

# Diet, nutrition and physical activity: Energy balance and body fatness

The determinants of weight gain,  
overweight and obesity

Conclusions document

May 2018

Available until late 2018

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# WORLD CANCER RESEARCH FUND NETWORK

## OUR VISION

We want to live in a world where no one develops a preventable cancer.

## OUR MISSION

We champion the latest and most authoritative scientific research from around the world on cancer prevention and survival through diet, weight and physical activity, so that we can help people make informed choices to reduce their cancer risk.

As a network, we influence policy at the highest level and are trusted advisors to governments and to other official bodies from around the world.

## OUR NETWORK

World Cancer Research Fund International is a not-for-profit organisation that leads and unifies a network of cancer charities with a global reach, dedicated to the prevention of cancer through diet, weight and physical activity.

The World Cancer Research Fund network of charities is based in Europe, the Americas and Asia, giving us a global voice to inform people about cancer prevention.

## Our Continuous Update Project (CUP)

The Continuous Update Project (CUP) is the World Cancer Research Fund (WCRF) Network's ongoing programme to analyse cancer prevention and survival research related to diet, nutrition and physical activity from all over the world. Among experts worldwide it is a trusted, authoritative scientific resource which informs current guidelines and policy on cancer prevention and survival.

Scientific research from around the world is continually added to the CUP's unique database, which is held and systematically reviewed by a team at Imperial College London. An independent panel of experts carries out ongoing evaluations of this evidence, and their findings form the basis of the WCRF Network's Cancer Prevention Recommendations (see [Recommendations and public health and policy implications](#)).

Through this process, the CUP ensures that everyone, including policymakers, health professionals and members of the public, has access to the most up-to-date information on how to reduce the risk of developing cancer.

The launch of the WCRF Network's Third Expert Report, Diet, Nutrition, Physical Activity and Cancer: a Global Perspective, in 2018 brings together the very latest research from the CUP's review of the accumulated evidence on cancer prevention and survival related to diet, nutrition and physical activity. For a full list of contents, see [dietandcancerreport.org](http://dietandcancerreport.org)

The CUP is led and managed by World Cancer Research Fund International in partnership with the American Institute for Cancer Research, on behalf of World Cancer Research Fund UK, Wereld Kanker Onderzoek Fonds and World Cancer Research Fund HK.

## How to cite the Third Expert Report

The whole report: World Cancer Research Fund/American Institute for Cancer Research. *Diet, Nutrition, Physical Activity and Cancer: a Global Perspective*. Continuous Update Project Expert Report 2018. Available at [dietandcancerreport.org](http://dietandcancerreport.org)

## Introduction

In March 2017, the Continuous Update Project (CUP) Panel discussed and judged the evidence presented in the Diet, nutrition and physical activity: [Energy balance and body fatness literature review 2017](#). That review contains the evidence on which this conclusions document is based (see **Annex**). For information on the grading criteria used to judge the evidence, please see [Judging the Evidence](#). The conclusions presented here form part of the basis for the 2018 Cancer Prevention Recommendations (see [Recommendations and public health and policy implications](#)). A full report summarising the evidence and detailing conclusions on diet, nutrition and physical activity in relation to energy balance and body fatness will be published later in 2018.

### Please note

Pending publication of the full report

**Diet, nutrition and physical activity:  
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overweight and obesity***

later in 2018, this interim document is intended only to summarise the CUP Panel's conclusions. The evidence on which these conclusions are based, available now in the separate [Energy balance and body fatness literature review 2017](#), will be included in the full report. This interim document will no longer be available once the full report is published.

## Summary of Panel judgements

The Continuous Update Project (CUP) Panel has drawn conclusions about individual exposures and whether they decrease or increase the risk of weight gain, overweight and obesity as outlined below. Each conclusion on the likely causal relationship between an exposure and the risk of weight gain, overweight and obesity forms a part of the overall body of evidence that is considered during the process of making Cancer Prevention Recommendations. Any single conclusion does not represent a recommendation in its own right. The 2018 Cancer Prevention Recommendations are based on a synthesis of all the separate conclusions across the CUP, as well as other relevant evidence, and can be found in [Recommendations and public health and policy implications](#).

The exposures are judged to increase or decrease the risk of weight gain, overweight and obesity by promoting excess energy intake (positive energy balance, increased risk) relative to the level of energy expenditure (in particular physical activity) or appropriate energy balance (decreased risk) through a complex interplay of physiological, psychological, and social influences.

Several singular exposures (increased aerobic physical activity, consumption of wholegrains, foods containing dietary fibre, fruit and vegetables) have been judged to show specific associations with decreased risk of weight gain, overweight and obesity, as has a predefined 'Mediterranean type' dietary pattern (which itself includes these singular exposures). However, the CUP Panel has greater confidence that the overall clustering of the exposures, including higher adherence to a 'Mediterranean type' dietary pattern, is more likely to decrease the risk of weight gain, overweight and obesity than any given single exposure.

Furthermore, several singular exposures have been individually associated with increased risk of weight gain, overweight and obesity: increased sedentary time, including screen time, and consumption of sugar sweetened drinks, 'fast foods', and refined grains. The CUP Panel also judged a 'Western type' diet (characterised by high intakes of free sugars, meat and dietary fat) to be associated with increased risk of weight gain, overweight and obesity; such a diet itself often includes these singular exposures. And similarly, the CUP Panel has greater confidence that the overall clustering of these exposures is more likely to increase the risk of weight gain, overweight and obesity than any exposure in isolation. These groupings include both strong and limited evidence conclusions.

In addition, the Panel notes the strength of the evidence for having been breastfed reducing the risk of excess weight gain, overweight and obesity in children and the limited nature of the evidence for lactation and decreased risk in mothers. Please see [Diet, nutrition and physical activity: Energy balance and body fatness](#) report, due for publication in late 2018, for discussion of the integration of the evidence.

The CUP Panel's judgements for each singular exposure are as follows:

## CONVINCING

**Walking:** Walking convincingly protects against weight gain, overweight and obesity.

**Screen time (children):** Greater screen time is a convincing cause of weight gain, overweight and obesity in children. Screen time is a marker of sedentary behaviour and may also be associated with low levels of physical activity, consumption of energy dense snacks and drinks and exposure to marketing of such foods and drinks.

**Sugar sweetened drinks:** Consumption of sugar sweetened drinks is a convincing cause of weight gain, overweight and obesity.

## PROBABLE

**Aerobic physical activity:** Aerobic physical activity probably protects against weight gain, overweight and obesity.

**Foods containing dietary fibre:** Consumption of foods containing dietary fibre probably protects against weight gain, overweight and obesity.

**'Mediterranean type' dietary pattern:** Consumption of a 'Mediterranean type' dietary pattern probably protects against weight gain, overweight and obesity.

**Having been breastfed:** Having been breastfed probably protects against excess weight gain, overweight and obesity in childhood.

**Screen time (adults):** Greater screen time is probably a cause of weight gain, overweight and obesity in adults. Screen time is a marker of sedentary behaviour and may also be associated with low levels of physical activity, consumption of energy dense snacks and drinks and exposure to marketing of such foods and drinks.

**'Fast foods':** Consumption of 'fast foods' is probably a cause of weight gain, overweight and obesity.

**'Western type' diet:** Consumption of a 'Western type' diet is probably a cause of weight gain, overweight and obesity.

## LIMITED – SUGGESTIVE

**Wholegrains:** The evidence suggesting that consumption of wholegrains decreases the risk of weight gain, overweight and obesity is limited.

**Fruit and vegetables:** The evidence suggesting that consumption of fruits and vegetables decreases the risk of weight gain, overweight and obesity is limited.

**Lactation:** The evidence that lactation decreases the risk of weight gain, overweight and obesity in the mother is limited.

**Sedentary behaviours:** The evidence suggesting that sedentary behaviours increase the risk of weight gain, overweight and obesity is limited.

**Refined grains:** The evidence suggesting that consumption of refined grains increases the risk of weight gain, overweight and obesity is limited.

### The following exposures were judged by the CUP Panel as 'Limited – no conclusion':

Vegetarian/vegan diets; adherence to dietary guidelines; dietary variety; breakfast; family meals; eating in the evening; eating frequency; snacking; pulses (legumes); nuts; fish; dairy; confectionery; water; artificially sweetened drinks; fruit juice; coffee and tea; alcoholic drinks; total carbohydrate; glycaemic load; total protein; dietary sodium; caffeine; catechins; strength training; energy density; and sleep

For a full description of the definitions of, and criteria for, the terminology of 'convincing', 'probable', 'limited – suggestive', 'limited – no conclusion' and 'substantial effect on risk unlikely', see [Judging the evidence](#).

A summary of the CUP Panel judgements for the determinants of weight gain, overweight and obesity relating to diet, nutrition and physical activity are also shown in the **Matrix**, on page 8.

## The matrix

The conclusions are summarised in the matrix:

### Diet and physical activity and weight gain, overweight and obesity in adults and children<sup>1</sup>

The factors identified in the matrix as increasing or decreasing risk of weight gain, overweight or obesity do so by promoting excess energy intake (positive energy balance, increased risk) relative to the level of energy expenditure (in particular physical activity), or appropriate energy balance (decreased risk), through a complex interplay of physiological, psychological and social influences.<sup>2</sup>

		Decreases risk of weight gain, overweight, and obesity	Increases risk of weight gain, overweight, and obesity
<b>STRONG EVIDENCE</b>	<b>Convincing</b>	Walking	Screen time (children) <sup>3</sup> Sugar sweetened drinks <sup>4</sup>
	<b>Probable</b>	Aerobic physical activity Foods containing dietary fibre 'Mediterranean type' dietary pattern <sup>5</sup> Having been breastfed <sup>6</sup>	Screen time (adults) <sup>3</sup> 'Fast foods' <sup>7</sup> 'Western type' diet <sup>8</sup>
<b>LIMITED EVIDENCE</b>	<b>Limited – suggestive</b>	Wholegrains <sup>9</sup> Fruit and vegetables Lactation (mother)	Sedentary behaviours <sup>10</sup> Refined grains <sup>9</sup>
	<b>Limited – no conclusion</b>	Vegetarian or vegan diets, adherence to dietary guidelines, dietary variety, eating breakfast, family meals, eating in the evening, eating frequency, snacking, pulses (legumes), nuts, fish, dairy, confectionery, water, artificially sweetened drinks, fruit juice, coffee and tea, alcoholic drinks, total carbohydrate, glycaemic load, total protein, caffeine, catechins, strength training, energy density, and sleep	
<b>STRONG EVIDENCE</b>	<b>Substantial effect on risk unlikely</b>	None identified	

- 1 The evidence for these conclusions comes mostly from studies of adults, except where specified. However, the CUP Panel judged that the conclusions for adults, unless there is evidence to the contrary, also apply to children. Relates to children aged 5 years and over.
- 2 Please see [Diet, nutrition and physical activity: Energy balance and body fatness](#) (to be published late 2018) for discussion of the integration of the exposures into clusters.
- 3 With the available evidence the Panel were able to make separate conclusions for children and adults in relation to screen time. Screen time is a marker of sedentary behaviour and may also be associated with low levels of physical activity, consumption of energy dense snacks and drinks and exposure to marketing of such foods and drinks.
- 4 Sugar sweetened drinks are defined here as liquids that are sweetened by adding free sugars, such as sucrose, high fructose corn syrup and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrate. This includes, among others, sodas, sports drinks, energy drinks, sweetened waters, cordials, barley water, and coffee- and tea-based beverages with sugars or syrups added. This does not include versions of these drinks which are 'sugar free' or sweetened only with artificial sweeteners.
- 5 There are recognised scores for quantifying adherence to a 'Mediterranean type' dietary pattern but it is unclear exactly what such a diet comprises. It generally describes a diet rich in fruits and vegetables, with modest amounts of meat and dairy, some fish and wine, and rich in unrefined olive oil. Traditionally it is also associated with high levels of physical activity. Currently most countries around the Mediterranean do not consume such a diet.
- 6 The evidence relates principally to excess weight gain, overweight and obesity in childhood but overweight and obesity in childhood tends to track into adult life.
- 7 'Fast foods' are readily available convenience foods that tend to be energy dense, and are often consumed frequently and in large portions. Most of the evidence on fast foods is from studies of foods such as burgers, fried chicken pieces, chips (French fries), and high-calorie drinks (containing sugars, such as cola, or fat, such as shakes), as typically served in international franchise outlets. Many other foods can also be prepared quickly, but the speed of preparation is not the important factor, even though it is characteristic of this group of foods.
- 8 Such diets are characterised by high intakes of free sugars, meat and dietary fat, which are probably the factors responsible for the effects on weight. The overall conclusion includes all these factors.
- 9 Refined grains refers to the grains themselves, or products of such grains, that have been mechanically processed to remove one or more of the bran, germ or endosperm. This is in contrast to wholegrains (or their products) which contain all three constituents.
- 10 Sedentary behaviours comprise both high levels of physical inactivity and low levels of physical activity.



## Annex

The evidence can be found in the [Diet, nutrition and physical activity: Energy balance and body fatness literature review 2017](#). The relevant sections for each exposure are listed below.

Exposure	Relevant section in literature review	
Walking	Section 4	
Screen time	Section 5.2	
Sugar sweetened drinks	Section 2.7	
Aerobic physical activity	Section 4	
Foods containing dietary fibre	Section 3.1	
'Mediterranean type' dietary pattern	Section 1.1	
Having been breastfed	Section 1.3	
'Fast foods'	Section 2.6	
'Western type' diet <i>(New exposure defined which encompasses all three exposures)</i>	Free sugars	Section 3.2
	Meat	Section 2.4
	Dietary fat	Section 3.3
Wholegrains	Section 2.1	
Fruit and vegetables	Section 2.3	
Lactation	Section 1.2	
Sedentary behaviour	Section 5.1	
Refined grains	Section 2.2	

### Reminder

Pending publication of the full report

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later in 2018, this interim document is intended only to summarise the CUP Panel's conclusions. The evidence on which these conclusions are based, available now in the separate [Energy balance and body fatness literature review 2017](#), will be included in the full report. This interim document will no longer be available once the full report is published.

# Acknowledgements

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# Our Cancer Prevention Recommendations

## **Be a healthy weight**

Keep your weight within the healthy range and avoid weight gain in adult life

## **Be physically active**

Be physically active as part of everyday life – walk more and sit less

## **Eat a diet rich in wholegrains, vegetables, fruit and beans**

Make wholegrains, vegetables, fruit, and pulses (legumes) such as beans and lentils a major part of your usual daily diet

## **Limit consumption of ‘fast foods’ and other processed foods high in fat, starches or sugars**

Limiting these foods helps control calorie intake and maintain a healthy weight

## **Limit consumption of red and processed meat**

Eat no more than moderate amounts of red meat, such as beef, pork and lamb.  
Eat little, if any, processed meat

## **Limit consumption of sugar sweetened drinks**

Drink mostly water and unsweetened drinks

## **Limit alcohol consumption**

For cancer prevention, it's best not to drink alcohol

## **Do not use supplements for cancer prevention**

Aim to meet nutritional needs through diet alone

## **For mothers: breastfeed your baby, if you can**

Breastfeeding is good for both mother and baby

## **After a cancer diagnosis: follow our Recommendations, if you can**

Check with your health professional what is right for you

**Not smoking and avoiding other exposure to tobacco and excess sun are also important in reducing cancer risk.**

**Following these Recommendations is likely to reduce intakes of salt, saturated and trans fats, which together will help prevent other non-communicable diseases.**

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