



Guidance on Physical Activity and Cancer Risk

Key Messages

Physical activity is important for good health and wellbeing. Physical activity can help to prevent a range of health problems, including cardio vascular disease, diabetes and some cancers. Being active also helps to maintain a healthy body weight, improve mental wellbeing and helps people feel better and sleep well.

There is *convincing* evidence that physical activity protects against colon cancer.

Being physically active *probably* reduces the risk of cancer of the endometrium and breast (especially in post-menopausal women).

There is *limited but suggestive* evidence that physical activity may reduce the risk of lung, pancreatic and ovarian cancers.

The evidence on physical activity and prostate cancer risk is *inconsistent*.

The Cancer Society supports the New Zealand Physical Activity Guidelines, which recommend adults have **at least** 30 minutes of moderate intensity physical activity, such as brisk walking, on most, if not every day of the week **and also** undertake some regular vigorous exercise to gain added health and fitness benefits.

The Society also supports the New Zealand Physical Activity Guidelines for Children and Young People (aged 5-18 years) which recommends 60 minutes or more of moderate to vigorous activity each day. More is likely to be better.

The Society supports limiting time spent being inactive or sedentary and recommends children, young people and adults spend no more than two hours, preferably much less, a day, engaged with television, computers, game consoles and other sedentary activities.

For people who are inactive, any increase in physical activity is beneficial. The Cancer Society, therefore, encourages people to increase the amount of daily incidental activity they do, as this can help increase the total amount of energy used and assist in maintaining a healthy body weight.

Background

Physical activity, including exercise, sport, active transport, occupational and domestic incidental activities, is when the body contracts skeletal muscle to move, which results in increased energy expenditure.¹

Physical activity is important for good health and wellbeing. Physical activity can help to prevent a range of health problems, including heart disease, diabetes, osteoporosis and some cancers.^{2,3}

Being active also helps to maintain a healthy body weight.³ The World Health Organization (WHO) has found convincing evidence that regular physical activity decreases the risk of weight gain and obesity, and sedentary lifestyles increase the risk.³ Being overweight or obese can increase the risk of developing cancers of the colorectum, kidney, pancreas, oesophagus and endometrium, as well as breast cancer in post-menopausal women.⁴ Excess body weight has also been linked with gallbladder and liver cancers.⁴

In addition, being active can help people feel and sleep better, giving them more energy and vitality. It can also improve mental wellbeing by reducing depression, anxiety and stress.⁵

There are environmental benefits from people engaging in physical activity. Increases in walking and cycling leads to fewer cars on the road, which leads to less greenhouse emissions and other forms of pollution.

Rationale

In Australia, being physically inactive ranks second only to tobacco smoking in terms of adding to the cancer burden from different known risk factors.⁶ Recent Australian data suggests physical inactivity accounts for 5.6 percent of the total cancer burden and 6.6 percent of the total burden of disease.⁶

This cancer data are not available for New Zealand but estimates from 1997 put physical inactivity as second to smoking as a modifiable risk factor for poor health and associated inactivity with 8 percent of all deaths, ie. over 2000 deaths per year.⁷

The International Agency for Research on Cancer (IARC) estimates 14 percent of all cases of colon cancer and 11 percent of post-menopausal breast cancers are attributable to physical inactivity.⁸

Colon cancer is reduced by 40 percent among the most active individuals, compared with the least active.⁸ Studies for breast cancer have shown a 20-40 percent reduction in risk, in both pre- and post-menopausal women.⁸

Therefore, it is important for the Cancer Society to acknowledge the effects of physical activity and exercise on cancer risk.

Evidence from Major Reviews of the Epidemiological Literature

In 2002, IARC published a handbook on the evidence for body weight and physical activity in relation to cancer risk.⁸ Most studies showed a consistent reduction in risk of colon cancer with increasing levels of activity.⁸ Studies of rectal cancer and colorectal cancer gave less consistent results.⁸ Regular physical activity was also associated with a reduced risk of breast cancer, and possibly endometrial and prostate cancers.⁸

An expert report by the WHO in 2003 observed that physical activity was consistently associated with a reduced risk of colon, but not rectal cancer.³ The report concluded that physical activity *convincingly* decreased the risk of colon cancer.³

The World Cancer Research Fund (WCRF) in 2007 released a comprehensive report on food and the prevention of cancer.⁴ The report found there was abundant epidemiological evidence from prospective studies showing colorectal cancer risk

was reduced with higher levels of physical activity (Figure 1).⁴ However, the effect was not as clear for rectal cancer as it was for colon cancer.⁴

The WCRF concluded that physical activity is *convincingly* linked to a reduced risk of colon cancer, and *probably* reduces the risk of cancer of the breast (in post-menopausal women) and endometrium.⁴ In addition, there is some *limited but suggestive* evidence that physical activity can lower the risk of lung, pancreatic and breast (in pre-menopausal women) cancers.⁴ For prostate cancer, the evidence on physical activity was inconsistent, so the WCRF stated *no conclusion* could be made.⁴

The evidence on physical activity can also be interpreted in terms of evidence that sedentary ways of life may increase the risk of these cancers.⁴

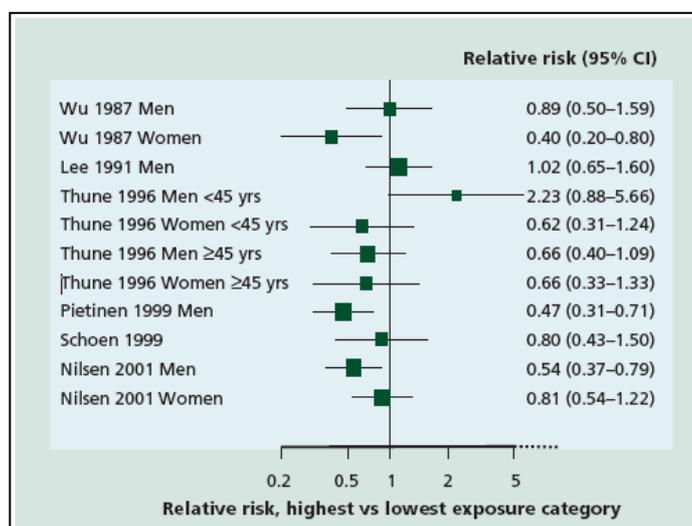


Figure 1. Results from cohort studies on total physical activity and colorectal cancer for highest versus lowest exposure category as reported by the World Cancer Research Fund.⁴

Evidence from Epidemiological Studies

Colorectal Cancer

In 2003, a systematic review on physical activity and the mechanisms for lowering colon cancer risk found all cohort and case-control studies published between 1997 and 2002 showed physical activity to be inversely related to colon or colorectal cancer risk.⁹ Although the risk reduction was present for colorectal cancer, there was no association with physical activity when rectal cancer was analysed separately.⁹

The risk reduction from physical activity for colon and colorectal cancer occurred in both men and women at various ages, although the association was stronger for men.⁹ There were also several dose-response associations observed across various physical activity exposures, eg. occupational and leisure time activity.⁹

Another review in 2003 found physical activity reduced the risk of colon cancer in most of the populations included in the review.¹⁰

The conclusion reached is that there is strong epidemiological evidence that an association between physical activity and colon cancer exists, with *convincing* evidence from numerous studies that not doing enough physical activity can increase risk.⁴

Breast Cancer

A systematic review in 2007 found strong evidence for an inverse association between leisure time physical activity and post-menopausal breast cancer with risk reductions ranging from 20 percent to 80 percent among cohort and case-control studies.¹¹ However, the evidence was much weaker for pre-menopausal breast cancer.¹¹

Evidence for a dose-response effect was observed in about half the higher quality studies that reported a decreased breast cancer risk.¹¹ A trend analysis among case-control studies revealed each additional hour of physical activity per week decreased the risk of breast cancer (all types) by 6 percent.¹¹

While duration of physical activity (hours/week) was the primary exposure measure in the review, some studies also reported metabolic intensity (MET).¹¹ Three out of four cohort studies found higher MET hours/week was associated with a lower risk of breast cancer, and one study was statistically significant.¹¹ This was also seen in case-control studies, with three out of four showing breast cancer risk was reduced with higher MET hours/week, and one study was statistically significant.¹¹

In 2003, a systematic review examining health behaviours in early adulthood found that case-control studies appear to show a weak link between physical activity in early life (ie. adolescence) and risk of breast cancer (both pre- and post-menopausal), although no relationship was seen in two out of three cohort studies.¹² However, these results only reflect a particular life stage (ie. adolescence) and it is likely that the accumulation of physical activity over many years is important for cancer protection.

Overall, epidemiological studies suggest being physically active *probably* reduces the risk of breast cancer, especially in post-menopausal women.²

Endometrial Cancer

In 2007, a systematic review found both cohort and case-control studies showed a link between physical activity and decreased endometrial cancer risk.¹³ This effect was determined to be independent of body weight.¹³ Pooled analysis of seven cohort studies showed a significantly decreased risk of endometrial cancer for the most active women (odds ratio (OR)= 0.77, 95 percent confidence interval (CI)= 0.70-0.85) compared with the least active.¹³

Therefore, the evidence for physical activity and endometrial cancer appears to be consistent among different study types, and it is *probable* being physically active can lower the risk of endometrial cancer.⁴

Ovarian Cancer

In 2007, a pooled analysis of six case-control studies in 2007 found recreational physical activity reduced the risk of ovarian cancer (relative risk (RR)= 0.79, 95 percent CI= 0.70-0.85).¹⁴ However, a meta-analysis of cohort studies found there was no association between ovarian cancer risk and recreational physical activity (RR= 0.81, 95 percent CI= 0.57-1.17), and there was significant heterogeneity between studies (P=0.004).¹⁴

When all studies were pooled, the risk of ovarian cancer was reduced by recreational physical activity (RR= 0.81, 95 percent CI= 0.72-0.92).¹⁴

Evidence for occupational activity, vigorous activity and sedentary behaviour on ovarian cancer risk was not as consistent as fewer studies had examined these measures.¹⁴

Therefore, there appears to be some *limited* evidence, particularly from case-control studies, that physical activity may reduce the risk of ovarian cancer.⁴

Prostate Cancer

A review published in 2004 found mixed results.¹⁵ Nine out of thirteen cohort studies showed an association between physical activity and reduced prostate cancer risk, while only five out of eleven case-control studies found a similar result.¹⁵

In 2003, another review noted that findings from studies on physical activity and prostate cancer were inconsistent.¹⁶ While individual studies have reported as much as a 70 percent reduction in the risk of prostate cancer among most active compared to least active men, several studies have reported an increased risk.¹⁶ However, the median relative risk across all studies for most active versus least active men is around 0.9.¹⁶

An earlier review in 2002 also found the evidence for an association between physical activity and prostate cancer was not consistent.¹⁷ Fifteen out of thirty studies (both cohort and case-control) found a reduction in risk in those more physically active, while two found a reduction in risk only in subgroups of the population, nine found no association, and four found an increased risk.¹⁷ Inconsistencies across these studies may be due to methodological issues, eg. some studies did not have enough subjects who attained very high levels of activity.¹⁷

Therefore, the available epidemiological evidence suggests physical activity might protect against prostate cancer; however, inconsistencies mean *no conclusion* can be made at this stage.⁴

Potential Mechanisms of Action

It is not entirely clear how physical activity protects against cancer. However, the following mechanisms may be involved, as physical activity can:^{18, 19}

- reduce insulin and insulin-like growth factors, which can enhance tumour development by stimulating cell proliferation or inhibiting apoptosis
- increase prostaglandin PGF, which acts as an inhibitor of colonic cell proliferation
- lower the level of endogenous hormones such as oestrogens, which exert stimulatory effects on breast tissue
- reduce body fatness (see Guidance on overweight, obesity and cancer risk)
- decrease systemic inflammation by lowering production of inflammatory cytokines
- enhance immune function by improving the function of natural killer cells, which have a role in tumour suppression
- decrease gut transit time, thereby reducing carcinogen exposure in the colon.

Benefits for Cancer Survivors

Physical activity may be important for reducing the risk of cancer recurrence (particularly colorectal and breast cancers) and extending overall cancer survival.²⁰ It can also help maintain a healthy body weight. *Convincing* data exists that suggests obesity is associated with breast cancer recurrence.²⁰

One of the first studies to show physical activity improved breast cancer survival was published in 2005.²¹ Results from the Nurses Health Study showed the greatest survival benefit occurred in women who performed moderate activity, such as the equivalent of walking 3 to 5 hours per week at an average pace, compared with those women who were sedentary.²¹ There was a 26-40 percent improvement in survival outcomes for women who were more active compared with the least active women.²¹

It is currently not known what exercise prescription is most beneficial for certain types of cancer, at which stage of disease or treatment. However other benefits of physical activity for cancer survivors can lead to an improved quality of life. This includes the ability to help alleviate fatigue, improve cardiovascular fitness, muscle strength, body composition and self-esteem, as well as reduce anxiety and depression.^{22, 23, 24}

Current physical activity levels in New Zealand adults

Results from the 2006/07 New Zealand Health Survey²⁵ found :

- half of all adults (50.5 percent) met the definition¹ of being regularly physically active.
- overall, one in seven (15.0 percent) adults were sedentary, reporting less than 30 minutes of physical activity in the previous week.

Men were significantly more likely than women to be physically active with the greatest difference between men and women being in the 15-24 year age group where men were 1.5 times more likely than women to do at least 30 minutes of physical activity on five days.²⁵

Participation in regular physical activity declined in women after the age of 65 and in men over the age of 75.²⁵

Asian men and women were less likely to meet the recommendations for physical activity compared with the total population. European/Other men and women were slightly more likely to be physically active than the total population.²⁵

In both males and females, adults living in NZDep2001 quintile 1 (least deprived) were more likely than adults living in quintile 5 (most deprived) to be physically active, although this difference was not significant for males²⁵

These results were very similar to the results of the 2002/03 Survey of Health.²⁵

The 15 percent of adults who reported being sedentary were more likely to come from Asian and Pacific populations and more likely to be female. There was a significant increase in the percentage of women who reported being sedentary from the 2002/03 Survey- from 13.6 percent to 15.7 percent.²⁵

The SPARC 2007/08 Active NZ Survey²⁶ found a slightly lower percentage of adults met the recommendations for physical activity. This survey found that: 48.3 percent of adults met the guidelines of 30 minutes of activity 5 days a week; 39.1 percent did some activity, but not enough to meet the national recommendations; 12.7 percent of adults were inactive.

¹ 30 minutes of physical activity on at least 5 days of the week.

Of those that met the guideline they met it through:

Percentage	Activity
42.2 percent	Sport and Recreation
31.1 percent	Occupational Activity
7.9 percent	Active Travel
18.2 percent	Unpaid Work/Other Activities

The most popular physical activities (participation in the 12 months prior to the survey) were:

Activity	Percentage
Walking	64.1 percent
Gardening	43.2 percent
Swimming	34.8 percent
Equipment-based Exercise	26.5 percent
Cycling	22.7 percent
Fishing	19.3 percent
Jogging/Running	17.5 percent
Dancing	16.8 percent

NB: There are no data on the intensity or duration of these activities.

Current physical activity levels in New Zealand children

The Physical Activity Guidelines for New Zealand Children and Young People (5- 18 years) recommend at least 60 minutes of physical activity a day.²⁷

The 2003 Children's Nutrition Survey²⁸ found six out of ten New Zealand European females aged 5-6 years (62.8 percent) and 7-10 years (60.3 percent) were active in the weekends on more than four occasions, but this dropped sharply at 11-14 years age to four out of ten (42.8 percent).

The survey also found clear differences in rates of physical activity in different New Zealand Deprivation Index (NZDep), groups. Children living in the most deprived geographic areas of New Zealand were more likely to be in the most active group (NZDep01-V: males 31.4 percent; females 20.8 percent) compared with those living in the least deprived geographic areas of New Zealand (NZDep01-I: males 20.7 percent, females 13.1 percent).

Just under half 5 to14 year olds used active transport to school, the rest were transported by private motor vehicle or used public transport.²⁸

Boys were generally more physically active than girls in all age groups and categories. For example, males (29 percent) were more likely than females (15.6 percent) to be in the highest physical activity quartile; more likely to be very active during the lunchtime break; and more likely to cycle.²⁸

Walking at least 15 minutes a day was the most frequently reported activity by children (63.7percent) though the youngest children (5 to 6 years) were more likely to participate in active games than walking.²⁸

The Youth '07 Health and Wellbeing of Secondary School of Students in New Zealand²⁹ reported two-thirds of students said they had engaged in 20 minutes of vigorous physical activity on three or more occasions in the week before the

survey. However, only 11 percent of youth met the recommendations for 60 minutes of physical activity a day. Overall males tended to be more active than females and levels of activity tended to decrease with age in both sexes.

The number of youth doing more than 20 minutes a day of vigorous activity day increased from 54 percent in 2001 to 64 percent in 2007; however, sedentary behaviours also increased over the same period. The number of students watching more than one hour of TV a day increased from 55 percent in 2001 to 73 percent in 2007 with 35 percent watching more than three hours a day and those using the internet for more than an hour/day increased from 18 percent in 2001 to 52 percent in 2007. Thirty-six percent of females and 22 percent of males spent three or more hours a day texting and 8 percent of females and 21 percent of males spent three or more hours playing computer games.²⁹

The New Zealand Health Survey²⁵ enquired about children's television viewing time. Watching television is a very sedentary behaviour and the time spent displaces opportunities for active pursuits. Findings were that 2 out of 3 (64 percent) children (5 - 14 years) watched two or more hours of television/day. Māori children and children from more deprived areas were significantly more likely than children from other population groups to watch two or more hours of television.²⁵

Factors Influencing Physical Activity Levels

Recent studies suggest lack of time and environmental factors, such as urban location and climate/season are associated with lower physical activity levels.³⁰

Improving health and fitness are two common motivating factors for exercise.^{30, 31} In addition, social support, access to facilities and neighbourhood safety have all been positively associated with increased levels of physical activity.³⁰

A recent Australian report found motivation for adults to do more exercise may have been influenced by increased media coverage on physical activity and body weight between 2001 and 2004, as well as changes to the way people commute to work, eg. higher petrol prices leading to the decreased use of cars and increased walking, cycling and use of public transport.³²

In New Zealand, Obstacles to Action³³ examined the motivators and barriers to physical activity for adults, to try to understand the 'why' and 'why not' of physical activity. It looked at a number of areas, including the following:

- What are people's attitudes and opinions on physical activity?
- What reasons do people have for being, or not being, physically active?
- What encourages people to be physically active, or discourages them from being physically active?
- What might make people be more physically active?

The study found key barriers include:

- lack of time and/or energy
- lack of encouragement or support from others
- health problems.

Key motivators include:

- awareness and belief that physical activity is good for your health
- desire to keep in shape
- encouragement from others or wanting to role model physically active behaviours.

Working with families and schools is likely to have the greatest effect on childrens activity levels.³⁴

Recommendations

The Cancer Society supports and encourages the New Zealand Physical Activity Guidelines,² which recommend adults:

- think of movement as an opportunity, not an inconvenience
- be active every day in as many ways as you can
- put together **at least** 30 minutes of moderate intensity physical activity (like brisk walking) on most, if not every day of the week. This can be achieved by doing three 10-minute sessions in a day.
- undertake some regular vigorous exercise, if possible, for added health and fitness.

The Society also supports and encourages the New Zealand Physical Activity Guidelines for Children and Young People (Aged 2-18 years)²⁷ which recommend children and young people:

- throughout each day, do 60 minutes or more of moderate to vigorous activity
- be active in as many ways as possible; for example, through play, cultural activities, dance, sport and recreation, jobs and going from place to place
- be active with friends and whanau, at home, school, and in the community
- spend less than 2 hours a day (out of school time) in front of television, computers and game consoles.

Evidence suggests the risk of cancer decreases with higher total activity, as well as with greater frequency and intensity. There is also evidence of a dose-response effect.⁴ The amount of activity to reduce the risk of cancer is not clear, but it has been estimated that 30-60 minutes per day of more intense types of activity is needed to see the greatest reduction in risk.⁸

Therefore, to **reduce cancer risk**, the Cancer Society recommends adults work up to doing:

- 30 minutes or more of vigorous activity each day, or
- 60 minutes or more of moderate activity each day.

While the research does not relate to cancer prevention in children it is important to encourage children to learn to be active so it becomes the norm in their lives and a habit they continue into adulthood. It is likely the accumulation of physical activity over many years is important for cancer protection.

Therefore, the Cancer Society recommends children and young people:

- do 60 minutes or more of moderate to vigorous activity each day
- spend less than 2 hours a day (out of school time) in front of television, computers and game consoles.

Moderate intensity activity is defined as activity that causes a slight but noticeable increase in breathing and heart rate. It includes brisk walking, mowing the lawn, digging in the garden, medium-paced swimming or cycling.

Vigorous activity makes people huff and puff. Vigorous activity can come from active sports such as football, squash, netball and basketball, and activities such as aerobics, circuit training, jogging, fast cycling or brisk rowing.

For people who are inactive, any increase in physical activity is beneficial. People should be encouraged to be active every day in as many ways as they can.

Increasing incidental activity in everyday tasks can help increase the total amount of energy burnt, and using energy assists in maintaining a healthy body weight.

Cancer survivors should be physically active as well. The Cancer Society recommends cancer survivors aim for **at least 30 minutes** of moderate activity daily.

Future Research

Because of the variation and difficulty in measuring physical activity levels, its impact on cancer may be underestimated.⁸ There is a need, in the future, for more studies that clarify:

- the nature of the dose response relationship
- the duration and intensity of activity required for cancer protection (e.g. vigorous versus moderate intensity activity; planned versus incidental activity)
- the temporal relationship to the incidence of the cancer (e.g. is there more value in doing exercise in adolescence or adulthood, before the onset of menopause or post menopause).
- the appropriate types of activity for different stages of cancer progression

Acknowledgements

New South Wales Cancer Council, Kathy Chapman, Hayley Griffin, Craig Sinclair, Jenny Atkins, Loren Muhlmann, Steve Pratt

Who to contact for further information:

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