70. doi:10.1136/oem-2019-epi.188

Shams-White MM, Brockton NT, Mitrou P, et al. Operationalizing the 2018 World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Cancer Prevention Recommendations: a standardized scoring system. *Nutrients*. 2019;11(7):1572. doi:10.3390/nu11071572

Song N, Xi X, Yang K, Pei C, Zhao L. Effects of endocrine disrupting chemicals, blood metabolome, and epigenetics on breast cancer risk: a multi-dimensional mendelian randomization study. *Ecotoxicol Environ Saf*. 2025;291:117791. doi:10.1016/j.ecoenv.2025.117791

Srouf B, Kaaks R, Johnson T, et al. Ageing-related markers and risks of cancer and cardiovascular disease: a prospective study in the EPIC-Heidelberg cohort. *Eur J Epidemiol*. 2022;37(1):49-65. doi:10.1007/s10654-021-00828-3

Srouf B, Plancoulaine S, Andreeva VA, et al. Circadian nutritional behaviours and cancer risk: new insights from the NutriNet-santé prospective cohort study. *Int J Cancer*. 2018;143(10):2369-2379. doi:10.1002/ijc.31584

Stamatakis E, Ahmadi MN, Friedenreich CM, et al. Vigorous intermittent lifestyle physical activity and cancer incidence among nonexercising adults: the UK Biobank accelerometer study. *JAMA Oncol*. 2023;9(9):1255-1259. doi:10.1001/jamaoncol.2023.1830

Sung H, Jiang C, Bandi P, et al. Differences in cancer rates among adults born between 1920 and 1990 in the USA: an analysis of population-based cancer registry data. *Lancet Public Health*. 2024;9(8):e583-e593. doi:10.1016/S2468-2667(24)00156-7

© DR NINA FULLER-SHAVEL 2026

References (10 of 11)

Sung H, Siegel RL, Laversanne M, et al. Colorectal cancer incidence trends in younger versus older adults: an analysis of population-based cancer registry data. *Lancet Oncol*. 2025;26(1):51-63. doi:10.1016/S1470-2045(24)00600-4

Swanton C, Bernard E, Abbosh C, et al. Embracing cancer complexity: hallmarks of systemic disease. *Cell*. 2024;187(7):1589-1616. doi:10.1016/j.cell.2024.02.009

Swanton C, et al. NHS-Galleri: primary results from a randomised controlled trial to assess the clinical utility of a multi-cancer early detection (MCED) test in population screening [presentation]. *ASCO Annual Meeting*; 2026 May 30; Chicago, IL. Abstract LBA100.

Tian R, Zong X, Ren D, et al. Biological aging and generational shifts in early-onset cancer risk. *Nat Med*. 2026;32(8):2983-2990. doi:10.1038/s41591-026-04448-w

Tilg H, Petta S, Stefan N, Targher G. Metabolic dysfunction-associated steatotic liver disease in adults: a review. *JAMA*. 2026;335(2):163-174. doi:10.1001/jama.2025.19615

Toledo E, Salas-Salvadó J, Donat-Vargas C, et al. Mediterranean diet and invasive breast cancer risk among women at high cardiovascular risk in the PREDIMED trial: a randomized clinical trial. *JAMA Intern Med*. 2015;175(11):1752-1760. doi:10.1001/jamainternmed.2015.4838

Travis RC, Balkwill A, Fensom GK, et al. Night shift work and breast cancer incidence: three prospective studies and meta-analysis of published studies. *J Natl Cancer Inst*. 2016;108(12):djw169. doi:10.1093/jnci/djw169

Turati F, Galeone C, Augustin LSA, La Vecchia C. Glycemic index, glycemic load and cancer risk: an updated meta-analysis. *Nutrients*. 2019;11(10):2342. doi:10.3390/nu11102342

Ugai T, Sasamoto N, Lee HY, et al. Is early-onset cancer an emerging global epidemic? Current evidence and future implications. *Nat Rev Clin Oncol*. 2022;19(10):656-673. doi:10.1038/s41571-022-00672-8

US Food and Drug Administration. FDA Executive Summary: Galleri (GRAIL, Inc.). Molecular and Clinical Genetics Panel of the Medical Devices Advisory Committee; 2026 Sep 23 [cited 2026 Oct 7]. Available from: <https://www.fda.gov/media/194909/download>

Vaz J, Jepsen P, Strömberg U, et al. Metabolic dysfunction-associated steatotic liver disease has become the most common cause of hepatocellular carcinoma in Sweden: a nationwide cohort study. *Int J Cancer*. 2025;156(1):40-51. doi:10.1002/ijc.35097

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References (11 of 11)

Vollset SE, Clarke R, Lewington S, et al. Effects of folic acid supplementation on overall and site-specific cancer incidence during the randomised trials: meta-analyses of data on 50,000 individuals. *Lancet*. 2013;381(9871):1029-1036. doi:10.1016/S0140-6736(12)62001-7

Wan MLY, Co VA, El-Nezami H. Endocrine disrupting chemicals and breast cancer: a systematic review of epidemiological studies. *Crit Rev Food Sci Nutr*. 2022;62(24):6549-6576. doi:10.1080/10408398.2021.1903382

Wang L, Sun K, Lu S, et al. The joint association of clonal hematopoiesis of indeterminate potential and biological aging with cancer risk among 332,911 individuals. *J Natl Cancer Inst*. 2026. doi:10.1093/jnci/djag268

Wang L, Xu R, Kaelber DC, Berger NA. Glucagon-like peptide 1 receptor agonists and 13 obesity-associated cancers in patients with type 2 diabetes. *JAMA Netw Open*. 2024;7(7):e2421305. doi:10.1001/jamanetworkopen.2024.21305

Xu J, Zhao X, Sun S, et al. Homocysteine and digestive tract cancer risk: a dose-response meta-analysis. *J Oncol*. 2018;2018:3720684. doi:10.1155/2018/3720684

Yang L, Singh V, Gawey BJ, et al. Microbiome signatures linked to cancer and treatment adverse events in a real-world cohort. *Cell*. 2026. doi:10.1016/j.cell.2026.09.009

Zahm S, Bonde JP, Chiu WA, et al. Carcinogenicity of perfluorooctanoic acid and perfluorooctanesulfonic acid. *Lancet Oncol*. 2024;25(1):16-17. doi:10.1016/S1470-2045(23)00622-8

Zhao J, Xu L, Sun J, et al. Global trends in incidence, death, burden and risk factors of early-onset cancer from 1990 to 2019. *BMJ Oncol*. 2023;2(1):e000049. doi:10.1136/bmjonc-2023-000049

Zhou F, He Y, Xie X, et al. Homocysteine and multiple health outcomes: an outcome-wide umbrella review of meta-analyses and Mendelian randomization studies. *Adv Nutr*. 2025;16(6):100434. doi:10.1016/j.advnut.2025.100434

Zugni F, Padhani AR, Koh DM, et al. Whole-body magnetic resonance imaging (WB-MRI) for cancer screening in asymptomatic subjects of the general population: review and recommendations. *Cancer Imaging*. 2020;20(1):34. doi:10.1186/s40644-020-00315-0

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