Supplementary Table 1: Description of included studies ordered alphabetically by first author.

| **Author and year** | **Study design\*** | **Population** | **Definition of primary outcomes\*** | **Time period** | **Age in years** | **Follow-up** | **Primary results\*\*** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ahirwar et al. - 2008[1] | Case-control | 136 patients with NMIBC/MIBC | Recurrence: Newly found bladder tumor following a previous negative follow-up cystoscopy. | 2004-2007 | Mean/median NR | 13 months (median) | **Smoking***Ref. = Never**Former*Recurrence: NS on univariable analysis*Current*Recurrence: NS on univariable analysis |
| Ahn et al. - 2016[2] | Retrospective cohort | 645 patients with NMIBC  | Recurrence: First tumor recurrence (regardless of grade or stage).Progression: Any increase in grade (G1/2 to G3) or stage (Ta to T1 or T2, T1 to T2) after repeat transurethral resection for recurrence. | 2004-2015 | 64.6 (median) | 46 months (median) | **BMI***Ref. = <25*Recurrence: NS on univariable analysisProgression: NS on univariable analysis**DMII***Ref. = No DMII*Recurrence: OR 1.22 (0.89-1.30)Progression: OR 1.54 (0.95-2.50) |
| Ajili et al. - 2013[3] | Retrospective cohort | 81 patients with NMIBC | Recurrence: Reappearance of tumor after the initial treatment with at least one tumor-free cystoscopy interval. | 2000-2005 | 60 (median) | 30 months (max.) | **Smoking***Ref. = ≤60 pack-years**>60 pack-years*Recurrence: 0.264 (0.110-0.631) |
| Alfthan et al. - 1983[4] | Randomized controlled trial | 30 patients with NMIBC  | Prevention: No tumors during the last 12 months of treatment or during the whole treatment period if it was less. Partial prevention was described as disappearance of ≥50% of tumors.Progression: Increase in number and/or grade of tumors. | NR | 64.1-68.6 (mean) | 17.6 months (mean) | **Etretinate***Ref. = Placebo*Prevention/partial prevention: 11 intervention participants versus 4 control participants (p<0.01) Progression: 0 intervention participants versus 2 control participants (p<0.01) |
| Allard et al. - 1995[5] | Prospective cohort | 368 patients with NMIBC | Recurrence: Tumor detected on cystoscopy. | 1990-1992 | 65.1 (mean) | 23.7 (mean) | **Smoking***Ref. = Never**Former*Recurrence: NS on univariable analysis*Current*Recurrence: NS on univariable analysis |
| Aso et al. - 1992[6] | Randomized controlled trial | 48 patients with NMIBC  | Recurrence: ND | 1988-1989 | Mean/median NR | 427-428 days (mean) | ***Lactobacillus casei* probiotic***Ref. = No use or placebo*Recurrence at 12 months: 57% (intervention) versus 83% (control) (p<0.01) |
| Aso et al. - 1995[7] | Randomized controlled trial | 125 patients with NMIBC  | Recurrence: Cytologic examination, cystoscopy, and/or biopsy.Progression: Upgrading or upstaging of tumors. | 1990-1991 | Mean/median NR | NR | ***Lactobacillus casei* probiotic***Ref. = Placebo*Recurrence: 2.58 (p=0.013) (HR of being recurrence free)Progression: 1 intervention participant versus 7 control participants (p<0.01) |
| Bachir et al. – 2014[8]  | Retrospective cohort | 847 patients with NMIBC/MIBC  | Recurrence: NDCSM: NDACM: ND | 1998-2008 | 63.6-66.3 (mean) | 39 months (mean), 23.4 months (median) | **BMI***Continuous* Recurrence: 0.978 (0.955-1.003)CSM: 0.989 (0.960-1.019)ACM: 0.984 (0.958-1.010) |
| Berglund et al. - 2008[9] | Retrospective cohort | 952 patients with NMIBC/MIBC  | Recurrence: Visual and/or biopsy proven evidence of recurrence at cystoscopy or a positive repeat cytology.Progression: Progression to surgery. | 1978-2006 | 65-69 (mean) | 4.3 years (mean of those without recurren-ce) | **Statins***Ref. = No use*Recurrence: 1.04 (0.81-1.34)Progression: 0.77 (0.52-1.13) |
| Boorjian et al. - 2009[10] | Retrospective cohort | 907 patients with NMIBC/MIBC  | Recurrence: Visual and/or biopsy proven evidence of tumor at cystoscopy, or by positive urine cytology.Progression:Progression to surgery. | 1990-2006 | 65-71 (median) | 4.2 years (mean of those without recurrence) | **FCI***Ref. = No use**Any FCI (aspirin, clopidogrel, warfarin)*Recurrence: 1.01 (0.85-1.19)Progression: 0.91 (0.71-1.18)*Aspirin*Recurrence: 0.91 (0.75-1.10)Progression: 0.71 (0.52-0.96)*Clopidogrel*Recurrence: 1.35 (0.94-1.94)Progression: 0.70 (0.36-1.35)*Warfarin*Recurrence: 1.19 (0.89-1.59)Progression: 1.89 (1.31-2.74) |
| Bostrom et al. - 2009[11] | Retrospective cohort | 248 patients with NMIBC/MIBC | CSM/ACM: ND | 1986-2005 | 64 (median) | 75 months (mean) | **Smoking***Ref. = Non-smoker*CSM: NS on univariable analysisACM: MVNA |
| Byar et al. - 1977[12] | Randomized controlled trial | 118 patients with NMIBC  | Recurrence: A visit at which one or more tumors have reappeared in the bladder after having been removed previously by transurethral resection.Progression: Increase in number of tumors. Increase in tumor grade. | 1971-1976 | NR | 31 months (mean) | **Pyridoxine***Ref. = Placebo*Recurrence: NS on univariable analysis.Progression: 22% (intervention) versus 46% (control) had an increase in number of tumors (p=0.026) |
| Cao et al. - 2016[13] | Retrospective cohort | 242 patients with NMIBC  | Recurrence: Tumor recurrence after transurethral resection, with or without pathological upstaging or upgrading. | 2008-2013 | 64.2 (mean) | 21 months (mean) | **Areca nut chewing***Ref. = None* *Light (<10/day)*Recurrence: NS on univariable analysis*Heavy (>10/day)*Recurrence: 2.18 (1.37-3.47)**Smoking** *Ref. = Never**Former*Recurrence: NS on univariable analysis *Current*Recurrence: 3.09 (1.99-4.80)**DMII***Ref. = No DMII**DMII*Recurrence: NS on univariable analysis |
| Carpenter et al. - 1989[14] | ND | 100 patients with NMIBC/MIBC | Recurrence: NDProgression: Progression to cystectomy or partial cystectomyCSM/ACM: ND | 1982-1986 | 64 (years) | 4.3 years (mean) | **Smoking***Ref. = Non-smoker*Recurrence: MVNAProgression: NS on univariable analysisCSM/ACM: NS on univariable analysis |
| Carta et al. - 2018[15] | Retrospective cohort | 160 patients with NMIBC | Recurrence: Histological confirmation of a newly found bladder or prostatic urethra tumor following at least one tumor-negative follow-up cystoscopy or two surgical resection sessions for the primary tumor.Progression: Transition from low- to high-grade, increase in TNM staging, progression to cystectomy, or “uncontrollable” disease.  | 1997-2000 | Mean/median NR | 4.63 years (mean) | **Aromatic amines***Ref. = No exposure**Exposure*Recurrence: 1.129 (0.743-1.743)Progression: 0.719 (0.382-1.351)**PAH***Ref. = No exposure**Exposure*Recurrence: 1.077 (0.701-1.654)Progression: 0.690 (0.358-1.327) |
| Chade et al. - 2010[16] | Retrospective cohort | 155 patients with NMIBC | Recurrence: NDProgression: Progression to invasive bladder cancer, defined as cT1 or higher (≥cT1) and progression to MIBC, defined as cT2 or higher (≥cT2), or radical cystectomy. | 1990-2008 | 69 (median) | 3.3-4.0 years (median) | **Smoking***Ref. = Never**Former*Recurrence: NS on univariable analysisProgression: NS on univariable analysis*Current*Recurrence: NS on univariable analysisProgression: NS on univariable analysis |
| Chen et al. - 2007[17] | NR | 265 patients with NMIBC | Recurrence: Histologically confirmed recurrent bladder cancer detected >8 weeks after the initial TUR.Progression:Recurrent cancer that invaded into the muscle layer. | 1997-2005 | 65-69 (median) | 38 months (median) | **Smoking - categorical***Ref. = Quitters (quit within 1 year before and 3 months after diagnosis)**Never*Recurrence:2.2 (1.1-4.5)Progression: NS on univariable analysis*Former*Recurrence: 1.4 (0.7-2.7)Progression: NS on univariable analysis*Current*Recurrence: 2.2 (1.2-4.0)Progression: MVNA**Smoking – cumulative***Ref. = 1-19 pack-years**20-39 pack-years*Recurrence: NS on univariable analysisProgression: NS on univariable analysis *40-59 pack-years*Recurrence: NS on univariable analysisProgression: NS on univariable analysis≥*60 pack-years*Recurrence: MVNAProgression: MVNA |
| Cheng et al. - 1999[18] | Retrospective cohort | 83 patients with NMIBC  | Progression: The development of muscle-invasive or more advanced stage carcinoma, distant metastasis, or death from bladder cancer.CSM: Included in definition of progression. | 1987-1992 | 71 (mean) | 5.2 years (mean) | **Alcohol**Progression: Never, former, and current NS different on univariable analysis.CSM: Never, former, and current NS different on univariable analysis.**Smoking\*\*\****Ref. = Non-smoker*Progression: Never, former, and current NS different on univariable analysis.CSM: Never, former, and current NS different on univariable analysis. |
| Chromecki et al. - 2013[19] | Retrospective cohort | 4,118 patients with NMIBC/MIBC  | Recurrence: NDCSM: NDACM: ND | 1979-2008 | 67 (median) | 44 months (median) | **BMI***Ref. = <25**25.9-29.9*Recurrence: 0.91 (0.76-1.06)CSM: 0.80 (0.68-0.95)ACM: 1.40 (1.23-1.57)*>30*Recurrence: 1.67 (1.46-1.91)CSM: 1.43 (1.24-1.66)ACM: 1.81 (1.60-2.05) |
| Crivelli et al. - 2013[20] | Retrospective cohort | 1,117 patients with NIMBC  | Recurrence: Defined as the first tumor relapse in the bladder regardless of stage.Progression: A muscle-invasive relapse in the bladder.CSM/ACM: Cause of death was determined by the treating physicians, chart review corroborated by death certificates or death certificates alone. | 1996-2007 | 65 (mean), 67 (median) | 62.7 months (median) | **Statins***Ref. = No use*Recurrence: NS on univariable analysisProgression: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis |
| da Silva et al. - 2013[21] | Retrospective cohort | 1,502 patients with NMIBC/MIBC  | Recurrence: Tumor relapse in the operative field, regional lymph nodes and/or distant metastasis.CSM: Cause of death was determined by treating physicians by chart review corroborated by death certificates or by death certificates alone. | 1992-2008 | 65.5 (mean), 66 (median) | 34 months (median) | **BMI***Continuous*Recurrence: 1.05 (1.03-1.07)CSM: 1.05 (1.02-1.07)**Smoking***Ref. = Never**Former*Recurrence: 1.27 (0.98-1.65)CSM: 1.24 (0.98-1.66)*Current*Recurrence: 1.47 (1.12-1.92)CSM: 1.43 (1.06-1.93)**Statins***Ref. = No use*Recurrence: 1.04 (0.86-1.24)CSM: 1.04 (0.84-1.28) |
| Dabi et al. - 2017[22] | Retrospective cohort | 701 patients with NMIBC/MIBC  | Recurrence: Tumor relapse in the operative field, regional lymph nodes and/ or distant metastases.CSM: Death cause was determined using patient’s death certificate.  | 1995-2011 | 65.2 – 66.8 (mean) | 45 months (median) | **BMI***Ref. = 18-25**>25 - 30*Recurrence: 1.14 (0.78–1.66)CSM: 1.13 (0.74–1.74)*>30*Recurrence: 1.58 (1.06-2.34)CSM: 1.58 (1.01–2.48) |
| Decensi et al. - 2000[23] | Randomized controlled trial | 99 patients with NMIBC  | Recurrence: Presence of a papillary tumor or an infiltrating cancer at the time of cystoscopy. | 1993-1994 | 61.6-63.8 (mean) | NR | **Fenretinide***Ref. = Placebo*Recurrence: 27 participants in the intervention group versus 21 participants in the control group (p=0.36) |
| Donat et al. - 2003[24] | Prospective cohort | 267 patients with NMIBC  | Recurrence: ND | 1998-2001 | 69.1 (median) | 2.6 years (median) | **Fluid intake***Continuous*Recurrence: NS on univariable analysis**Smoking***Ref. = Never**Former*Recurrence: 0.94 (0.65-1.35)*Current*Recurrence: 1.10 (0.67-1.82) |
| Ferro et al. - 2018[25] | Retrospective cohort | 1,115 patients with NMBIC  | Recurrence: The appearance of any tumor.Progression: Muscle-invasive disease during follow up.CSM: NDACM: ND | 2002-2012 | 71 (median) | 26 months (median) | **BMI***Ref. = 18.5-<25**<18.5*Recurrence: 0.27 (0.06-1.11)Progression: 0.64 (0.15-2.66)CSM: NSACM: NS*25-29.99*Recurrence: 4.00 (3.18-5.01)Progression: 2.52 (1.85-3.42)CSM: NSACM: NS≥*30*Recurrence: 5.33 (4.16-6.83)Progression: 2.51 (1.76-3.57)CSM: NSACM: NS |
| Fleshner et al. - 1999[26] | Retrospective cohort | 286 patients with NMIBC | Recurrence: A recurrent lesion in the bladder at least 3 months after the initial transurethral resection.Progression: The development of MIBC, the development of metastases, or the development of uncontrollable NMIBC that was unamenable to conservative therapy. | 1985-1995 | 58.7-63.7 (mean) | 55.2-59.1 months (mean) | **Smoking***Ref. = Former**Quitter (pa tients with 20 pack-years of exposure and who quit smoking between 1 year prior to and up to 3 months following the diagnosis)*Recurrence: 0.99 (0.77-1.25)Progression: NS on univariable analysis*Current*Recurrence: 1.40 (1.03-1.91)Progression: MVNA |
| Gee et al. – 2008[27] | Retrospective cohort | 43 patients with NMIBC  | Recurrence: First tumor recurrence.Progression: Progression in stage to lamina propria invasion or more advanced stages. | 1991-2003 | 63-72 (mean) | NR | **Aspirin***Ref. = No use*Recurrence: 0.179 (0.062-0.516)Progression: NS on univariable analysis**Smoking***Ref. = Never**Former*Recurrence: 3.199 (0.981-10.433)*Current*Recurrence: 0.270 (0.082-0.889) |
| Gierth et al. - 2018[28] | Prospective cohort | 678 patients with NMIBC/MIBC  | CSM/ACM: The cause of death was determined by the treating physician, by chart review corroborated by death certificates, or by death certificates alone. | 2011 | 70 (median) | At least 21 months | **BMI***Ref. = <25**25-29.9*CSM: 1.12 (0.73-1.71)ACM: 0.80 (0.56-1.13)*>30*CSM: 0.71 (0.42-1.19)ACM: 0.60 (0.39-0.92) |
| Goossens et al. - 2016[29] | Randomized controlled trial | 292 patients with NMIBC  | Recurrence: The new occurrence of tumor at the same or at a different site as the index cancer.Progression: Recurrence with an increase in tumor grade, or an increase in TNM stage, or a new occurrence of carcinoma in situ in the bladder previously free from such lesions, or a new occurrence of multiple tumors following resection of a solitary tumor, or the need for a cystectomy because of refractory disease. | 2009-2013 | 68 (median) | 17.93 months (median) | **Selenium***Ref. = Placebo*Recurrence: 0.85 (0.56-1.29)Progression: 1.48 (0.65-3.38) |
| Grotenhuis et al. - 2014[30] | Retrospective cohort | 963 patients with NMIBC | Recurrence: New, histologically confirmed bladder or prostatic urethra tumor following at least 1 tumor-negative follow-up cystoscopy result or 2 surgical resection sessions for the primary tumor.Progression: First occurrence of grade progression, stage progression, occurrence of local metastasis or distant metastasis or both, andcystectomy for therapy-resistant disease. | 1995-2010 | 61-66 (mean) | 3.7 years (median) | **Smoking***Ref. = Never**Ever*Recurrence: 1.06 (0.80-1.41)Progression: 1.15 (0.72-1.84)*Former*Recurrence: 1.14 (0.85-1.53)Progression: 1.36 (0.84-2.21)*Current*Recurrence: 0.93 (0.67-1.29)Progression: 0.80 (0.45-1.42) |
| Hoffman et al. - 2006[31] | Retrospective cohort | 84 patients with NMIBC  | Recurrence: Number of total recurrences.Progression: Tumor progression, the time to cystectomy, and the time to the development of distant metastases. | NR | 65 (median) | 46 months (median) | **Statins***Ref. = No use*Recurrence: NS on UV analysisProgression: MVNA |
| Holz et al. - 2017[32] | Retrospective cohort | 123 patients with NMIBC | Recurrence: Reappearance of tumor (any grade and any stage) during follow-up.Progression: Progression to MIBC, development of lymph node (N+) disease or distant metastasis (M1). | 1998-2012 | 68 (mean), 69 (median) | 49 months (median) | **Smoking***Ref. = Never**Former*Recurrence: MVNAProgression: NS on univariable analysis*Current*Recurrence: MVNAProgression: NS on univariable analysis |
| Hou et al. - 2017[33] | Meta-analysis | 10,192 patients with NMIBC/MIBC | Recurrence: NDProgression: NDCSM: ND | 1995-2015 | 61.6-75.0 (mean) | 23.7-80.9 months (mean) | **Smoking***Ref. = Never**Former*Recurrence: SSRE 1.22 (1.09-1.37)Progression: SSRE 1.16 (0.92-1.46)CSM: SSRE 1.20 (1.03-1.41)*Current*Recurrence: SSRE 1.23 (1.05-1.45)Progression: SSRE 1.11 (0.70-1.75)CSM: SSRE 1.28 (1.07-1.52) |
| Hudson et al. – 1990[34] | Retrospective cohort | 149 patients with NMIBC | Recurrence: Recurrence following BCGProgression: Invasive or metastatic disease. | 1981-1989 | NR | 29.8 months (median) | **FCIs (Aspirin, aspirin plus dipyramidole, indomethacin, ibuprofen, warfarin)***Ref. = No use*Recurrence: MVNAProgression: NS on univariable analysis |
| Hwang et al. - 2011[35] | Retrospective cohort | 251 patients with NMIBC | Recurrence: First tumor recurrence (regardless of grade or stage).Progression: Any increase in grade (G1/2 to G3) or stage (Ta to T1 or T2, T1 to T2). | 2000-2010 | 67 (median) | 34 months (median) | **Smoking***Ref. = Non-smoker*Recurrence: 1.63 (1.1-2.5)Progression: NS on univariable analysis**DMII***Ref. = No DMII*Recurrence: 2.11 (1.4-3.2)Progression: 9.35 (3.1-28.6) |
| Jochems et al. - 2018[36] | Prospective cohort | 716 patients with NMIBC  | Recurrence: The new occurrence of NMIBC (stage Ta, T1, or pTis) at the same or at a different site as the initial primary bladder tumor and excluding recurrence identified at the first check cystoscopy. | 2005-2011 | 71 (median) | 3.7 years (mean) | **Alcohol***Ref. = No use**25-125mL/day*Recurrence: 0.90 (0.63-1.27)*>125mL/day*Recurrence: 0.97 (0.70-1.36)**Fluid intake***Ref. = 250-850mL/day**850-1200mL/day*Recurrence: 1.17 (0.85-1.62)*>1200mL/day*Recurrence: 0.98 (0.70-1.38) |
| Jochems et al. - 2018[37] | Prospective cohort | 728 patients with NMIBC  | Recurrence: The new occurrence of a NMIBC (stage Ta, T1, or pTis) at the same or at a different site as the initial pri- mary bladder tumor and excluding recurrence identified at the first check cystoscopy. | 2005-2011 | 69 (mean) | 3.7 years (median) | **Fruits and vegetables***Ref. = Tertile 1**Tertile 2*Recurrence: 1.09 (0.79-1.50)*Tertile 3*Recurrence: 1.07 (0.78-1.47)**Total fruits** *Ref. = Tertile 1**Tertile 2*Recurrence: 1.22 (0.89-1.69)*Tertile 3*Recurrence: 0.85 (0.63-1.14)**Total vegetables***Ref. = Tertile 1**Tertile 2*Recurrence: 0.97 (0.70-1.33)*Tertile 3*Recurrence: 1.02 (0.74-1.41) |
| Kamat et al. - 2007[38] | ND | 156 patients with NMIBC | Recurrence: NDProgression: NDACM: ND | NR | NR | 56 months (median) | **Statins***Ref. = No use*Recurrence: NS on univariable analysisProgression: NS on univariable analysisACM: NS on univariable analysis |
| Kashif Khan et al. - 2014[39] | Retrospective cohort | 64 patients with NMIBC | Recurrence: Tumors of the same initial stage at cystoscopy.Progression: Tumor involved the detrusor muscle, had nodal or distant metastasis. | 2008-2012 | 59.86 (mean) | 28.36 months (mean) | **Smoking***Ref. = Non-smoker*Recurrence: NS on univariable analysisProgression: OR 4.02 (1.01-15.88) |
| Kelly et al. - 2019[40] | Randomized controlled trial | 427 patients with NMIBC  | Recurrence: Confirmation of cancer recurrence by cystoscopy. | 2007-2012 | 67 (median) | 44 months (median) | **Celecoxib***Ref. = Placebo*Recurrence: 0.82 (0.60-1.12)Progression: 10% versus 9.7% (log-rank p=0.8)ACM: 1.21 (0.68-2.15) |
| Kluth et al. - 2013[41] | Retrospective cohort | 892 patients with NMIBC  | Recurrence: First tumor relapse in bladder or prostatic urethra regardless of tumor stage. Progression: Tumor relapse at tumor stage T2 or higher in the bladder or prostate.CSM/ACM: The cause of death was determined by treating physicians, by chart review corroborated by death certificates or by death certificates alone.  | 1996-2007 | 68 (median) | 42.8 months (median) | **BMI***Continuous*Recurrence: 1.07 (1.04-1.09)Progression: 1.08 (1.04-1.12)CSM: 1.29 (1.20-1.37)ACM: 1.06 (1.04-1.09)*Ref. = <30*≥*30*Recurrence: 2.66 (2.12-3.32)Progression: 1.49 (1.00-2.21)CSM: 3.15 (1.74-5.67)ACM: 1.42 (1.06-1.92) |
| Koch et al. - 1986[42] | Prospective cohort | 761 patients with NMIBC  | Recurrence: Histologically-proven diagnosis.  | 1977-1983 | Mean/median NR | 59 months (median) | **Artificial sweeteners***Ref. = No use*Recurrence: NS (hazard ratio NA) **Chemical exposure***Ref. = No exposure*Recurrence: NS (hazard ratio NR) **Coffee***Ref. = No use*Recurrence: NS (hazard ratio NR) **Smoking***Ref. = Non-smoker*Recurrence: NS (hazard ratio NR)  |
| Korkes et al. - 2010[43] | Retrospective cohort | 99 patients with NMIBC | Recurrence: NDProgression: Progression to MIBCCSM: ND | 1994-2000 | 67 (mean) | 49.3 months (median) | **Smoking - categorical***Ref. = Never* *Current*Progression: NS on univariable analysisNS on Chi-square between former smokers, Early-quitters (quit *≤*1 year after diagnosis), Late-quitters (quit >1 year after diagnosis), and current smokers***Smoking – cumulative****Ref. = <60 pack years**>60 pack years*Progression: MVNACSM: NS on univariable analysis |
| Koshiaris et al. - 2017[44] | Retrospective cohort | 1,733 patients with bladder cancer (stage unspecified) | CSM/ACM: Clinical Practice Research Datalink record and also from the UK national system of recording death provided by the Office for National Statistics. | 1999-2013 | 65.39-67.49 (mean) | NR | **Smoking***Ref. = Quitters**Current*CSM: 1.14 (0.71-1.83)ACM: 0.86 (0.44-1.65) |
| Lacombe et al. - 2016[45] | Retrospective cohort | 189 patients with NMIBC | Recurrence: a pathologically confirmed (at re-TURBT) new tumor(s) identified during cystoscopy follow-up after TURBT. | 1990-1992, 1997-2002 | 62.8 (mean) | 5.6 years (mean) | **Smoking***Ref. = Never**Former*Recurrence:2.76 (1.03-7.40)*Current*Recurrence: 2.93 (1.08-7.94) |
| Lamm et al. - 1994[46] | Randomized controlled trial | 65 patients with bladder cancer (stage unspecified) | Recurrence: Presence of recurrent tumors resected transurethrally and confirmed by microscopic examination.ACM: ND | 1985-1992 | 65.9-68.1 (mean) | 45 months (mean) | **Megadose multivitamins***Ref. = Recommended daily allowance*Recurrence (5-year estimates): 80% (intervention) versus 40% (control) (p=0.0014)ACM (survival rate): 76% (intervention) versus 74% (control) (NS) |
| Lammers et al. - 2011[47] | Prospective cohort | 718 patients with NMIBC | Recurrence: Recurrence during treatment period, recurrence after treatment period, and occurrence of CIS. | 1998-2004 | 66.2-66.6 (mean) | 2.5 years (mean) | **Smoking***Ref. = Never**Current/former*Recurrence (European Organization for Research and Treatment of Cancer risk factors included in multivariable analysis): 1.47 (1.00-2.15) Recurrence (Club Urologico Espanol de Tratamiento Oncologico risk factors included in multivariable analysis): 1.57 (1.06-2.31) |
| Lee et al. - 2011[48]\*\*\*\* | Retrospective cohort | 602 patients with NMIBC/MIBC | Recurrence/progression: Local recurrence at or below the common iliac bifurcation or distant metastasis documented by imaging and biopsy, if indicated.  | 1989-2008 | 60.5-64.3 (mean) | 56 months (median) | **Smoking - binary***Ref. = Non-smoker*Recurrence/progression: 0.94 (p=0.697)CSS: 1.10 (p=0.587)ACM: 1.01 (p=0.930)**Smoking – categorical***Ref. = Never**Former*Recurrence/progression: 0.93 (0.66-1.29)CSS: 1.21 (0.86-1.70)*Current*Recurrence/progression: 0.91 (0.63-1.31)CSS: 0.94 (0.64-1.37)**Smoking – cumulative***Ref. = Never**<10 pack-years*Recurrence/progression: 1.55 (0.74-3.27)CSS: 1.38 (0.58-3.28)*<20 pack-years*Recurrence/progression: 0.59 (0.30-1.16)CSS: 0.68 (0.34-1.39)*<30 pack-years*Recurrence/progression: 0.91 (0.50-1.65)CSS: 1.02 (0.56-1.85)*<40 pack-years*Recurrence/progression: 0.98 (0.55-1.74)CSS: 1.15 (0.65-2.02)≥*40 pack-years*Recurrence/progression: 0.86 (0.56-1.31)CSS: 0.95 (0.61-1.48) |
| Leibovici et al. – 2015[49] | Case-control | 519 patients with NMIBC and 505 healthy control participants | Recurrence: Newly found bladder tumor following a previous negative follow-up cystoscopy.Progression: The transition from NMIBC to MIBC or metastatic disease. | 1995-2003 | 62.3-65.7 (mean) | 20.8 months (median) | **Smoking - categorical***Ref. = Never**Former*Recurrence: 1.11 (0.73-1.70)Progression: 1.30 (0.53-3.16)*Current/recent quitter*Recurrence: 0.81 (0.47-1.37)Progression: 0.59 (0.17-2.03)**Smoking – cumulative**Recurrence: 1.00 (0.99-1.00)Progression: 1.01 (1.00-1.02) |
| Lenis et al. – 2018[50] | Retrospective cohort | 90 patients with NMIBC  | Recurrence: The presence of urothelial carcinoma on biopsy or repeat resection. Progression: Any increase in grade or stage of disease.  | 2012-2015 | 69.7 (mean) | 20 months (median) | **BMI***Ref. = <30*≥*30*Recurrence or progression: 3.42 (1.55-7.52)**DMII***Ref. = No DMII*Recurrence or progression: 1.09 (0.46–2.59) |
| Li et al. - 2017[51] | Retrospective cohort | 484 patients with NMIBC | Recurrence: Histologically-confirmed tumor recurrence.Progression: Pathological stage ≥T2 or disease metastasis. | 2007-2015 | 64 (median) | 25 months (median) | **Smoking - categorical***Ref. = Never**Former*Recurrence: 0.970 (0.639-1.471)Progression: NS on univariable analysis*Current*Recurrence: 1.487 (0.948-2.331)Progression: NS on univariable analysis**Smoking – categorical***Ref. = Current**Quit <10 years prior to diagnosis*Recurrence: 0.937 (0.620-1.415)*Quit* ≥*10 years prior to diagnosis*Recurrence: 0.456 (0.257-0.809)**Smoking – cumulative***Ref. = cigarette index <400**Cigarette index* ≥*400*Recurrence: 2.409 (1.487-3.903) |
| Lipsky et al. - 2013[52] | Retrospective cohort | 224 patients with NMIBC  | Recurrence: Biopsy-proven recurrence within the bladder.Progression: Stage increase at the time of recurrence.CSM/ACM: ND | 2001-2011 | 68-78 (mean) | 44.1 months (median) | **Aspirin***Ref. = No use*Recurrence: NS on univariable analysisProgression: NS on univariable analysisCSM/ACM: NS on univariable analysis**Clopidogrel***Ref. = No use*Recurrence: NS on univariable analysisProgression: NS on univariable analysisCSM/ACM: NS on univariable analysis**Warfarin***Ref. = No use*Recurrence: NS on univariable analysisProgression: NS on univariable analysisCSM/ACM: NS on univariable analysis |
| Lopez-Beltran et al. – 1992[53] | Retrospective cohort | 36 patients with NMIBC/MIBC | CSM: ND | NR | 64.4 (mean) | 56.75 months (mean) | **Smoking***Ref. = Non-smoker*CSM: NS on univariable analysis |
| Lukas et al. - 2017[54]\*\*\*\* | Case-control | 143 patients with NMIBC/MIBC and 337 controls | Recurrence: ND | NR | 60.36-70.4 (median), 59.94-69.24 (mean) | NR | **Aromatic amine***Ref. = Not exposed**Exposed*Recurrence: 1.58 (0.66-3.74)**Azo dyes***Ref. = Not exposed**Exposed*Recurrence: 0.92 (0.51-1.65)**PAH***Ref. = Not exposed**Exposed*Recurrence: 0.75 (0.42-1.33) |
| Maurer et al. - 2009[55] | Retrospective cohort | 390 patients with NMIBC/MIBC  | ACM: ND | 1986-2004 | 68 (median) | NR | **BMI***Ref. = Normal weight*ACM: MVNA |
| Mazdak et al. - 2012[56] | Randomized controlled trial | 46 patients with NMIBC  | Recurrence: ND | 2006-2010 | 59.16-60.62 (mean) | 17.8-24.57 (mean) | **Vitamin E***Ref. = No use*Recurrence: RR 0.53 (0.19-0.92) |
| Michalek et al. - 1985[57] | NR | 302 patients with NMIBC/MIBC | Recurrence: Determined from patient’s medical record.ACM: Review of medical records. | 1063-1975 | 66 (mean) | NR | **Smoking***Ref. = Never**Former/Current*Recurrence: NS on univariable analysisACM: Regression coefficient=0.012, SE=0.092, p=0.89 |
| Michalek et al. - 1987[58] | Prospective cohort | 102 patients with NMIBC  | Recurrence: ND | 1960-1965 | NR | NR | **Smoking***Ref. = Non-smoker*Recurrence: NS on univariable analysis**Vitamin A***Ref. = Low intake (lesser half of cohort)**High intake*Recurrence: MNVA  |
| Mitra et al. - 2013[59] | Prospective cohort | 212 patients with NMIBC/MIBC | ACM: ND | 1987-1996 | 58.9 (median) | 13.2 years (median) | **Smoking***Ref. = Never or ≤20 cigarettes/day for ≤30 years**Smoking for 31-40 years or >20 cigarettes/day for ≤30 years*ACM: 2.59 (1.29-5.21)*Smoking for >40 years*ACM: 6.11 (3.02-12.37) |
| Naito et al. - 2008[60] | Randomized controlled trial | 202 patients with NMIBC  | Recurrence: Positive findings on cystoscopy or consecutive positive findings on urine cytology.Progression: MIBC or metastasis.CSM/ACM: ND | 1999-2002 | Mean/median NR | 26.9-43.6 months (median) | ***Lactobacillus casei* probiotic***Ref. = No use*Recurrence: 0.5654 (0.3450-0.9265)Progression: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis**Smoking***Ref. = Non-smoker*Recurrence: NS on univariable analysis |
| Nayan et al. - 2015[61] | Retrospective cohort | 85 patients with NMIBC/MIBC  | Recurrence: Imaging, cystoscopic, or physical examination evidence of disease recurrence.CSM/ACM: Obtained through electronic medical record review and the Princess Margaret Hospital Cancer Registry. | 1997-2013 | 71 (mean) | 50 months (median) | **Metformin***Ref. = No use*Recurrence: 0.38 (0.20-0.72)CSM: 0.57 (0.35-0.91)ACM: 1.05 (0.49-2.26)**Other oral hypoglycemics***Ref. = No use*Recurrence: 1.00 (0.57-1.76)CSM: 0.65 (0.42-1.02)ACM: 0.96 (0.46-1.98)**Insulin***Ref. = No use*Recurrence: 0.96 (0.22-4.10)CSM: 0.56 (0.12-2.60)ACM: 0.60 (0.21-1.72) |
| Nepple et al. - 2010[62] | Randomized controlled trial | 670 patients with NMIBC  | Recurrence: Confirmed by biopsy or cytology. | 1999-2003 | 68.4 (mean) | 24 months (median) | **Megadose multivitamins***Ref. = Recommended daily allowance*Recurrence: 1.07 (0.83-1.39) |
| Nerli et al. - 2018[63] | Retrospective cohort | 42 patients with NMIBC | Recurrence: Occurrence of a new tumor in the bladder. | 2007-2016 | 57.3 (mean) | 57.38 (median) | **Smoking\*\*\****Ref. = Tobacco non-users**Tobacco users*Recurrence: Significantly higher. HR for multivariable analysis NR.  |
| Newling et al. - 1995[64] | Randomized controlled trial | 252 patients with NMIBC | Recurrence: Identification on cystoscopy.Progression: NDACM: ND | 1979-1981 | 65 (median) | 3.4 years (mean) | **Pyridoxine***Ref. = Placebo*Recurrence: NS on univariable analysisProgression: NS on univariable analysisACM: NS on univariable analysis |
| Ogihara et al. - 2016[65] | Retrospective cohort | 634 patients with NMIBC | Recurrence: ND | 1995-2012 | 68.5 (mean) | 68.1 months (median) | **Smoking***Ref. = Non-smoker*Recurrence: 2.55 (1.70-3.83)**Smoking – cumulative***Ref. = <1 pack/day*≥*1 pack/day*Recurrence: NS on univariable analysis**Smoking – cumulative***Ref. = <30 years*≥*30 years*Recurrence: NS on univariable analysis**Smoking – cumulative***Ref. = Quit* ≥*15 years prior to initial consultation**Quit <15 years prior to initial consutlation*Recurrence: 2.20 (1.31-3.70) |
| P’ng et al. - 1993[66] | Retrospective cohort | 45 patients with NMIBC  | Therapeutic failure: persistent or recurrent tumor(s), or positive cytology at the first follow-up cystoscopy at 3 months. | 1985-1990 | 69 (mean), 70 (median) | 20.3 months (median) | **FCI (aspirin, NSAIDs, warfarin)***Ref. = No use*Therapeutic failure (including recurrence): MVNA |
| Pastore et al. - 2015[67] | Retrospective cohort | 574 patients with NMIBC  | Recurrence: According to the American Cancer Society as the return of cancer after treatment and after a period of time during which the cancer could be detected, and at the site where it began (somewhere else in the bladder or at distant sites). | 2008-2013 | 62.24 (mean) | 45.06 months (mean) | **Aspirin***Ref. = No use*Recurrence: 0.749 (0.452-1.239)**Aspirin and statins***Ref. = No use*Recurrence: 1.394 (0.852-2.279)**Smoking***Ref. = Never* *Former*Recurrence: 2.191 (1.382-3.478)*Current*Recurrence: 3.202 (1.983-5.171)**Statins***Ref. No use*Recurrence: 1.886 (1.095-3.247) |
| Pedersen et al. - 1984[68] | Randomized controlled trial | 73 patients with NMIBC | Recurrence: ND | NR | NR | 8 months (study period) | **Etretinate***Ref. = Placebo*Recurrence: NS on univariable analysis |
| Psutka et al. - 2014[69] | Retrospective cohort | 205 patients with NMIBC/MIBC  | CSM/ACM: Cause of death is confirmed via death certificate. | 2000-2007 | 71 (median) | 6.7 years (median) | **BMI***Continuous*CSM: 1.00 (0.97-1.05)ACM: 1.00 (0.96-1.03) |
| Psutka et al. - 2015[70] | Retrospective cohort | 262 patients with NMIBC/MIBC  | ACM: Verified via death certificate. | 2000-2008 | 71 (median) | 6.3 years (median) | **BMI***Ref. = <30*≥*30*ACM: 0.79 (0.50-1.26)**Smoking***Ref. = Non-smoker*ACM: 1.24 (0.81-1.92) |
| Raitanen et al. - 1995[71] | ND | 169 patients NMIBC/MIBC | Recurrence: ND | 1978-1986 | 65-67 (mean) | 7.5 years (mean) | **Smoking***Ref. = Non-smoker*Recurrence: NS on univariable analysis |
| Raitanen et al. - 1995[72] | ND | 252 patients with NMIBC/MIBC | CSM: ND | 1978-1986 | 63-66 (mean) | 6.7 years (mean) | **Smoking** *Ref. = Non-smoker**Smoker*CSM: 1.4 (0.9-2.3) |
| Rausch et al. - 2014[73] | Retrospective cohort | 192 patients with NMIBC  | Recurrence: Tumor recurrence with or without pathological upstaging or upgrading.Progression: Pathological progression by either upstaging or upgrading. Occurrence of a staging of greater or equal to pT2. | 1996-2006 | 68.31 (median) | 80 months (median) | **Smoking***Ref. = Non-smoker*Recurrence: NS on univariable analysisProgression: NS on univariable analysis**DMII***Ref. = No DMII*Recurrence: NS on univariable analysisProgression: NS on univariable analysis |
| Richard et al. - 2017[74] | Retrospective cohort | 13,811 patients with NMIBC  | CSM/ACM: As indicated in databases. | 1992-2002 | 76 (median) | 7.1 years (median) | **Statins***Ref. = No use**Cumulative use before diagnosis*CSM: 0.99 (0.97-1.01)ACM: 1.01 (0.99-1.03)*Cumulative use after diagnosis*CSM: 1.04 (0.99-1.09)ACM: 0.93 (0.91-0.96)**DMII***Ref. = No DMII*CSM: 0.99 (0.97-1.01)ACM: 1.04 (1.03-1.05) |
| Richard et al. - 2018[75] | Retrospectivecohort | 1,742 patients with NMIBC | CSM/ACM: As indicated in databases. | 1992-2012 | 78 (median) | 5.2 years (median) | **DMII***Cumulative time between DMII and NMIBC diagnosis*CSM: 1.0 (0.96-1.1)ACM: 1.01 (0.99-1.03)**Glyburide***Ref. = No use**Cumulative use before diagnosis*CSM: 0.97 (0.88-1.1)ACM: 1.06 (1.02-1.1)*Cumulative use after diagnosis*CSM: 1.17 (1.02-1.3)ACM: 1.01 (0.97-1.1)**Insulin***Ref. = No use**Cumulative use before diagnosis*CSM: 1.1 (0.65-1.9)ACM: 1.3 (1.11-1.5)*Cumulative use after diagnosis*CSM: 1.17 (0.76-1.8)ACM: 1.09 (0.87-1.2)**Metformin***Ref. = No use**Cumulative use before diagnosis*CSM: 1.0 (0.90-1.1)ACM: 1.0 (0.97-1.1)*Cumulative use after diagnosis*CSM: 1.1 (0.92-1.2)ACM: 0.96 (0.92-1.01)**Other oral anti-diabetic agents***Ref. = No use**Cumulative use before diagnosis*CSM: 0.99 (0.70-1.4)ACM: 0.97 (0.86-1.1)*Cumulative use after diagnosis*CSM: 0.86 (0.53-1.4)ACM: 1.06 (0.85-1.2)**Thiazolidinedione***Ref. = No use**Cumulative use before diagnosis*CSM: 0.85 (0.36-2.0)ACM: 0.1 (0.83-1.1)*Cumulative use after diagnosis*CSM: 0.85 (0.30-1.3)ACM: 0.91 (0.77-1.1) |
| Rieken et al. - 2013[76] | Retrospective cohort | 1,117 patients with NIMBC  | Recurrence: First tumor relapse in the bladder or prostatic urethra, regardless of tumor stage.Progression: Tumor relapse at tumor stage T2 or higher in the bladder or prostatic urethra.CSM/ACM: The cause of death was determined by the treating physicians, by chart review corroborated by death certificates, or by death certificates alone. | 1996-2007 | 65 (mean), 67 (median) | 64 months (median) | **Smoking***Ref. = Never**Former*Recurrence: NS on univariable analysisProgression: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis*Current*Recurrence: NS on univariable analysisProgression: MVNACSM: NS on univariable analysisACM: NS on univariable analysis**DMII***Ref. = No DMII**DMII, no metformin*Recurrence: 1.39 (1.04-1.86)Progression: 2.21 (1.29-3.77)CSM: NS on univariable analysisACM: 1.19 (0.81-1.73)*DMII, metformin*Recurrence: 0.48 (0.26-0.89)Progression: 0.34 (0.05-2.42)CSM: NS on univariable analysisACM: 1.49 (0.88-2.53) |
| Rieken et al. - 2014[77] | Retrospective cohort | 1,502 patients with NMIBC/MIBC  | Recurrence: Tumor relapse in the operative field, regional lymph nodes, and distant metastases.CSM/ACM: Cause of death was determined by treating physicians by chart review corroborated by death certificates or by death certificates alone. | 1992-2008 | 65.5 (mean), 66 (median) | 34 months (median) | **BMI***Continuous*Recurrence: 1.05 (1.03-1.07)CSM: 1.05 (1.03-1.07)ACM: 1.01 (0.99-1.03)**DMII***Ref. = No DMII**DMII, no metformin*Recurrence: 1.29 (0.97-1.73)CSM: 1.53 (1.12-2.09)ACM: 1.52 (1.16-2.00)*DMII, metformin*Recurrence: 0.96 (0.63-1.46)CSM: 1.01 (0.62-1.63)ACM: 0.99 (0.65-1.50)**Smoking***Ref. = Non-smoker*Recurrence: 1.19 (1.05-1.35)CSM: 1.17 (1.02-1.35)ACM: 1.10 (0.98-1.24) |
| Rink et al. - 2012[78] | Retrospective cohort | 390 patients with NMIBC | Recurrence: First tumor relapse in the bladder regardless of stage.Progression: Tumor relapse with an increase to disease stage T2 or higher in the bladder.ACM: ND | 1987-2007 | 67 (median) | 66 months (median) | **Smoking (categorical)***Ref. = Never**Former*Recurrence: NS on univariable analysisProgression: NS on univariable analysisACM: NS on univariable analysis*Current*Recurrence: NS on univariable analysisProgression: NS on univariable analysisACM: NS on univariable analysis**Smoking (cessation)***Ref. = Current**Cessation* ≥*10 years*Recurrence: 0.403 (0.241-0.671)Progression: 0.509 (0.223-1.161)*Cessation <10 years*Recurrence: 1.438 (0.995-2.079)Progression: 1.263 (0.666-2.393)**Smoking (cumulative)***Ref. = Light short-term**Moderate*Recurrence: 2.075 (1.231-3.496)*Heavy long-term*Recurrence: 4.307 (2.434-7.622) |
| Rink et al. - 2012[79] | Retrospective cohort | 1,987 patients with NMIBC | Recurrence: First tumor relapse in the bladder regardless of tumor stage. | 1987-2007 | 68 (median) | NR | **Smoking** *Risk of recurrence greater among BCG treated smokers (HR 1.44, 95% CI 1.01-2.04). NS risk of recurrence between those who did versus did not receive BCG among former and never smokers.*  |
| Rink et al. - 2013[80] | Retrospective cohort | 2,043 patients with NMIBC | Recurrence: First tumor relapse in the bladder regardless of tumor stage.Progression: Tumor relapse at tumor stage T2 or higher in the bladder.ACM: ND | 1987-2007 | 67 (median) | 49 months (median) | **Smoking (categorical)***Ref. = Never**Former*Recurrence: 1.12 (0.94-1.34)Progression: 1.29 (0.79-2.09)ACM: 1.10 (0.86-1.41)*Current*Recurrence: 1.22 (1.01-1.48)Progression: 2.09 (1.29-3.39)ACM: 1.12 (0.85-1.47)**Smoking (cessation)***Ref. = Current**Former <10 years*Recurrence: 1.30 (1.09-1.53)Progression: 0.99 (0.65-1.50)ACM: 1.02 (0.79-1.30)*Former* ≥*10 years*Recurrence: 0.66 (0.52-0.84)Progression: 0.42 (0.22-0.83)ACM: 0.98 (0.72-1.34)**Smoking (cumulative)***Ref. = Heavy long**Light long*Recurrence: 0.91 (0.77-1.07)Progression: 0.43 (0.29-0.63)ACM: 0.67 (0.52-0.85)*Heavy short*Recurrence: 0.43 (0.30-0.60)Progression: 0.12 (0.03-0.44)ACM: 0.81 (0.51-1.27)*Light short*Recurrence: 0.35 (0.26-0.47)Progression: 0.05 (0.01-0.19)ACM: 0.54 (0.37-0.80) |
| Sabichi et al. - 2008[81] | Randomized controlled trial | 137 patients with NMIBC | Recurrence: Cystoscopy, biopsy confirmation. | 1998-2003 | 64.5-69.2 (mean), 64.0-70.9 (median) | NR | **Fenretinide***Ref. = Placebo*Recurrence: NS on univariable analysis |
| Sabichi et al. - 2011[82] | Randomized controlled trial | 146 patients with NMIBC  | Recurrence: A biopsy that yielded a histologically confirmed recurrence. | 2000-2005 | NR | 2.49 years (median) | **Celecoxib***Ref. = Placebo*Recurrence: 0.69 (0.37-1.29) |
| Segal et al. - 2014[83] | Retrospective cohort | 278 patients with NMIBC | Recurrence: NDWorsening: Includes evidence of disease stage progression, need for radical cystectomy or disease-specific mortality. | 1995-2005 | 72.8 (median) | 3 years (median) | **Statins***Ref. = No use*Recurrence: NS on univariable analysisWorsening (includes progression and CSM): 0.784 (0.453-1.341)**Smoking***Ref. = Non-smoker*Recurrence: NS on univariable analysisWorsening (includes progression and CSM): NS on univariable analysis |
| Selinksi et al. - 2016[84]\*\*\*\* | Case-control | 795 patients with NMIBC | Recurrence: ND | 2008-2014 | 70.27 (median) | NR | **Aromatic amines***Ref. = No exposure**Exposure*Recurrence: 1.13 (0.77-1.68)**Chemical industry***Ref. = No exposure**Exposure*Recurrence: 1.29 (0.86-1.94)**Painter/varnisher***Ref. = No exposure**Exposure*Recurrence: 0.70 (0.36-1.37) |
| Serretta et al. - 2013[85] | Retrospective cohort | 395 patients with NMIBC | Recurrence: Pathologically confirmed | 2002-2003 | 68 (median) | 48 months (median) | **Smoking (binary)***Ref. = Non-smoker*Recurrence: 1.60 (1.02-2.50)**Smoking (categorical)***Ref. = Never**Former*Recurrence: 1.94 (1.18-3.18)*Current*Recurrence: 1.39 (0.40-2.24)***Smoking (categorical)****Ref. = Former**Current*Recurrence: NS on univariable analysis |
| Sfakianos et al. - 2011[86] | Retrospective cohort | 623 patients with NMIBC | Recurrence: Visual and/or biopsy-confirmed evidence of tumor at cystoscopy or positive urine cytology.Progression: The development of an invasive tumor of higher stage or by the presence of metastatic disease.CSM/ACM: The cause of death was determined bythe treating physicians or by chart review corroborated by death certificates. | 1994-2008 | 75 (mean), 76 (median) | 80.9 months (median) | **Smoking (binary)***Ref. = Never**Smoker*Recurrence: 1.05 (0.84-1.31)Progression: 1.02 (0.66-1.59)CSM: 1.15 (0.68-1.96)ACM: 1.14 (0.79-1.64)**Smoking (categorical)***Ref. = Never**Former*Recurrence: 1.05 (0.84-1.32)Progression: 1.00 (0.64-1.58)CSM: 1.14 (0.66-1.97)ACM: 1.20 (0.82-1.74)*Current*Recurrence: 1.04 (0.77-1.40)Progression: 1.16 (0.65-2.10)CSM: 1.27 (0.64-2.53)ACM: 1.03 (0.63-1.68)**Smoking (categorical)***Ref. = Never**Stopped >10 years*Recurrence: 1.06 (0.83-1.35)Progression: 1.06 (0.65-1.72)CSM: 1.29 (0.72-2.29)ACM: 1.34 (0.90-1.98)*Stopped 0.1-10 years*Recurrence: 1.22 (0.90-1.66)Progression: 0.95 (0.51-1.77)CSM: 0.96 (0.45-2.06)ACM: 1.16 (0.71-1.90)*Stopped at diagnosis*Recurrence: 0.75 (0.49-1.16)Progression: 0.81 (0.35-1.88)CSM: 0.80 (0.30-2.18)ACM: 0.64 (0.31-1.34)*Current*Recurrence: 1.04 (0.77-1.40)Progression: 1.16 (0.65-2.08)CSM: 1.27 (0.64-2.52)ACM: 1.03 (0.63-1.68) |
| Singla et al. – 2017[87]  | Prospective cohort | 99 patients with NMIBC  | Recurrence: NDProgression: Stage, including development of muscle-invasive (≥pT2) or metastatic disease. Progression to radical cystectomy was also evaluated.CSM/ACM: ND | 2006-2012 | 73 (median) | 31.4 months (median) | **BMI***Continuous*Recurrence: NS on univariable analysisStage progression: NS on univariable analysis Progression to cystectomy: NS on univariable analysisCSM: NS on univariable analysisACM: 0.86 (0.76–0.96)**Smoking**\*\*\**Ref. = Non-smoker*Recurrence: NS on univariable analysisStage progression: NS on univariable analysis Progression to cystectomy: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis**Aspirin use***Ref. = No use*Recurrence: NS on univariable analysisStage progression: NS on univariable analysis Progression to cystectomy: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis**NSAID or COX inhibitor use***Ref. = No use*Recurrence: NS on univariable analysisStage progression: NS on univariable analysis Progression to cystectomy: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis**Statin***Ref. = No use*Recurrence: NS on univariable analysisStage progression: NS on univariable analysis Progression to cystectomy: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis |
| Skolarus et al. - 2009[88] | Retrospective cohort | 90 patients with NMIBC  | Recurrence: Total recurrences.Progression: Local tumor progression; undergoing cystectomy, chemotherapy or radiation therapy; or development of metastatic disease.CSM/ACM: ND | 1997-2007 | 68.1-68.9 (mean) | 5.1 years (median) | **Statins***Ref. = No use*Recurrence: NS on univariable analysisProgression: NS on univariable analysisCSM: NS on univariable analysisACM: NS on univariable analysis |
| Studer et al. - 1995[89] | Randomized controlled trial | 79 patients with NMIBC | Recurrence: First recurrence on cystoscopy. | NR | 59.5 (mean) | 30-33 months (median) | **Etretinate:***Ref. = Placebo*Recurrence: NS on univariable analysis |
| Takashi et al. - 1987[90] | ND | 264 patients with NMIBC/MIBC | ACM: ND | 1973-1984 | Mean/median NR | NR | **Smoking***Ref. = Non-smoker*ACM: NS on univariable analysis |
| Thompson et al. - 1987[91] | Retrospective cohort | 368 patients with NMIBC/MIBC | Recurrence: ND | 1980-1985 | 57.3-60.7 (mean) | NR | **Smoking***Ref. = Non-smoker*Recurrence: MVNA |
| Tang et al. - 2010[92]\*\*\*\* | Retrospective cohort | 239 patients with NMIBC/MIBC | CSM: Death attributable to bladder cancer as a primary or underlying cause on the death certificate.ACM: Death from any cause including bladder cancer. | 1980-1998 | Mean/median NR | 96 months (mean) | **Broccoli, cooked***Ref. = <1 serving/month*≥*1 serving/month*CSM: 0.68 (0.45-1.01)ACM: 0.67 (0.49-0.91)**Broccoli, raw***Ref. = <1 serving/month**1 serving/month*CSM: 0.43 (0.25-0.74)ACM: 0.57 (0.39-0.83)**Fruit***Ref. = <27.5 servings/month**27.5-51 servings/month*CSM: 0.94 (0.57-1.55)ACM: 0.86 (0.59-1.24)*>51 servings/month*CSM: 1.09 (0.66-1.81)ACM: 0.91 (0.62-1.33)**Raw Cruciferous***Ref. = <1 servings/month**1-3 servings/month*CSM: 0.67 (0.41-1.10)ACM: 0.67 (0.46-0.97)*>3 servings/month*CSM: 0.73 (0.44-1.21)ACM: 0.73 (0.50-1.06)**Vegetables***Ref. = <52 servings/month**52-85.5 servings/month*CSM: 0.95 (0.59-1.55)ACM: 0.90 (0.62-1.30)*>85.5 servings/month*CSM: 1.06 (0.63-1.78)ACM: 0.91 (0.62-1.36) |
| Tu et al. - 2018[93] | Prospective cohort | 619 patients with NMIBC | Recurrence: Newly found bladder tumor.Progression: The transition from NMIBC to MIBC or metastatic disease. | 1995-2003 | 61.7-64.8 (mean) | 62 months (median) | **Folate (natural)***Ref. = Low (tertile 1)**Medium (tertile 2)*Recurrence: 0.96 (0.71-1.30)Progression: 0.67 (0.40-1.11)*High (tertile 3)*Recurrence: 0.82 (0.60-1.13)Progression: 0.69 (0.41-1.15)**Folate (synthetic)***Ref. = Low (tertile 1)**Medium (tertile 2)*Recurrence: 1.72 (1.20-2.48)Progression: 1.17 (0.65-2.12)*High (tertile 3)*Recurrence: 1.80 (1.14-2.84)Progression: 1.33 (0.63-2.81)**Folate (total)***Ref. = Low (tertile 1)**Medium (tertile 2)*Recurrence: 1.67 (1.16-2.38)Progression: 1.83 (1.02-3.26)*High (tertile 3)*Recurrence: 1.23 (0.78-1.95)Progression: 1.20 (0.57-2.53) |
| Van Osch et al. - 2016[94] | Meta-analysis | 6908 patients with NMIBC from 11 studies | Recurrence: Local recurrence.Progression: NDCSM: ND | 1995-2014 | Mean/median NR | 14-81 months (median) | **Smoking***Ref. = Never**Former (5382 patients)*Recurrence: 1.13 (1.00-1.25)Progression: 1.13 (0.81-1.45)*Current*Recurrence: 1.27 (1.09-1.46)Progression: 1.21 (0.81-1.61)CSM (925 patients): 1.01 (0.93-1.10) |
| Van Osch et al. - 2018[95]\*\*\*\* | Prospective cohort | 722 patients with NMIBC | Recurrence: A new tumor that was at the same stage as the primary tumor (Ta or T1) but also when a primary Ta patient had a T1 recurrence. | 2005-2011 | 71 (median) | 4.21 years (median) | **Smoking (categorical)***Ref. = Never**Former*Recurrence: 0.78 (0.48-1.24)*Current*Recurrence: 1.04 (0.65-1.66)*Former who started again*Recurrence: 0.87 (0.53-1.41)*Current who quit*Recurrence: 1.47 (0.63-3.41)**Smoking (cessation)***Ref. = Current**<20 years*Recurrence: 0.82 (0.46-1.46)*21-40 years*Recurrence: 0.74 (0.51-1.08)*>40 years*Recurrence: 0.71 (0.46-1.09) |
| Wakai et al. - 1993[96]\*\*\*\* | Prospective cohort | 258 patients with NMIBC/MIBC | ACM: ND | 1976-1978 | Mean/median NR | 29.8 months (median) | **Alcohol (Males only)***Ref. = Never**Ex-drinker*ACM: 0.60 (0.23-1.59)*Current (<2 gou/day)*ACM: 0.41 (0.22-0.77)*Current (2-4 gou/day)*ACM: 0.43 (0.16-1.14)*Current (*≥*4 gou/day)*ACM: 0.82 (0.22-3.13)**Hair dye***Ref. = No exposure**Exposure*ACM: 0.65 (0.28-1.79)**Smoking***Ref. = Non-smoker*ACM: 0.88 (0.45-1.72) |
| Westhoff et al. - 2018[97]\*\*\*\* | Prospective cohort | 595 patients with NMIBC | Recurrence: New bladder tumor following a previous negative follow-up cystoscopy.Progression: The transition from NMIBC to muscle-invasive or metastatic tumors. | 1995 “onward” | 62.5-66.0 (mean) | 65.7 months (median) | **Fruits and vegetables***Ref. = Tertile 1**Tertile 2*Recurrence: 1.08 (0.79-1.47)Progression: 1.16 (0.70-1.92)*Tertile 3*Recurrence: 0.90 (0.64-1.26)Progression: 1.05 (0.61-1.82)**Low-fat pattern***Ref. = Tertile 1**Tertile 2*Recurrence: 0.96 (0.71-1.31)Progression: 0.78 (0.47-1.28)*Tertile 3*Recurrence: 0.86 (0.63-1.18)Progression: 0.74 (0.44-1.23)**Tex-Mex pattern***Ref. = Tertile 1**Tertile 2*Recurrence: 1.08 (0.79-1.48)Progression: 1.27 (0.79-2.06)*Tertile 3*Recurrence: 0.92 (0.66-1.27)Progression: 0.70 (0.40-1.24)**Western diet pattern***Ref. = Tertile 1**Tertile 2*Recurrence: 1.03 (0.75-1.42)Progression: 1.23 (0.73-2.06)*Tertile 3*Recurrence: 1.48 (1.06-2.06)Progression: 1.56 (0.91-2.65) |
| Westhoff et al. - 2018[98]  | Meta-analysis | 1,633 patients with NMIBC from three studies and 5,533 patients with NMIBC/MIBC from three studies | Recurrence: NDProgression: NDCSM/ACM: ND | Up to 2017 | Mean/median NR | NR | **BMI – NMIBC***Ref. = Normal weight**Overweight*Recurrence: 1.29 (1.05-1.58)Progression (2 studies, 1,294 patients): 1.03 (0.63-1.70)*Obese*Recurrence: 1.82 (1.12-2.95)Progression (2 studies, 1,294 patients): 1.90 (0.93-3.88)**BMI – NMIBC***Ref. = Normal weight**Overweight*Recurrence: 0.87 (0.67-1.14)CSM: 0.82 (0.65-1.02)*Obese*Recurrence: 1.12 (0.54-2.31)CSM: 0.98 (0.46-2.10) |
| Witjes et al. - 1993[99] | Prospective cohort | 183 patients with NMIBC  | Recurrence: Positive cystoscopy, cytology, or biopsy. | 1987-1991 | Mean/median NR | 20.8-22.5 months (median) | **FCIs (aspirin, dipyramidole, ibuprofen, indomethacin, naproxen, warfarin)***Ref. = No use*Recurrence: NS on univariable analysis. |
| Wyszynski et al. - 2014[100] | ND | 726 patients with NMIBC  | Recurrence: Any tumor identified after a disease-free remission period, more than 90 days after the date of initial primary bladder tumor diagnosis. Progression: The diagnosis of a tumor with a greater stage or grade than the initial primary bladder tumor.ACM: Life status (alive or deceased) was determined as of January 2011 using the Social Security and the National Death Indices (NDI).  | 1994-2001 | Mean/median NR | 6 years (median) | **BMI***Ref. = ≤24.9**24.9-29.9*Recurrence: 1.39 (0.96-2.01)≥*30*Recurrence: 1.22 (0.80-1.87)≥*24.9*Recurrence: 1.33 (0.94-1.89)**Smoking***Ref. = Never**Former*Recurrence: 1.61 (1.17-2.20)Progression: NSACM: 1.69 (0.70-4.10) *Current*Recurrence: 1.51 (1.08–2.13)Progression: NSACM: 3.42 (1.29-9.07)*Quit* ≥*29 years prior*Recurrence: 1.37 (0.89-2.10)*Quit 19-28 years prior*Recurrence: 1.44 (0.94–2.21)*Quit 1-8 years prior*Recurrence: 1.83 (1.30-2.59) |
| Xu et al. - 2015[101] | Retrospective cohort | 403 patients with NMIBC  | Recurrence: The first tumor relapse in the bladder.Progression: An increase to pathologic T2 stage or higher in the bladder. | 2006-2014 | 67.1 (mean) | 53 months (median) | **BMI** *Ref. = <24**24-<28*Recurrence: 1.435 (1.029-2.002)Progression: 1.362 (0.571-3.249)*>28*Recurrence: 1.707 (1.120-2.602)Progression: 3.037 (1.243-7.420)**DMII***Ref. = No DMII*Recurrence: 1.803 (1.141-2.850)Progression: 3.111 (1.113-8.696) |
| Yafi et al. - 2011[102] | Retrospective cohort | 2287 patients with NMIBC/MIBC | Recurrence/progression: Local (pelvic) and/or distant (metastasis).CSM/ACM: Cause of death was determined by the treating physician, based on chart review and/or the death certificate. | 1998-2008 | 68 (median) | 35 months (mean), 29 months (median) | **Smoking**Recurrence/progression: MVNACSM: 1.304 (1.005-1.691)ACM: 1.307 (1.049-1.628) |
| Yonekura et al. - 2018[103] | Retrospective cohort | 50 patients with NMIBC  | Recurrence: Histologically verified urothelial carcinoma involving any site within the bladder. | 2011-2016 | 73 years (median) | 38.55 months (median) | **BMI***Continuous*Recurrence: 1.138 (1.021-1.268)**Smoking***Ref. = Never**Current/former*Recurrence: NS on univariable analysis |
| Yu et al. - 1997[104] | Retrospective cohort | 870 patients with NMIBC/MIBC | ACM: ND | 1990-1995 | Bladder cancer-specific NR | Bladder cancer-specific NR | **Smoking**ACM: RR 1.18 (Statistically insignificant, no p-value or confidence interval available) |
| Yuruk et al. - 2017[105] | Retrospective cohort | 187 patients with NMIBC | Recurrence: ND | 2013-2014 | 64.68 (mean) | 32.28 months (mean) | **Smoking***Ref. = Never**Former*Recurrence: NS on univariable analysis*Current*Recurrence: NS on univariable analysis |

ACM = All-cause mortality, BMI = Body mass index, CIS = Carcinoma in-situ, CSM = Cancer-specific mortality, CSS = Cancer-specific survival, DMII = Diabetes Mellitus Type 2, FCI = Fibrin Clot Inhibitor, MVNA = Multivariable analysis not available, MIBC = Muscle invasive bladder cancer, ND = Not defined, NMIBC = Non-muscle invasive bladder cancer, NR = Not reported, NS = No significance, OS = Overall survival, RFS = Recurrence-free survival, RR = Relative risk, SE = Standard error, SSRE = Summary relative risk estimate, UK = United Kingdom, US = United States

\*Directly from Methods section of text or assessed to best ability. ND indicates insufficient information in text for certainty of designation/definition.

\*\*Presented as Hazard Ratio (95% confidence interval) unless otherwise specified. For cohort studies, only results from multivariable analyses are shown.

\*\*\*Smoking included in general variable of “tobacco use.”

\*\*\*\*Only select items of interest are shown. See study for full list of evaluated factors.

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