

Cecilie Kyrø, WholeGrain Summer School, May 18, 2021

# Whole grains and cancer prevention

Danish Cancer Society



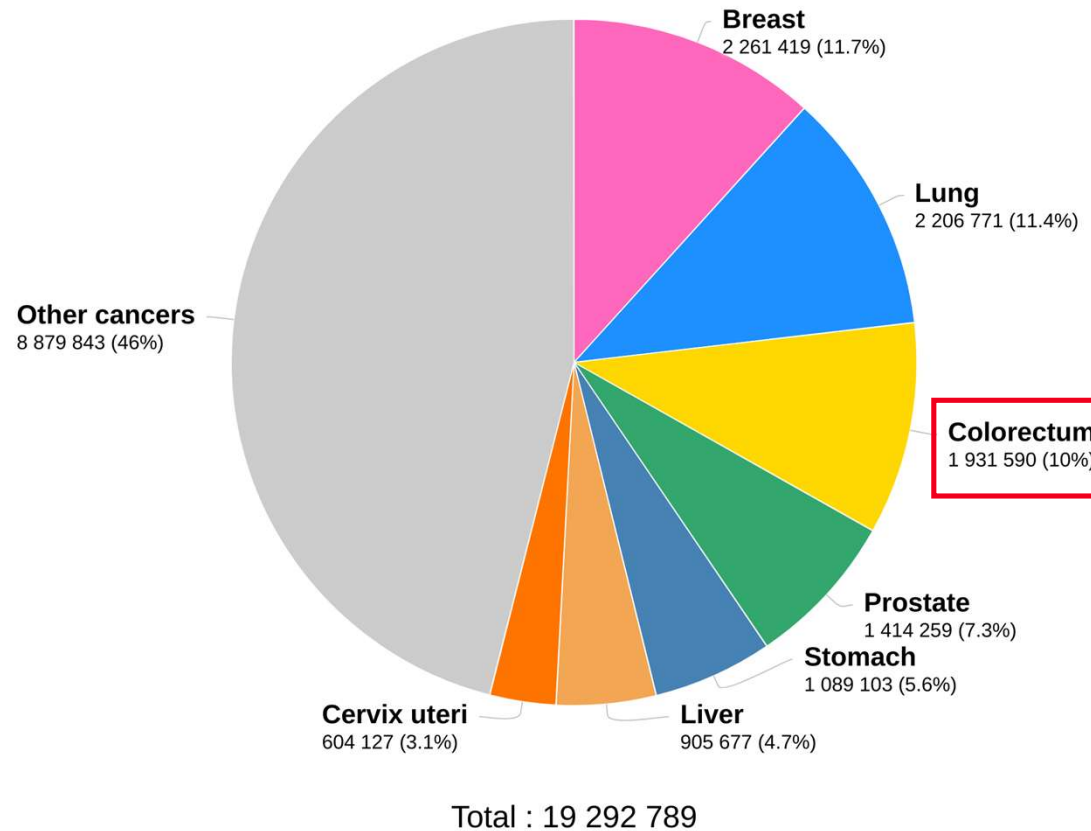
A decade of research...

A research journey in parallel with  
the Danish Wholegrain Partnership



# Cancer

Estimated number of new cases in 2020, worldwide, both sexes, all ages



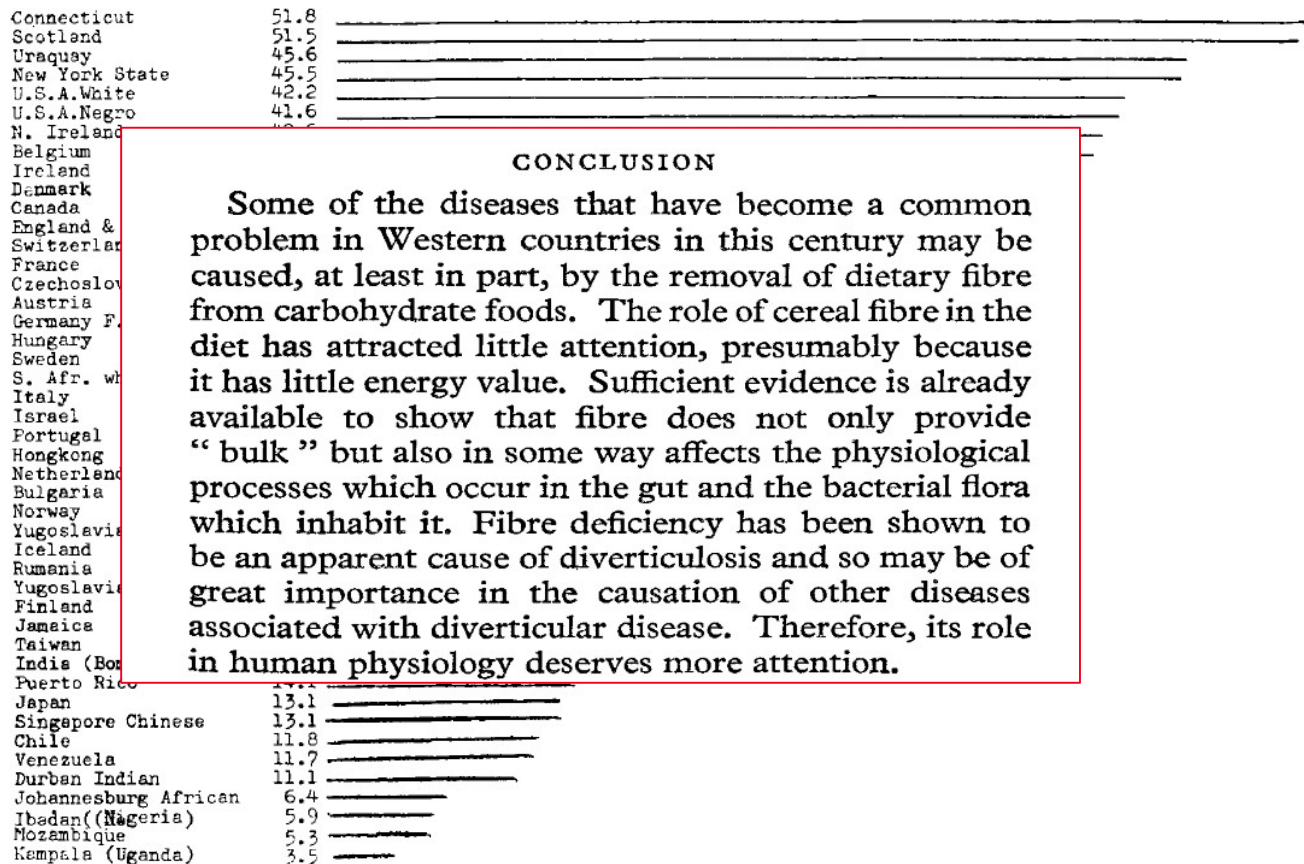
Data source: Globocan 2020  
Graph production: Global Cancer  
Observatory (<http://gco.iarc.fr>)





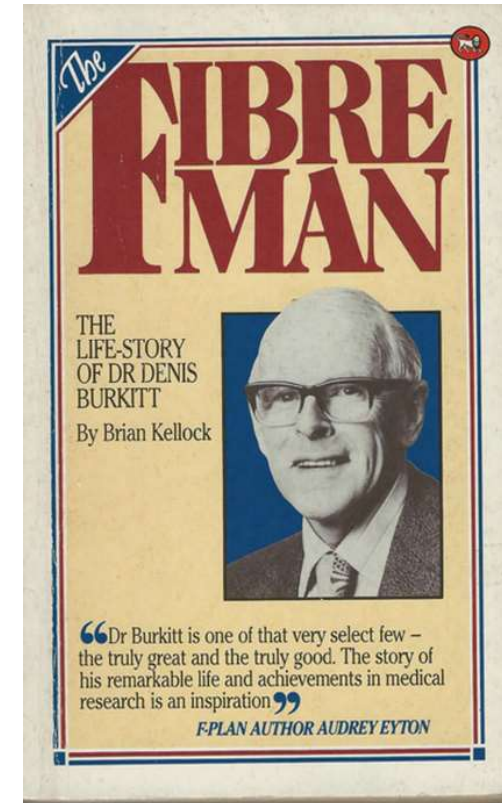
# Whole Grains and Colorectal Cancer?

Sir Denis Burkitt



## CONCLUSION

Some of the diseases that have become a common problem in Western countries in this century may be caused, at least in part, by the removal of dietary fibre from carbohydrate foods. The role of cereal fibre in the diet has attracted little attention, presumably because it has little energy value. Sufficient evidence is already available to show that fibre does not only provide "bulk" but also in some way affects the physiological processes which occur in the gut and the bacterial flora which inhabit it. Fibre deficiency has been shown to be an apparent cause of diverticulosis and so may be of great importance in the causation of other diseases associated with diverticular disease. Therefore, its role in human physiology deserves more attention.



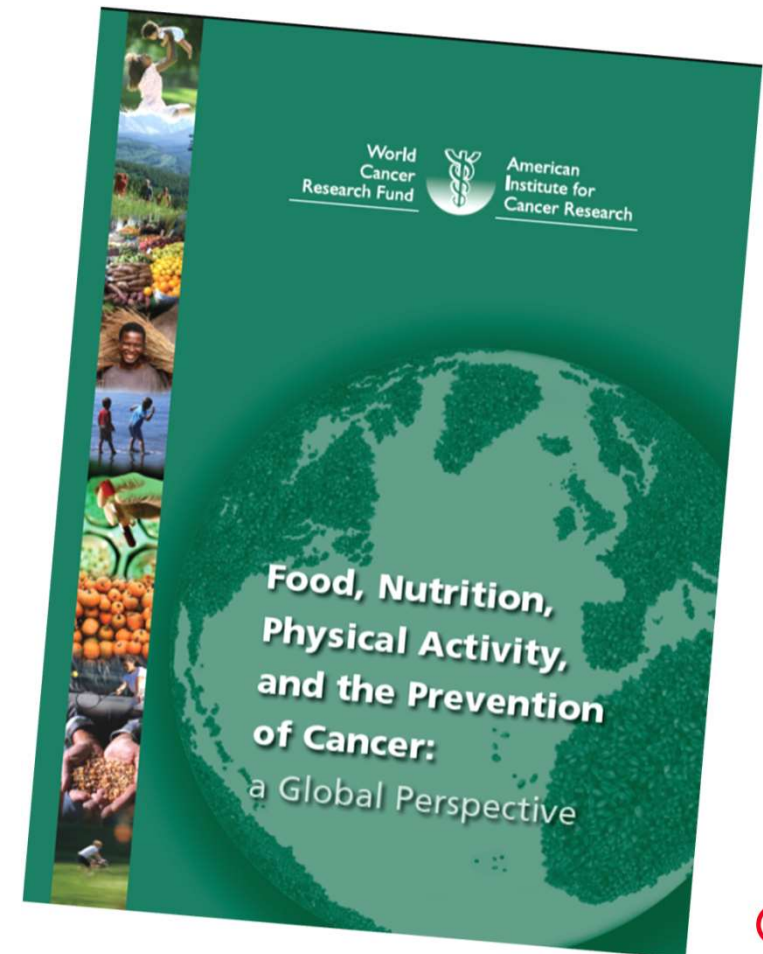
4 **FIG. 1. Age-standardized incidence rates for cancer of the colon and rectum in men 35-64 years of age arranged in order of incidence (modified from Doll<sup>10</sup>).**

Burkitt DP, Walker AR, Painter NS. *Lancet*. 1972;2(7792):1408-12



# Prevention of Colorectal Cancer

FOOD, NUTRITION, PHYSICAL ACTIVITY, AND CANCERS OF THE COLON AND THE RECTUM		
In the judgement of the Panel, the factors listed below modify the risk of cancers of the colon and the rectum. Judgements are graded according to the strength of the evidence.		
	DECREASES RISK	INCREASES RISK
Convincing	Physical activity <sup>1,2</sup>	Red meat <sup>2,4</sup> Processed meat <sup>4,5</sup> Alcoholic drinks (men) <sup>6</sup> Body fatness Abdominal fatness Adult attained height <sup>7</sup>
Probable	Foods containing dietary fibre <sup>8</sup> Garlic <sup>9</sup> Milk <sup>10,11</sup> Calcium <sup>12</sup>	Alcoholic drinks (women) <sup>6</sup>
Limited — suggestive	Non-starchy vegetables <sup>9</sup> Fruits <sup>9</sup> Foods containing folate <sup>8</sup> Foods containing selenium <sup>8</sup> Fish Foods containing vitamin D <sup>8,13</sup> Selenium <sup>14</sup>	Foods containing iron <sup>8</sup> Cheese <sup>10</sup> Foods containing animal fats <sup>5</sup> Foods containing sugars <sup>15</sup>
Limited — no conclusion	Cereals (grains) and their products; potatoes; poultry; shellfish and other seafood; other dairy products; total fat; fatty acid composition; cholesterol; sugar (sucrose); coffee; tea; caffeine; total carbohydrate; starch; vitamin A; retinol; vitamin C; vitamin E; multivitamins; non-dairy sources of calcium; methionine; beta-carotene; alpha-carotene; lycopene; meal frequency; energy intake	
Substantial effect on risk unlikely	None identified	



# Whole Grains

Health mechanisms?



## Fermentable fiber

- Production of SCFA – butyrate
- Drop in pH → decrease in formation of secondary bile acids

## Non-fermentable fiber

- “Mechanical” effects
- Faster transit time

## B-glucans

- → Lower cholesterol

## Other possible mechanisms

- Phytoestrogens
- Folate – deficiency → DNA damages
- Glucose/insulin homeostasis
- Weight management?
- Microbiome?



# Epidemiological research – Cohort studies

Whole Grains and Colorectal Cancer

## Questionnaire data

(HELGA n=108,000)

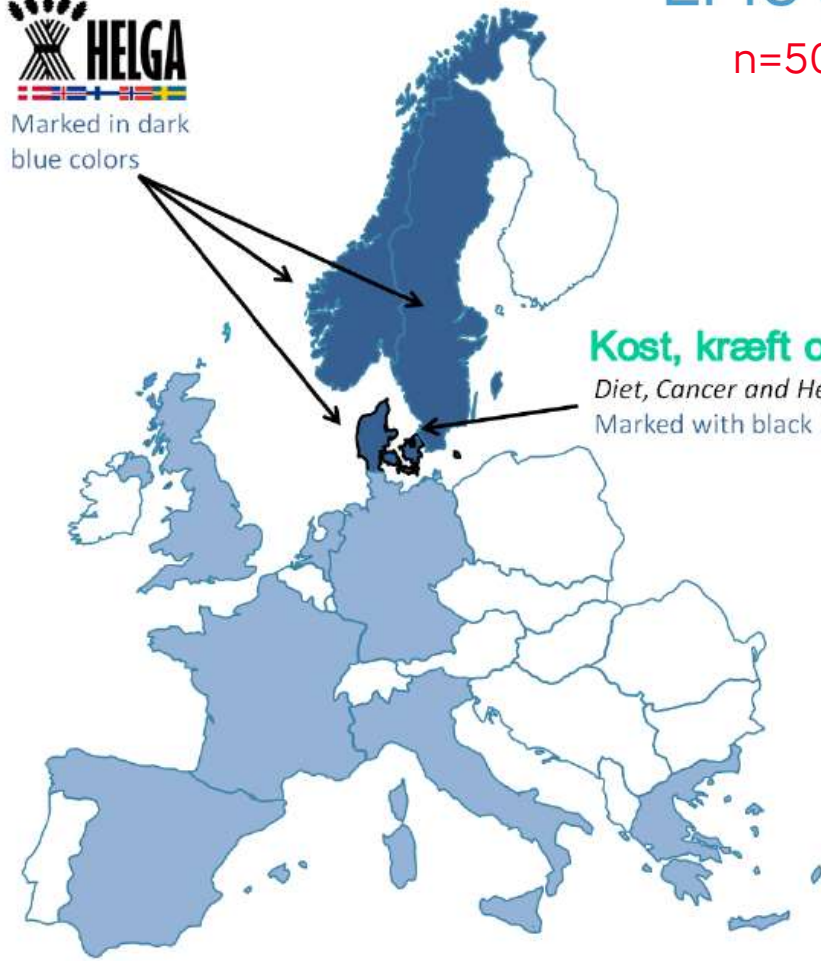
- Dietary fiber sources (1168 cases)
- Whole grains (1123 cases)



## Biomarkers of intake

(EPIC n=500,000)

- Plasma Alkylresorcinols (1372 cases, 1372 controls)



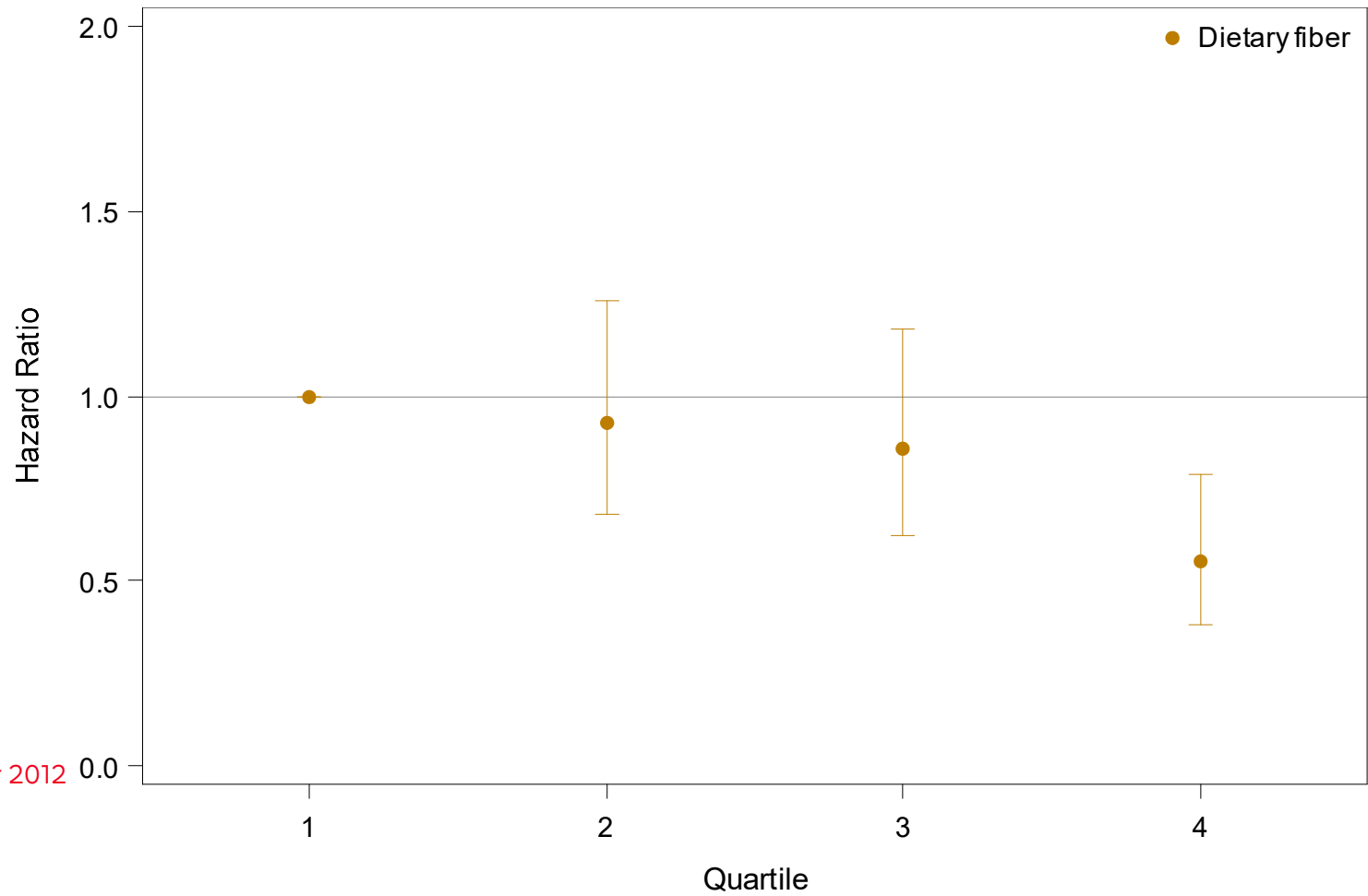
EPIC study

n=500,000

**Kost, kræft og helbred**  
Diet, Cancer and Health cohort  
Marked with black lines

# Colorectal cancer

Men



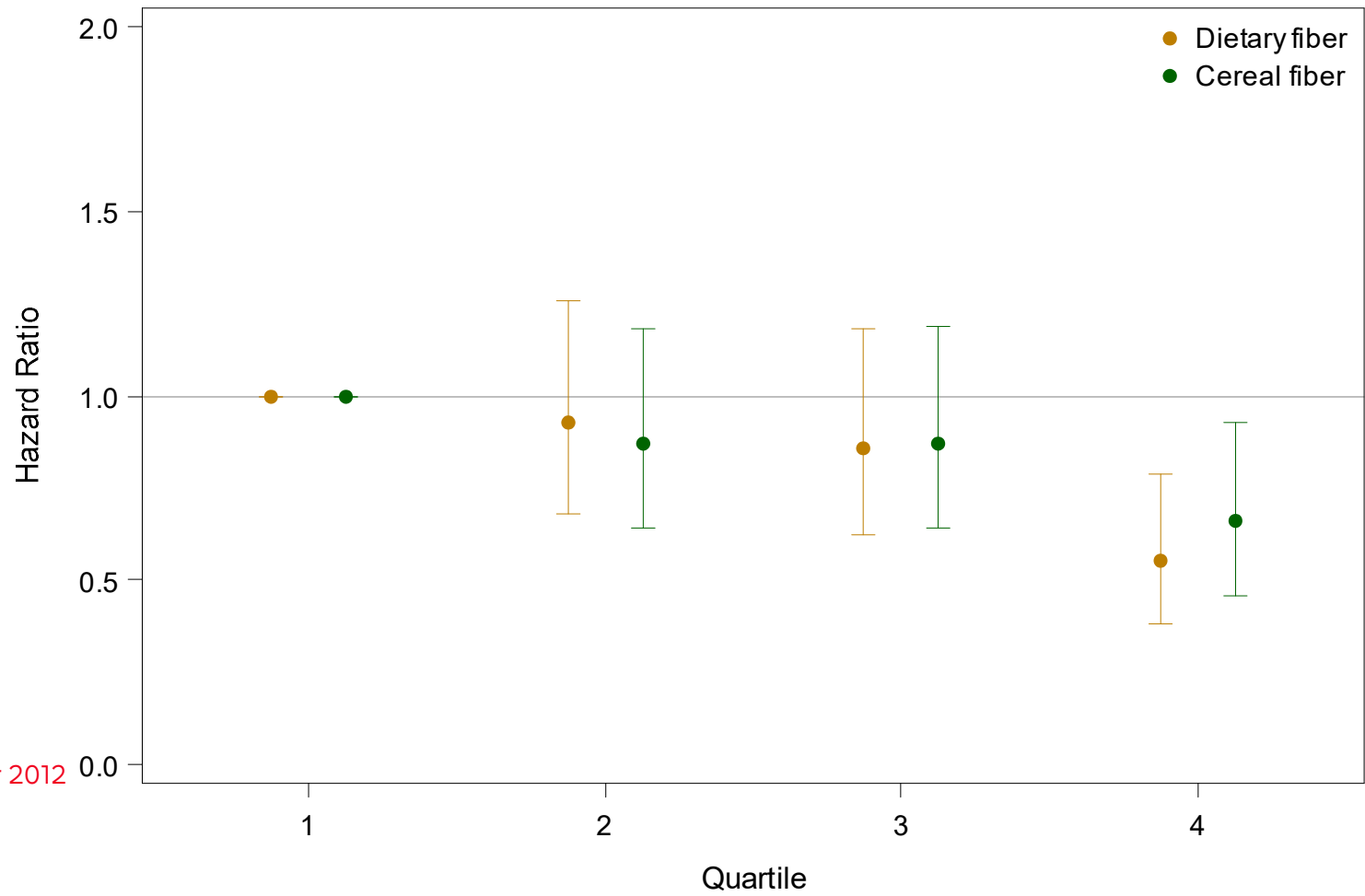
Hansen L *et al.* Int J Cancer 2012





# Colorectal cancer

Men

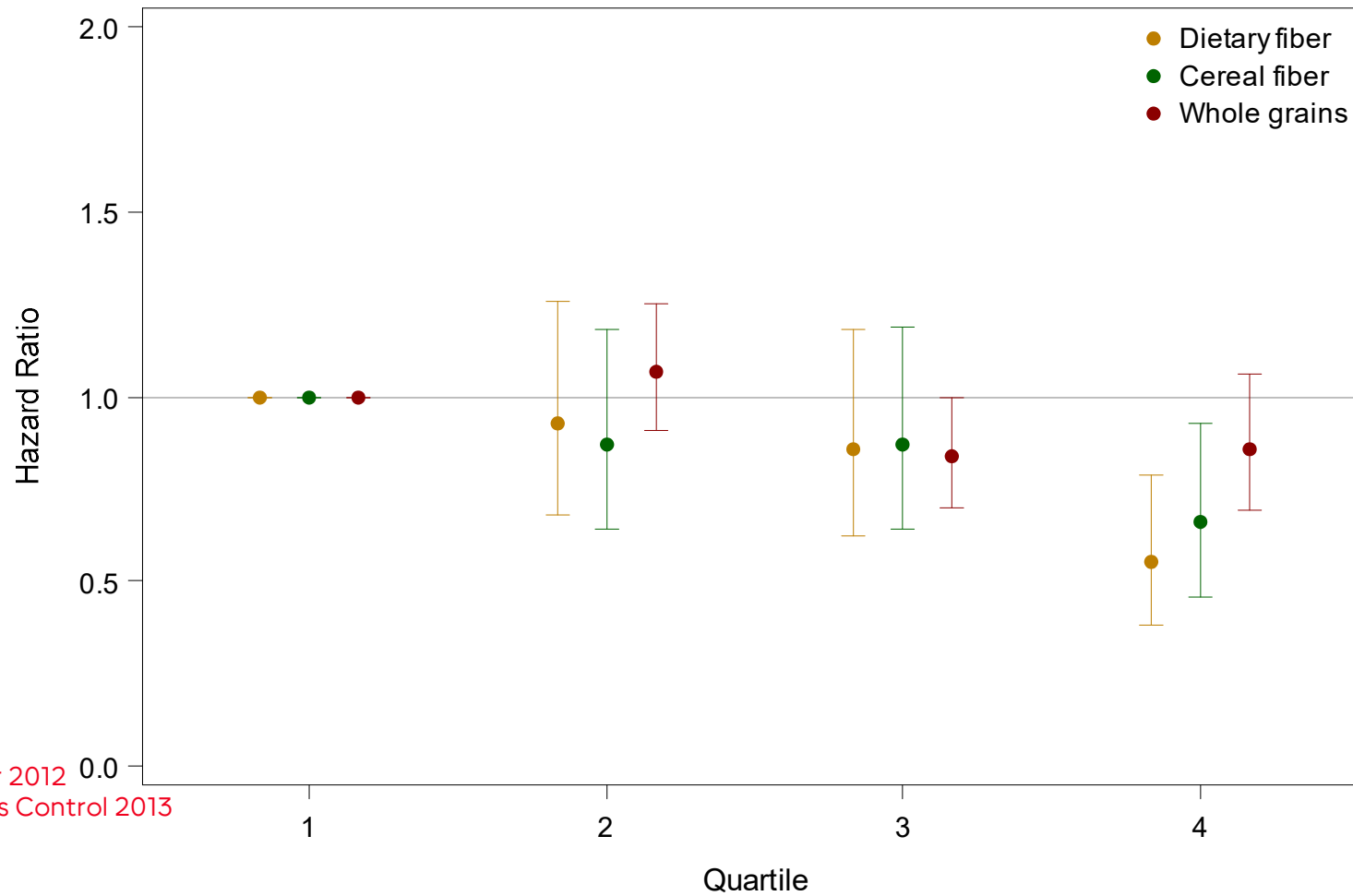


Hansen L *et al.* Int J Cancer 2012



# Colorectal cancer

Men

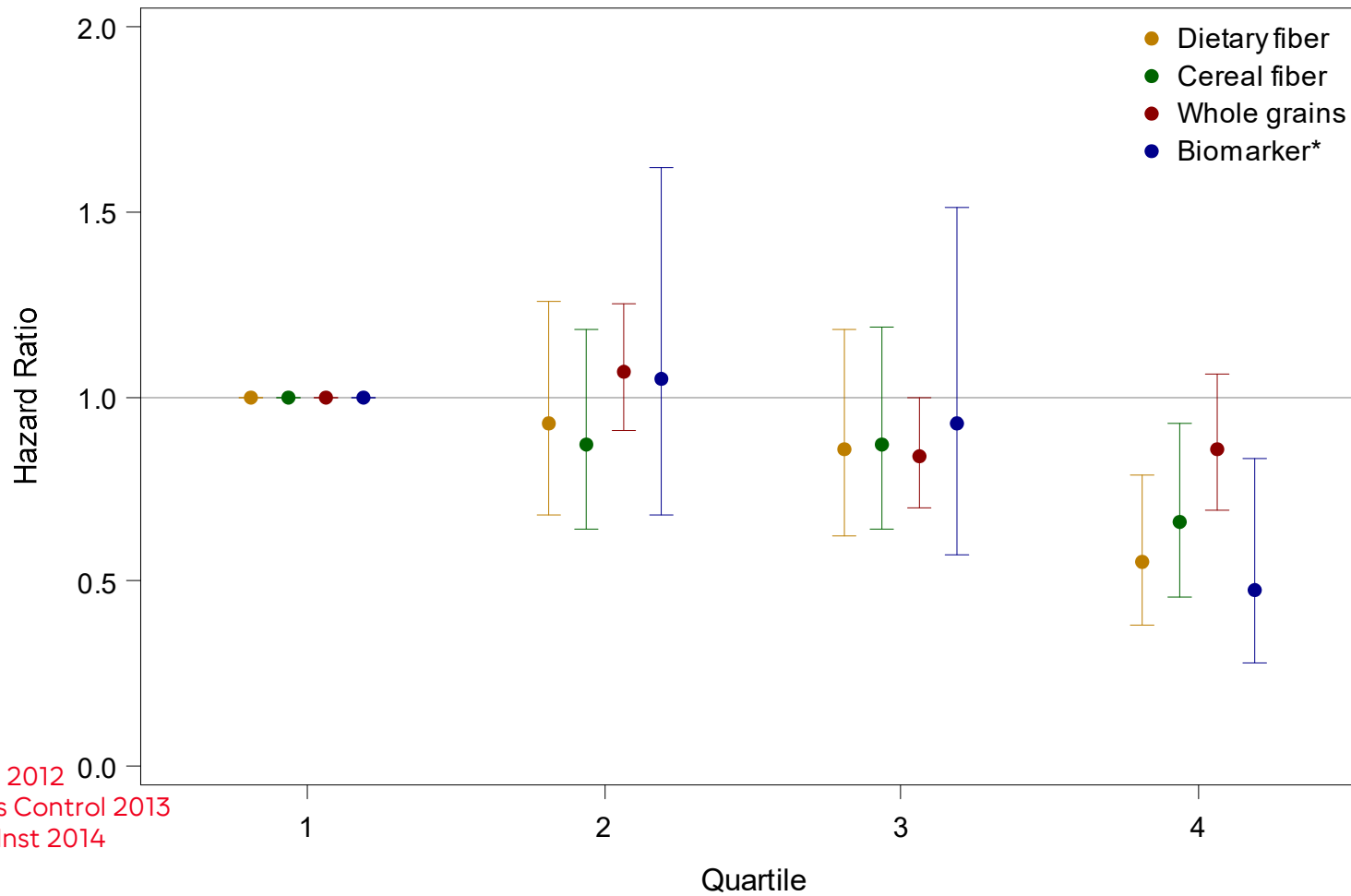


Hansen L *et al.* Int J Cancer 2012  
Kyrø C *et al.* Cancer Causes Control 2013



# Colorectal cancer

Men

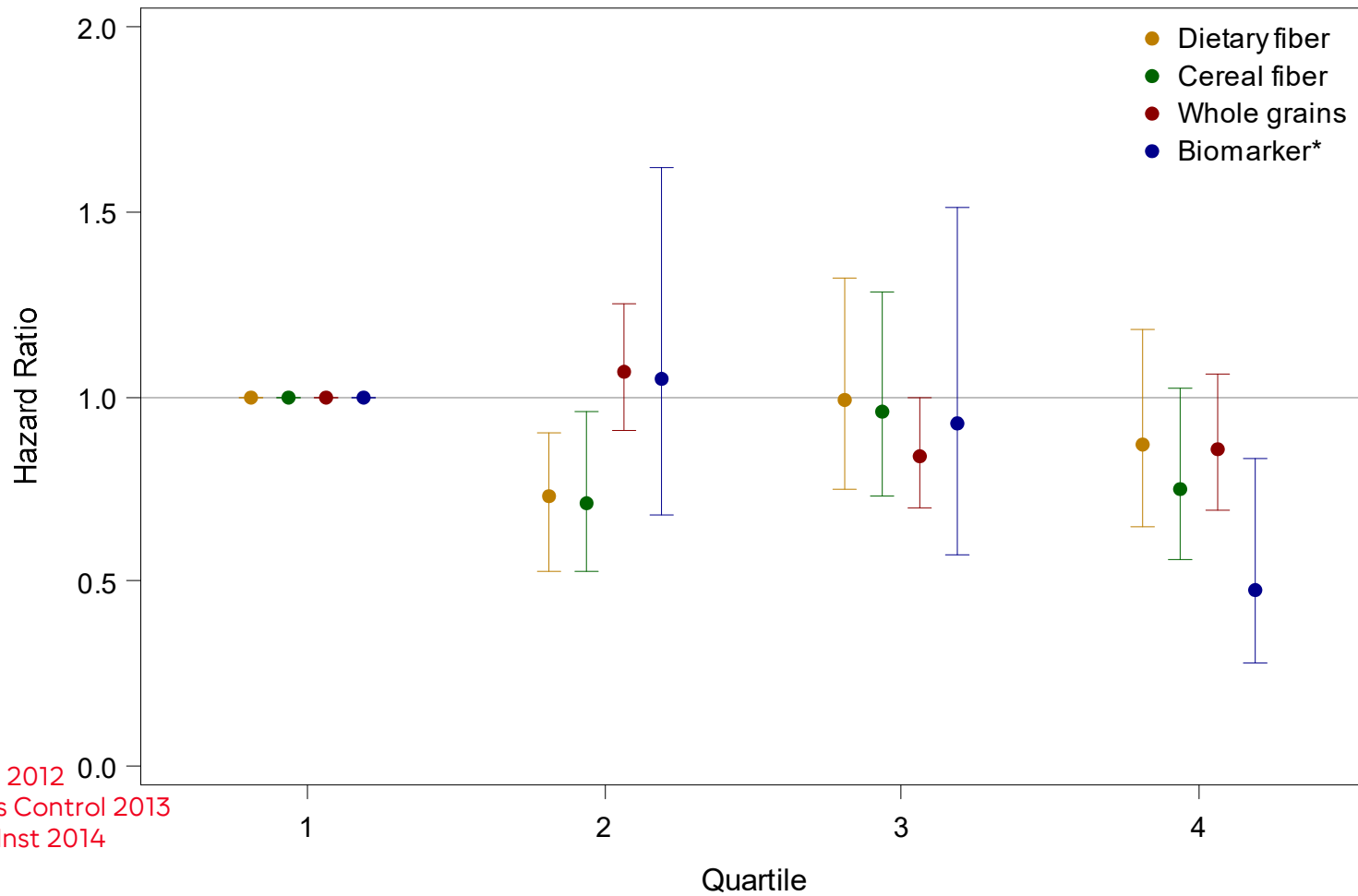


Hansen L *et al.* Int J Cancer 2012  
Kyrø C *et al.* Cancer Causes Control 2013  
Kyrø C *et al.* J Natl Cancer Inst 2014  
\*distal colon cancer



# Colorectal cancer ♀

Women



Hansen L *et al.* Int J Cancer 2012  
Kyrø C *et al.* Cancer Causes Control 2013  
Kyrø C *et al.* J Natl Cancer Inst 2014  
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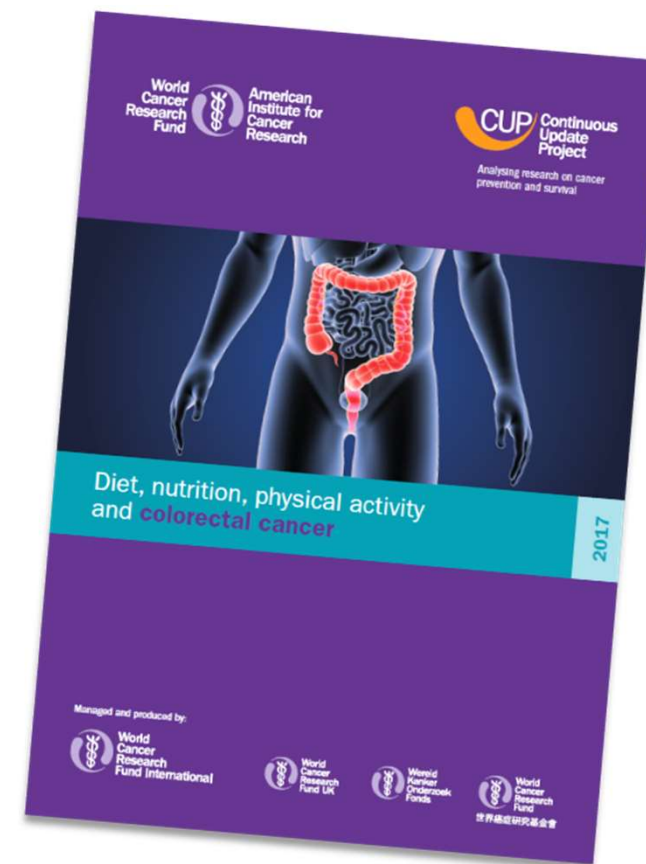




# 2017 update of evidence

Evidence – Diet, nutrition, physical activity and colorectal cancer

2017	DIET, NUTRITION, PHYSICAL ACTIVITY AND COLORECTAL CANCER 2017		
		DECREASES RISK	INCREASES RISK
STRONG EVIDENCE	Convincing	Physical activity <sup>1,2</sup>	Processed meat <sup>3</sup> Alcoholic drinks <sup>4</sup> Body fatness <sup>5</sup> Adult attained height <sup>6</sup>
	Probable	Wholegrains Foods containing dietary fibre <sup>7</sup> Dairy products <sup>8</sup> Calcium supplements <sup>9</sup>	Red meat <sup>10</sup>



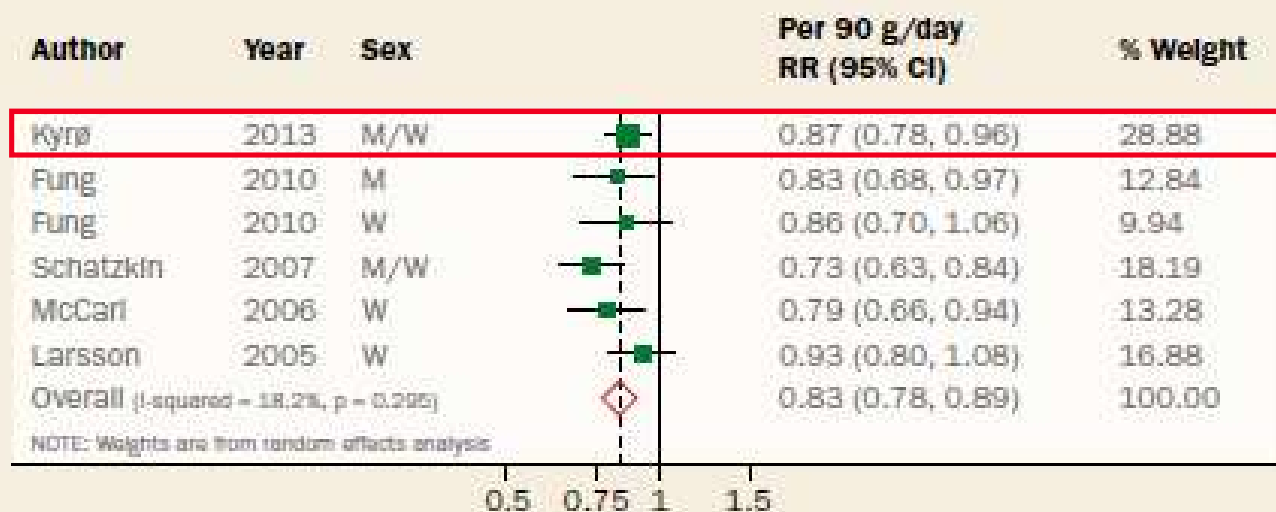
World Cancer Research Fund / American Institute for Cancer Research. Continuous Update Project Report. Food, Nutrition, Physical Activity, and the Prevention of Colorectal Cancer. 2017



# 2017 update of evidence

Evidence – Diet, nutrition, physical activity and colorectal cancer

**Figure 1: Dose-response meta-analysis of wholegrains intake and colorectal cancer per 90 grams per day**



# Future research

- Results for other cancers than colorectal cancer less clear

ASN The Journal of Nutrition  
Nutritional Epidemiology

## Whole-Grain Intake and Pancreatic Cancer Risk—The Danish, Diet, Cancer and Health Cohort

Simon R. Schacht,<sup>1,2</sup> Anja Olsen,<sup>2,3</sup> Lars O. Dragsted,<sup>1</sup> Kim Overvad,<sup>3,4</sup> Anne Tjønneland,<sup>2,5</sup> and Cecilie Kyre<sup>2</sup>

**Conclusion:** Our findings indicate that intake of whole grains is associated with lower risk of pancreatic cancer in middle-aged men. Consuming ample amounts of whole grains may prove beneficial in terms of lowering pancreatic cancer risk. *J Nutr* 2021;151:666–674.

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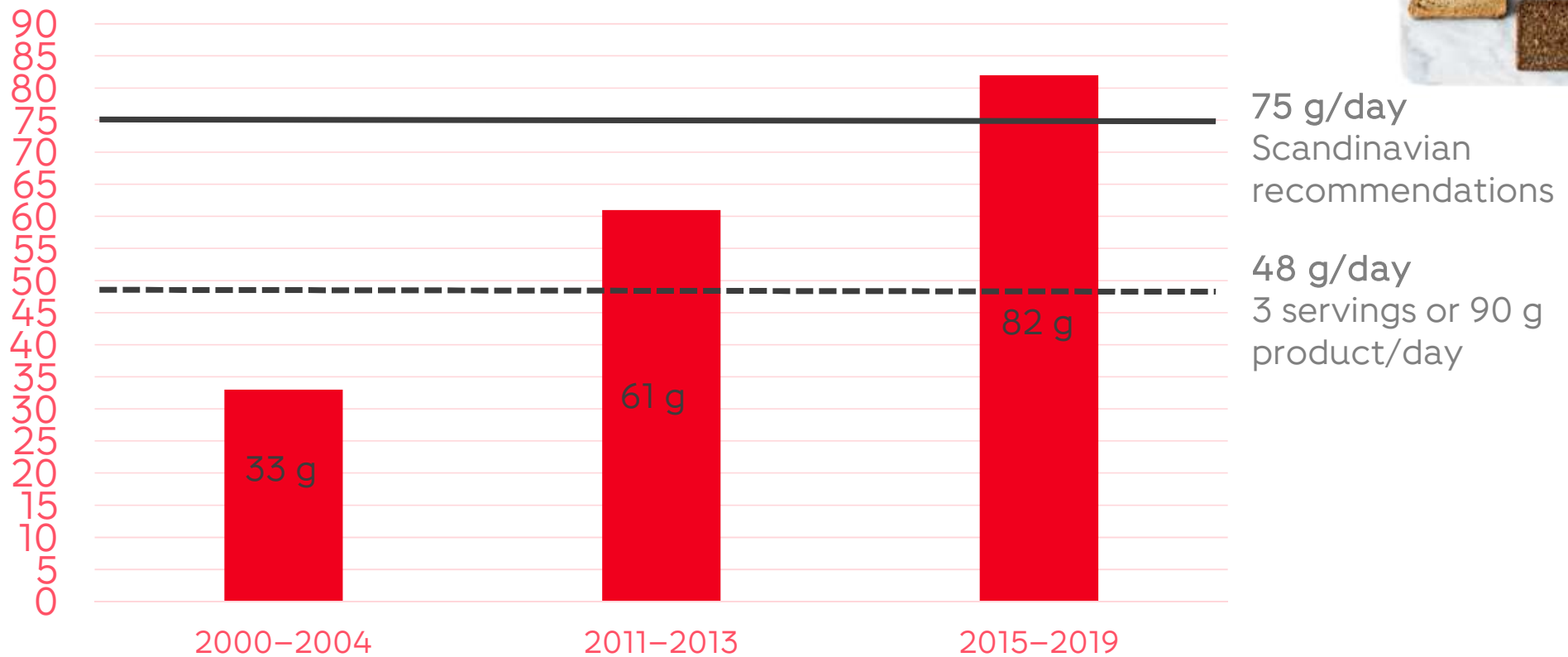


# Perspectives and acknowledgements





# Mean whole-grain intake in Denmark



# A life without cancer

Danish Cancer Society

