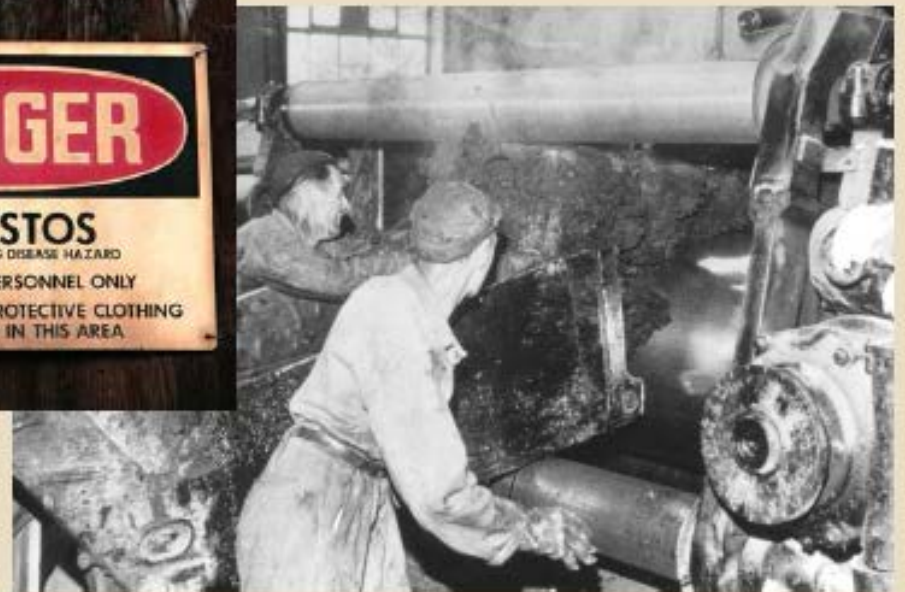
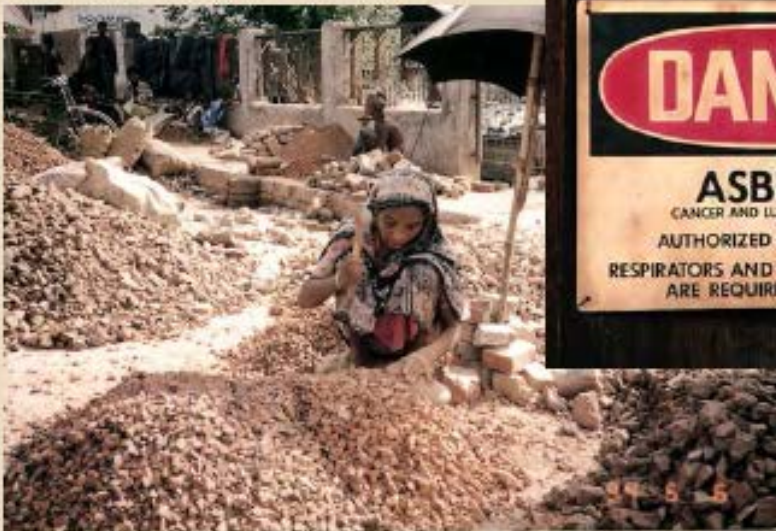


# Long-term sedentary work and the risk of subsite-specific colorectal cancer

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# Sedentary Behaviour and Cancer

1. Long-term sedentary work and the risk of subsite-specific colorectal cancer
2. Sedentary behaviour and cancer: A systematic review of the literature and proposed biologic mechanisms (*Lynch, 2010*)

# Sedentary Behaviour

- Sedentary behaviour is characterized by prolonged sitting and other activities requiring very low energy expenditure.
- Too much sitting may be a distinct exposure to not doing enough physical activity.
  - It isn't about not doing enough physical activity, it's about sitting too much.

# Sedentary Behaviour

- May increase the risk of some chronic diseases, including heart disease and diabetes.
  - It is **independent** of physical activity.
  - Increased risk found among those who are physically active.
- Is sedentary behaviour associated with the risk of colorectal cancer?

# Sedentary Behaviour and Colorectal Cancer Risk

- Many studies have shown that a low level of work related activity is associated with an increased risk of colon cancer.
- But it's not clear if a low level of activity, a high level of sitting, or a perhaps a combination of both, is behind the associations found in these studies.

# Colon Cancer: More than one disease?

- Does sedentary work have a different effect on distal and proximal colon cancer risk?

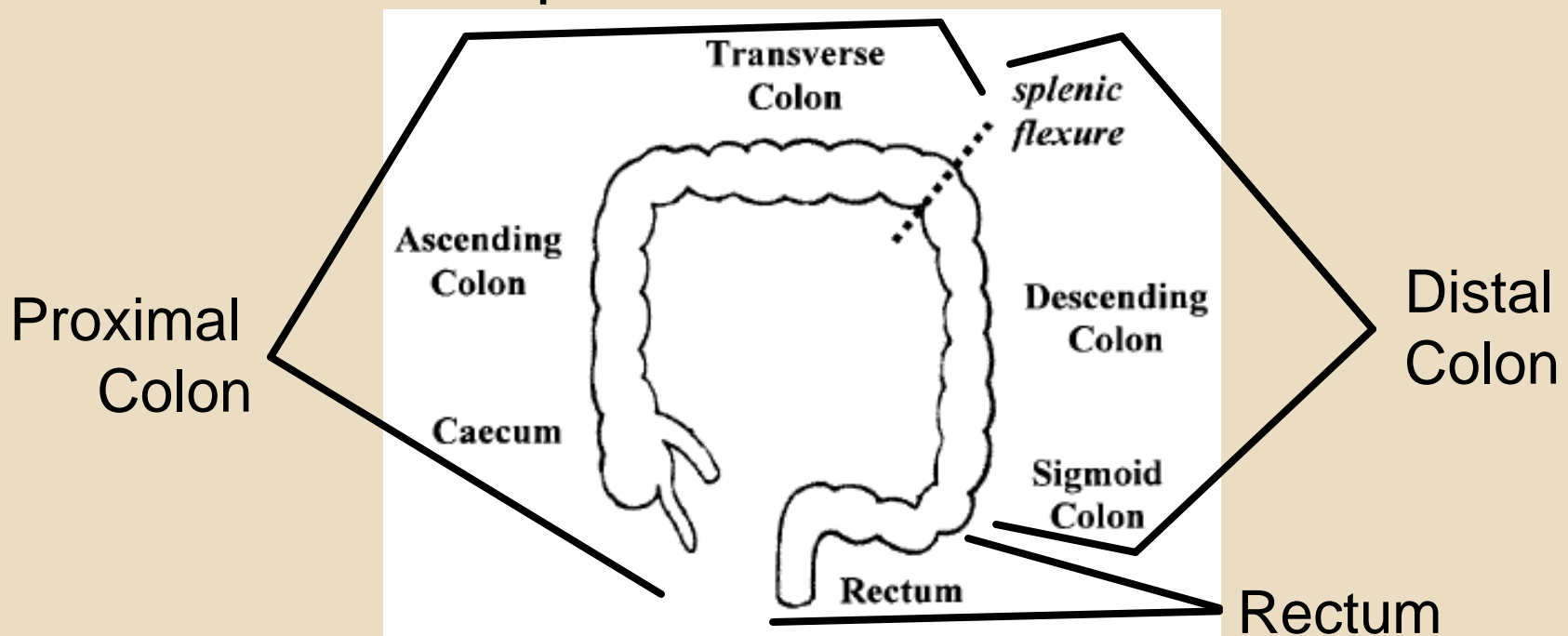


FIGURE 1 – Right-sided tumours are classified as originating proximal to the splenic flexure (caecum, ascending colon, transverse colon), whereas left-sided tumours arise distally to this site (descending colon, sigmoid colon and rectum).  
*From Iacopetta, IJC(2002)*

# Aim of the Study

- To identify if long-term sedentary work is associated with colorectal cancer risk.
- To determine if this association differs between colorectal subsite (proximal colon, distal colon, rectum).

# Methods: The Western Australian Bowel Health Study (WABOHS)

- Case-control study of genetic and environmental risk factors for colorectal cancer.
- Participants aged between 40 and 79 years of age.
- Incident cases of colorectal cancer were recruited from the WA Cancer Registry
- Age and sex-matched controls were randomly selected from the electoral roll
- 918 people with colorectal cancer and cases (59.5% response fraction) and 1021 controls (46.5% response fraction) participated in the WABOHS

# The WABOHS Questionnaires

- Lifestyle Questionnaire
  - Demographics
  - Height and Weight
  - Lifetime Recreational Physical Activity
  - Other Lifestyle Factors
  - Occupational History
- Food Frequency Questionnaire



# Level of Occupational Activity

- Each job was classified into one of five categories of Physical Demands Strength Rating, according to the U.S. Department of Labor's Dictionary of Occupational Titles.



# Level of Occupational Activity

- Sedentary (sitting most of the time)
  - e.g. Accountants, Secretaries, Clerks, IT workers
- Light (light activity 2/3 of the time)
  - e.g. Teachers, Hairdressers
- Medium (constant use of some force)
  - e.g. Mechanics, Police Officers, Nurses
- Heavy or Very Heavy (combined)
  - e.g. Plumbers, Farmers, Miners, Fire Fighters

# Level of Occupational Activity

- The number of years that a participant spent in each level of occupational activity was calculated.
- Years in Sedentary Work
  - Three categories:
    - 0 years
    - 0.1 to 9.9 years
    - 10 + years



# Statistical Analysis

- Multinomial logistic regression
  - Adjusted for potential confounders
    - Lifetime recreational physical activity level
    - Age group, sex, cigarette smoking, diabetes, education level, energy intake from food, alcohol intake, body mass index at age 20 years and 40 years, and socioeconomic status.
    - Also adjusted for years in a heavy or very heavy occupation.

# Results

Association between years in sedentary work and site-specific colorectal cancer risk in the WABOHS, 2005-2007

	Controls	Proximal Colon			Distal Colon			Rectal		
Sedentary Work	n	n	AOR	95% CI	n	AOR	95% CI	n	AOR	95% CI
<b>0 years (reference)</b>	805	234	1.00		196	1.00		251	1.00	
<b>0 &lt; to &lt;10 years</b>	95	24	0.89	0.55,1.44	27	1.21	0.76,1.95	26	0.93	0.58,1.49
<b>10+ years</b>	96	28	1.11	0.69, 1.76	45	1.94	1.28,2.93	41	1.44	0.96,2.18
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Compared with participants who spent no time in sedentary work, participants who spent 10 or more years in sedentary work had almost twice the risk of distal colon cancer and nearly 1.5 times the risk of rectal cancer.

# Discussion

- Long-term sedentary work increased the risk of distal colon cancer and rectal cancer.
  - The association was independent of recreational physical activity.
  - The increased risk was seen even among the most recreationally active participants.
  
- *Boyle T, Heyworth J, Fritschi L, Bull F (2011) Long term sedentary work and the risk of subsite-specific colorectal cancer. Am J Epidemiol 176(10):1183–1191*

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  - *Lynch BM (2010) Sedentary behavior and cancer: A systematic review of the literature and proposed biologic mechanisms. Cancer Epidemiol Biomarkers Prev 19(11):2691-2709.*

# Sedentary Behaviour and Cancer (from Lynch, 2010)

## Colorectal Cancer

### ■ Occupational Sitting

- Participants whose occupation in the past year involved mainly sitting had a 67% greater risk of colon cancer and a 41% greater risk of rectal cancer than those in light jobs (*Colbert, 2000*).

### ■ Non-occupational sitting

- 4 studies, 3 have shown an increased risk (*Whittemore, 1990; Steindorf, 2000; Colbert, 2000; Howard, 2008*).

# Sedentary Behaviour and Cancer (from Lynch, 2010)

## Prostate Cancer

- Occupational Sitting
  - Men whose lifetime occupation involved mainly sitting had 40% increased risk compared with men whose lifetime occupation involved manual labour (*Orsini, 2009*).
- Non-occupational sitting
  - No studies.

# Sedentary Behaviour and Cancer (from Lynch, 2010)

## Endometrial Cancer

- Occupational Sitting
  - Risk increased by 11% for each 5 hour/week/year increase over the lifetime (*Friedenreich, 2010*).
- Non-occupational sitting
  - 3 studies, all shown increased risk, although only one significant (*Friberg, 2006; Patel, 2008, Gierach, 2009*).

# Sedentary Behaviour and Cancer (from Lynch, 2010)

## Ovarian Cancer

- Occupational Sitting
  - Sitting (5 years ago) more than 6 hours/day increased risk by 96%, compared with sitting less than 2 hours/day (*Zhang, 2004*).
- Non-occupational sitting
  - 2 studies, both showed significantly increased risk (*Zhang, 2004; Patel, 2006*).

# Sedentary Behaviour and Cancer (from Lynch, 2010)

## Breast Cancer

- Occupational Sitting
  - No studies.
  
- Non-occupational sitting
  - 1 study, no association found (*Matthew et al, 2009*).

# Biological Mechanisms? (from Lynch, 2010)

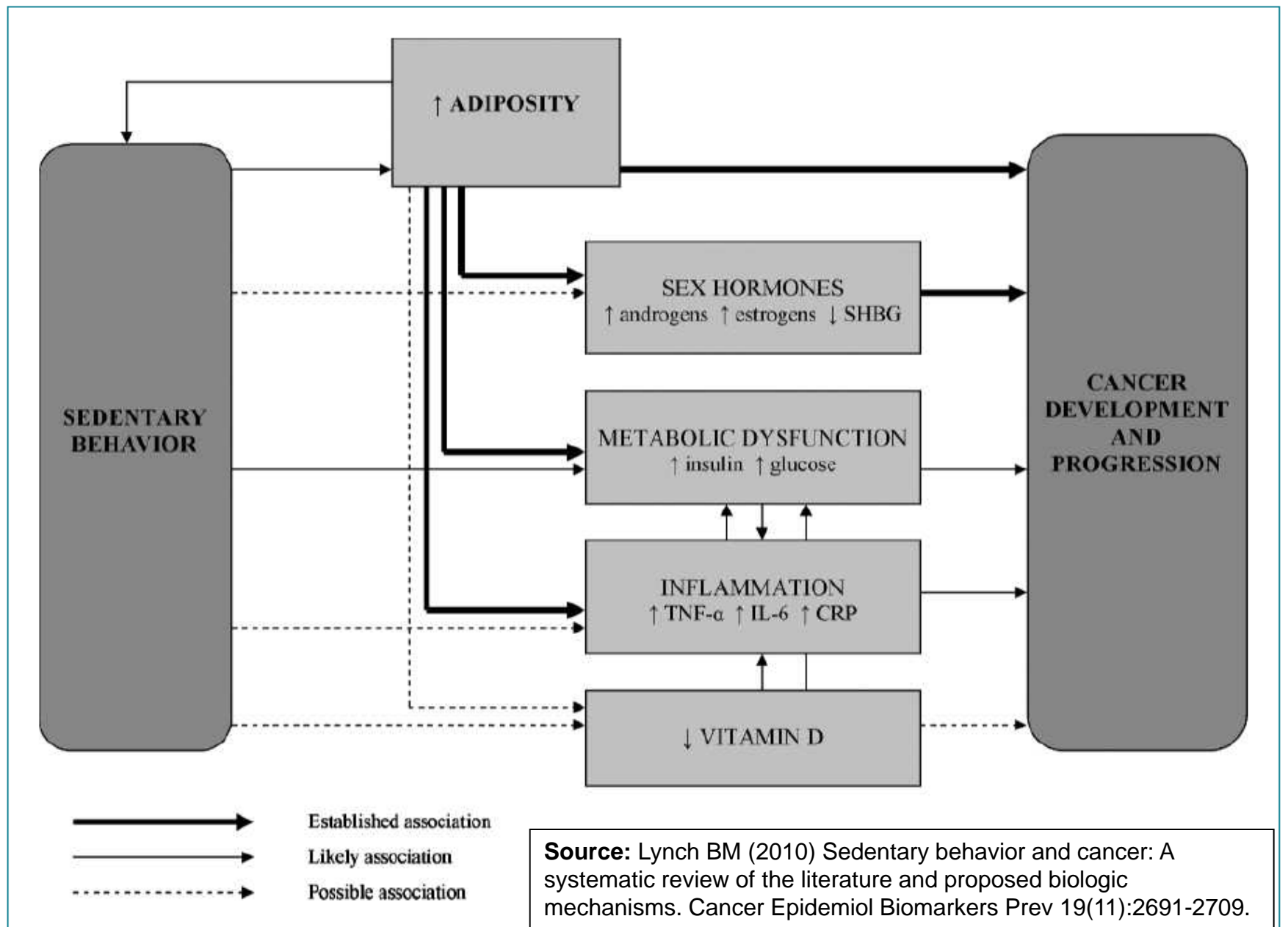
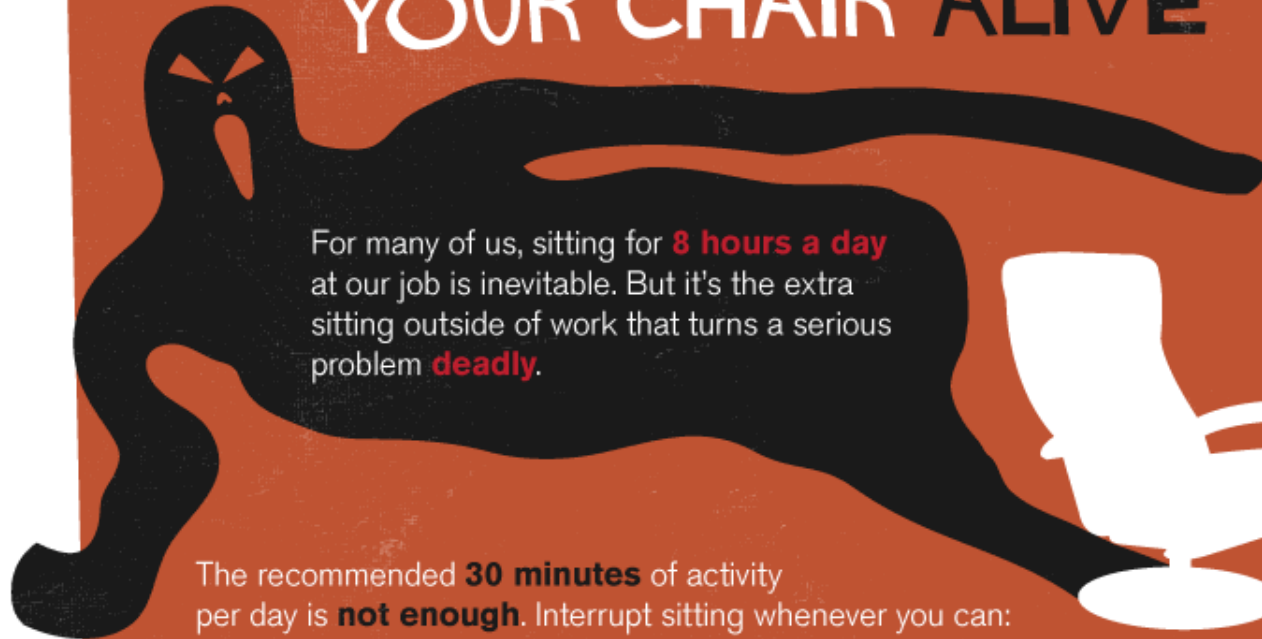


Figure 2. Biological model of hypothesized pathways from sedentary behavior to cancer. TNF- $\alpha$ , tumor necrosis factor- $\alpha$ ; IL-6, interleukin-6; CRP, C-reactive protein.

# HOW TO GET OUT OF YOUR CHAIR ALIVE



For many of us, sitting for **8 hours a day** at our job is inevitable. But it's the extra sitting outside of work that turns a serious problem **deadly**.

The recommended **30 minutes** of activity per day is **not enough**. Interrupt sitting whenever you can:



**Stretching**



**Walking/Marching In Place**



**Jumping Jacks**

Walking burns **3-5 times** the calories that sitting does. Take every opportunity to walk around the office.

Source: <http://www.medicalbillingandcoding.org/sitting-kills/>

# Channel Ten "Bowel Savers"

## BOWEL SAVERS

- \* BREAK EVERY HALF AN HOUR
- \* STAND UP ON THE PHONE
- \* WALK TO THE PRINTER
- \* DON'T EMAIL YOUR COLLEAGUES



# Summary

- The first studies of sedentary behaviour and cancer have found that it is independently associated with increased colorectal, endometrial, ovarian, and prostate cancer risk.
- Sedentary behaviour appears to be a novel and important risk factor for several chronic diseases.

# Acknowledgements

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