

2.2.17 Cancer of the urinary bladder

Cancer of the urinary bladder accounts for approximately 3% of all cancers and is the ninth most common cancer worldwide. The incidence of urinary bladder cancer in men is approximately 4 times that in women. The average age of diagnosis is after age 70 years. Globally, incidence rates are highest in Europe and North America and lowest in Asia and Latin America.

The strongest risk factor is smoking, as was established several decades ago ([IARC, 1986](#)). Compared with never-smokers, smokers have a 6-fold increase in the risk of developing urinary bladder cancer ([WCRF/AICR, 2015](#)). Other risk factors include occupational exposure to aromatic amines and polyaromatic hydrocarbons.

About 90% of urinary bladder cancers are transitional cell carcinoma; the remainder are squamous cell carcinoma, adenocarcinoma, and small cell carcinoma.

(a) Cohort studies

See Table 2.2.17a (web only; available at: <http://publications.iarc.fr/570>).

A total of 23 prospective cohorts were identified that evaluated associations between BMI and either urinary bladder cancer incidence (19 studies) ([Tulinius et al., 1997](#); [Nagano et al., 2000](#); [Tripathi et al., 2002](#); [Samanic et al., 2004, 2006](#); [Oh et al., 2005](#); [Rapp et al., 2005](#); [Cantwell et al., 2006](#); [Holick et al., 2007](#); [Reeves et al., 2007](#); [Jee et al., 2008](#); [Koebnick et al., 2008](#); [Larsson et al., 2008](#); [Prentice et al., 2009](#); [Andreotti et al., 2010](#); [Häggström et al., 2011](#); [Bhaskaran et al., 2014](#); [Roswall et al., 2014](#); [Song et al., 2014](#)) or urinary bladder cancer-related mortality (5 studies) ([Calle et al., 2003](#); [Batty et al., 2005](#); [Fujino et al., 2007](#); [Reeves et al., 2007](#); [Parr et al., 2010](#)) as the end-point. The large majority of these studies reported no significant association with urinary bladder cancer incidence or mortality.

Two studies did show a positive association between BMI and risk of urinary bladder cancer. The NIH-AARP cohort ([Koebnick et al., 2008](#)) reported significantly increased associations with overweight (RR, 1.16; 95% CI, 1.03–1.29), obesity I (RR, 1.23; 95% CI, 1.06–1.43), and obesity II (RR, 1.30; 95% CI, 1.04–1.63) in men and women combined, compared with normal weight; stratified analysis indicated that these positive associations were limited to men. The EPIC study ([Roswall et al., 2014](#)) found a small but significant association for BMI in men only (RR per 2 kg/m², 1.05; 95% CI, 1.02–1.08), with a strong dose–response relationship. Findings from the Iowa Women’s Health Study ([Tripathi et al., 2002](#)) demonstrated a statistically marginal inverse association between BMI and urinary bladder cancer incidence also in men only ($P_{\text{trend}} = 0.06$ after adjustments).

Almost all studies adjusted for smoking. Stratified analyses suggested that the associations were stronger in former smokers than in never-smokers. Four studies ([Calle et al., 2003](#); [Reeves et al., 2007](#); [Koebnick et al., 2008](#); [Bhaskaran et al., 2014](#)) specifically stratified by never versus ever smoking status and statistically tested for interactions. None of those interactions were significant.

Several studies reported on the associations between BMI and urinary bladder cancer in Asian populations ([Nagano et al., 2000](#); [Oh et al., 2005](#); [Fujino et al., 2007](#); [Jee et al., 2008](#); [Parr et al., 2010](#)). No pattern of difference compared with European or North American populations was noted.

From a large meta-analysis for the association between BMI and urinary bladder cancer risk, based on 22 prospective cohort studies, the summary risk estimate was 1.03 (95% CI, 0.97–1.09) ([WCRF/AICR, 2015](#)). Two additional meta-analyses, of 11 cohort studies ([Qin et al., 2013](#)) and 15 cohort studies ([Sun et al., 2015](#)), reported summary risk estimates of positive

associations between BMI and urinary bladder cancer. [These differences in part reflect variations in study inclusion. In the meta-analysis by [Sun et al., \(2015\)](#), the summary estimate may have been disproportionately influenced by an incorrect data extraction of risk estimates from the FINRISK study ([Song et al., 2014](#)).]

Three studies evaluated the relationship between waist circumference and urinary bladder cancer risk. Two studies ([Tripathi et al., 2002](#); [Larsson et al., 2008](#)) found no significant association; the third study, based on the EPIC cohort ([Roswall et al., 2014](#)), found a small but significant association with waist circumference in men only (RR per 5 cm, 1.04; 95% CI, 1.01–1.08).

(b) Case-control studies

See Table 2.2.17b (web only; available at: <http://publications.iarc.fr/570>).

The four case-control studies that evaluated the relationship between BMI and urinary bladder cancer incidence ([Pelucchi et al., 2002](#); [Lin et al., 2010](#); [MacKenzie et al., 2011](#); [Attner et al., 2012](#)) found no significant associations.

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