

HEIGHT AND BIRTHWEIGHT AND THE RISK OF CANCER

WCRF/AICR GRADING		DECREASES RISK		INCREASES RISK	
		Exposure	Cancer site	Exposure	Cancer site
STRONG EVIDENCE	Convincing			Adult attained height ^{1,2}	Colorectum 2017 Breast (premenopause) 2017 Breast (postmenopause) 2017 Ovary 2014
	Probable			Adult attained height ^{1,2}	Pancreas 2012 Endometrium 2013 Prostate 2014 Kidney 2015 Skin (malignant melanoma) 2017
				Birthweight ^{2,3}	Breast (premenopause) 2017
LIMITED EVIDENCE	Limited – suggestive			Adult attained height ^{1,2}	Skin (basal cell carcinoma) 2017
				Birthweight ^{2,3}	Skin (malignant melanoma) 2017
STRONG EVIDENCE	Substantial effect on risk unlikely	None identified			

- 1 Adult attained height is unlikely to directly influence the risk of cancer. It is a marker for genetic, environmental, hormonal and nutritional factors affecting growth during the period from preconception to completion of growth in length.
- 2 The evidence shows that, in general, the taller people are during adulthood and the more people weighed at birth, the higher their risk of some cancers. A better understanding of the developmental factors that underpin the associations between greater growth and cancer risk is needed.
- 3 Birthweight is a marker for prenatal growth, reflecting a combination of factors including fetal nutrition, and is also a predictor of later growth and maturation – for example, age at menarche – which are themselves determinants of breast cancer risk.

Summary of CUP dose–response meta-analyses of height^{1,2} and the risk of cancer

Cancer	Total no. of studies	No. of studies in meta-analysis	No. of cases	Risk estimate (95% CI)	Increment	I ² (%)	Conclusion ³	Date of CUP cancer report ⁴
Colorectum	20	13	65,880	1.05 (1.02–1.07)	5 cm	90	Convincing: Increases risk	2017
Breast (pre-menopause)	29	26	6,479	1.06 (1.02–1.11)	5 cm	46	Convincing: Increases risk	2017
Breast (post-menopause)	41	33	24,975	1.09 (1.07–1.11)	5 cm	33	Convincing: Increases risk	2017
Ovary	18	14	17,312	1.08 (1.05–1.10)	5 cm	35	Convincing: Increases risk	2014
Pancreas	14	10	6,147	1.07 (1.03–1.12)	5 cm	57	Probable: Increases risk	2012
Endometrium	13	10	17,732	1.07 (1.03–1.11)	5 cm	69	Probable: Increases risk	2013
Prostate	42	34	79,387	1.04 (1.03–1.05)	5 cm	21	Probable: Increases risk	2014
Kidney	11	10	9,874	1.10 (1.08–1.12)	5 cm	0	Probable: Increases risk	2015
Skin (malignant melanoma)	18	15	13,020	1.12 (1.09–1.16)	5 cm	64	Probable: Increases risk	2017
Skin (basal cell carcinoma) ⁵	2	0	–	Statistically significant increased risk in 2 studies	–	–	Limited – suggestive: Increases risk	2017

- 1
- Adult attained height is unlikely to directly influence the risk of cancer. It is a marker for genetic, environmental, hormonal and nutritional factors affecting growth during the period from preconception to completion of growth in length.
- 2
- The evidence shows that, in general, the taller people are during adulthood, and the more people weighed at birth, the higher their risk of some cancers. A better understanding of the developmental factors that underpin the associations between greater growth and cancer risk is needed.
- 3
- See Definitions of WCRF/AICR grading criteria (**Section 1:** Height and birthweight and the risk of cancer: a summary matrix) for explanations of what the Panel means by ‘convincing’, ‘probable’ and ‘limited – suggestive’.
- 4
- Throughout this Third Expert Report, the year given for each cancer site is the year the CUP cancer report was published, apart from for nasopharynx, cervix and skin, where the year given is the year the SLR was last reviewed. Updated CUP cancer reports for nasopharynx and skin will be published in the future.
- 5
- A dose–response meta-analysis of cohort studies could not be conducted in the CUP for height and the risk of basal cell carcinoma. A statistically significant increased risk was observed in two highest versus lowest analyses; one study reported a significant increased risk in men and women combined (RR 1.28 [95% CI 1.01–1.62]), but not for men and women analysed separately [64], and the other study reported a significant increased risk in women (RR 1.64 [95% CI 1.40–1.93]), but not men [65].

Summary of published pooled analysis of height and the risk of colorectal cancer

Publication	Increment	RR (95% CI)	I ² (%)	No. of studies (cohort)	No. of cases (deaths)
Emerging risk factors collaboration [79]	6.5 cm	1.07 (1.03–1.11)	12	121	4,855

Summary of published pooled analyses on height and the risk of ovarian cancer

Publication	Increment	RR (95% CI)	I ² (%)	No. of studies (cohort)	No. of cases
Collaborative Group on Epidemiological Studies of Ovarian Cancer, 2012 [121]	5 cm	1.08 (1.06–1.10)	–	17	10,858 diagnoses
The Emerging Risk Factors Collaboration, 2012 [79]	6.5 cm	1.07 (1.01–1.14)	0	–	1,353 deaths
Pooling Project of Prospective Studies of Diet and Cancer [120]	5 cm	1.10 (1.05–1.15)	–	12	2,036 diagnoses

Summary of published pooled analyses of height and the risk of pancreatic cancer

Publication	Increment/contrast	Sex	RR (95% CI)	I ² (%)	No. of studies	No. of cases
Pooling Project of Prospective Studies on Diet and Cancer [130]	≥ 180 vs. < 170 cm	Men	1.18 (0.93–1.49)	11	14 cohort	1,019 diagnoses
	≥ 170 vs. < 160 cm	Women	1.03 (0.84–1.25)	0		1,115 diagnoses
Pancreatic Cancer Cohort Consortium (PanScan) [132]	Highest vs. lowest	–	0.99 (0.83–1.18)	–	12 cohort and 1 case-control	2,095 diagnoses
Asia-Pacific Cohort Studies Collaboration [131]	6 cm	Men	1.08 (0.94–1.24)	–	38 cohort	294 deaths
	6 cm	Women	0.99 (0.82–1.21)	–		

Summary of published pooled analyses of height and the risk of prostate cancer

Publication	Increment	RR (95% CI)	I ² (%)	No. of studies (cohort)	No. of cases (deaths)
Emerging Risk Factor Collaboration [79]	6.5 cm	1.07 (1.02–1.11)	9	121	2,818
Asia Pacific Cohort Studies Collaboration [131]	6 cm	1.06 (0.95–1.18)	–	38	274

Summary of published pooled analyses of height and the risk of kidney cancer

Publication	Increment	Sex	RR (95% CI)	No. of studies (cohort)	No. of cases (deaths)
Asia-Pacific Cohort Studies Collaboration [131]	6 cm	Men	1.04 (0.83–1.31)	38	67
	6 cm	Women	1.21 (0.81–1.83)		23

Summary of published pooled analyses of height and malignant melanoma mortality

Publication	Increment	Sex	RR (95% CI)	I ² (%)	No. of studies (cohort)	No. of cases (deaths)
Emerging Risk Factors Collaboration ¹ [79]	6.5 cm	Men and Women	1.26 (1.12–1.42)	43	121	679
Asia-Pacific Cohort Studies Collaboration ¹ [131]	6 cm	Men	1.44 (1.15–1.79)	–	44	63
		Women	1.04 (0.71–1.52)	–		25
The Metabolic Syndrome and Cancer Project (Me-Can) ¹ [82]	5 cm	Men	1.10 (0.99–1.21)	–	7	246
		Women	1.09 (0.92–1.29)	–		102

Specific adjustments for skin sensitivity or sun exposure

- 1
- In this meta-analysis, the authors did not add confounding variables relating to skin sensitivity or sun exposure to the multivariate model used. For details of adjustments made please see original studies.

Summary of CUP dose–response meta-analyses of birthweight^{1,2} and the risk of cancer

Cancer	Total no. of studies	No. of studies in meta-analysis	No. of cases	Risk estimate (95% CI)	Increment	I ² (%)	Conclusion ³	Date of CUP cancer report ⁴
Breast (premenopause)	25	16	>3,135	1.05 (1.02–1.09)	500 g birthweight	0	Probable: Increases risk	2017
Skin (malignant melanoma)	6	5	3,561	1.06 (1.02–1.10)	500 g birthweight	0	Limited – suggestive: Increases risk	2017

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