**Supplementary**

*Supplementary Table 1. Morbid conditions at follow-up included in calculated frailty index, stratified by diagnosis of cancer*

|  |  |  |
| --- | --- | --- |
| **Morbid Condition (n=26)** | **No Cancer**  **n (%)** | **Cancer**  **n (%)** |
| High blood pressure | 108,715 (53.6%) | 16,898 (55.6%) |
| Diabetes | 31,012 (15.3%) | 4,941 (16.3%) |
| High cholesterol | 112,862 (55.7%) | 16,500 (54.3%) |
| Heart attack, angina, or coronary artery disease | 35,984 (17.7%) | 5,869 (19.3%) |
| Transient ischemic attack (TIA) | 7,987 (3.9%) | 1,272 (4.2%) |
| Heart-rhythm disturbance, like atrial fibrillation | 31,149 (15.4%) | 5,115 (16.8%) |
| Stroke | 7,012 (3.5%) | 1,148 (3.8%) |
| Pulmonary embolus | 2,524 (1.2%) | 533 (1.8%) |
| Emphysema or chronic bronchitis | 15,681 (7.7%) | 2623 (8.6%) |
| Osteoarthritis of the hip or knee | 42,075 (20.8%) | 5,869 (19.3%) |
| Osteoporosis of the spine or hip | 27,174 (13.4%) | 3,520 (11.6%) |
| Hip fracture | 2,687 (1.3%) | 492 (1.6%) |
| Macular degeneration of the eye | 11,267 (5.6%) | 1,826 (6.0%) |
| Glaucoma | 15,910 (7.8%) | 2,770 (9.1%) |
| Renal disease requiring dialysis | 827 (0.4%) | 165 (0.5%) |
| Kidney stones | 22,215 (11.0%) | 3,943 (13.0%) |
| Colon or rectal polyps | 48,623 (24.0%) | 9,950 (32.7%) |
| Stomach ulcer | 16,822 (8.3%) | 2,614 (8.6%) |
| Duodenal ulcer | 10,458 (5.2%) | 1,685 (5.5%) |
| Parkinson’s disease | 1,336 (0.7%) | 232 (0.8%) |
| Multiple sclerosis | 600 (0.3%) | 70 (0.2%) |
| Amyotrophic lateral sclerosis (ALS) | 109 (0.001%) | 23 (0.001%) |
| Depression | 27,160 (13.4%) | 3,657 (12.0%) |
| Coronary artery bypass or angioplasty | 26,896 (13.3%) | 4,593 (15.1%) |
| Gallbladder removal | 25,857 (12.8%) | 4,144 (13.6%) |
| Cataract extraction | 36,587 (18.0%) | 6,237 (20.5%) |

*Supplementary Table 2. Multinomial and logistic regression odds of poor ambulatory function of cancer survivors compared to cancer-free controls – sensitivity analyses by time since diagnosis*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Time Since Diagnosis** | **Cases, No.** | **Walk Pace**  **OR (95% CI)** | | **Cases, No.** | **Mobility Disability**  **OR (95% CI)** |
| <1 year | 3,544 | Slow | 1.51\*\* (1.35, 1.69) | 3,652 | 1.32\*\* (1.22, 1.43) |
|  |  | Normal | 1.20\* (1.08, 1.33) |  |  |
|  |  | Brisk (ref) | 1.00 |  |  |
| 1 to <5 years | 13,272 | Slow | 1.46\*\* (1.34, 1.60) | 13,674 | 1.25\*\* (1.18, 1.33) |
|  |  | Normal | 1.23\*\* (1.13, 1.33) |  |  |
|  |  | Brisk (ref) | 1.00 |  |  |
| ≥5 years | 12,652 | Slow | 1.32\*\* (1.21, 1.44) | 13,077 | 1.19\*\* (1.12, 1.27) |
|  |  | Normal | 1.16\* (1.07, 1.25) |  |  |
|  |  | Brisk (ref) | 1.00 |  |  |

OR=odds ratio

*Supplementary Table 3. Hazards of all-cause mortality by ambulatory function in cancer survivors – sensitivity analyses by receipt of treatment*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatment** | **Cases, No.** | **Deaths, No.** | **Walk Pace** | **HR (95% CI)** | **Cases, No.** | **Deaths, No.** | **Mobility Disability**  **HR (95% CI)** |
| Chemotherapy | 3,045 | 1,070 | Slow | 2.21 (2.02, 2.41) | 3,164 | 1,135 | 1.78 (1.69, 1.87) |
|  |  |  | Normal | 1.61 (1.53, 1.70) |  |  |  |
|  |  |  | Brisk (ref) | 1.00 |  |  |  |
| No Chemotherapy | 22,365 | 3,976 | Slow | 2.23 (2.06, 2.42) | 23,028 | 4,249 | 1.82 (1.74, 1.91) |
|  |  |  | Normal | 1.66 (1.58, 1.75) |  |  |  |
|  |  |  | Brisk (ref) | 1.00 |  |  |  |
| Radiation | 8,022 | 1,536 | Slow | 2.26 (1.97, 2.59) | 8,269 | 1,636 | 1.75 (1.62, 1.89) |
|  |  |  | Normal | 1.59 (1.46, 1.73) |  |  |  |
|  |  |  | Brisk (ref) | 1.00 |  |  |  |
| No Radiation | 17,956 | 3,663 | Slow | 2.09 (1.91, 2.28) | 18,515 | 3,918 | 1.78 (1.68, 1.87) |
|  |  |  | Normal | 1.62 (1.53, 1.72) |  |  |  |
|  |  |  | Brisk (ref) | 1.00 |  |  |  |
| Surgery | 17,455 | 3,050 | Slow | 2.13 (1.93, 2.34) | 18,026 | 3,285 | 1.82 (1.72, 1.93) |
|  |  |  | Normal | 1.65 (1.55, 1.76) |  |  |  |
|  |  |  | Brisk (ref) | 1.00 |  |  |  |
| No Surgery | 11,903 | 2,694 | Slow | 2.34 (2.10, 2.60) | 12,262 | 2,865 | 1.79 (1.68, 1.90) |
|  |  |  | Normal | 1.62 (1.52, 1.73) |  |  |  |
|  |  |  | Brisk (ref) | 1.00 |  |  |  |

HR=hazards ratio

*Supplementary Table 4. Detailed associations between self-reported walking pace and mortality in cancer survivors*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **All-Cause Mortality** | | | | **Cancer Mortality** | | |  |
| **Cancer** | **Cases, No.** | **Deaths, No.** | **Walk Pace** | **HR (95% CI)** | **P value** | **Deaths, No.** | **Walk Pace** | **HR (95% CI)** | **P value** |
| **All Cancers ǂ** | **29,468** | **5,784** | **Slow** | **2.22 (2.06, 2.39)** | **<0.001** | **1,467** | **Slow** | **2.12 (1.83, 2.45)** | **<0.001** |
|  |  |  | **Normal** | **1.36 (1.26, 1.46)** | **<0.001** |  | **Normal** | **1.43 (1.24, 1.64)** | **<0.001** |
|  |  |  | **Brisk (ref)** | **1.00** | **-** |  | **Brisk (ref)** | **1.00** | **-** |
| Soft Tissue | 107 | 25 | Slow | 4.60 (0.70, 30.19) | 0.111 | 9\* | Slow | - | - |
|  |  |  | Normal | 2.63 (0.42, 16.33) | 0.300 |  | Normal | - | - |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Non-Hodgkin’s | 635 | 167 | Slow | 3.04 (1.89, 4.90) | <0.001 | 61 | Slow | 4.19 (1.65, 10.67) | 0.003 |
| Lymphoma |  |  | Normal | 1.60 (1.02, 2.52) | 0.042 |  | Normal | 2.65 (1.08, 6.46) | 0.033 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Breast | 5,045 | 686 | Slow | 2.37 (1.84, 3.05) | <0.001 | 203 | Slow | 2.27 (1.49, 3.44) | <0.001 |
|  |  |  | Normal | 1.45 (1.13, 1.86) | 0.003 |  | Normal | 1.34 (0.89, 2.00) | 0.158 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Melanoma | 2,428 | 382 | Slow | 2.31 (1.74, 3.07) | <0.001 | 69 | Slow | 1.71 (0.88, 3.33) | 0.117 |
|  |  |  | Normal | 1.46 (1.12, 1.90) | 0.005 |  | Normal | 1.56 (0.87, 2.81) | 0.134 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Ovarian | 127 | 41 | Slow | 2.24 (0.68, 7.32) | 0.183 | 35 | Slow | 1.60 (0.46, 5.61) | 0.462 |
|  |  |  | Normal | 1.07 (0.36, 3.18) | 0.910 |  | Normal | 0.86 (0.27, 2.68) | 0.790 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Urinary | 2,483 | 653 | Slow | 2.23 (1.77, 2.79) | <0.001 | 131 | Slow | 1.76 (1.09, 2.84) | 0.021 |
|  |  |  | Normal | 1.36 (1.09, 1.69) | 0.006 |  | Normal | 1.36 (0.87, 2.13) | 0.179 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Rectum | 795 | 187 | Slow | 2.10 (1.40, 3.16) | <0.001 | 31 | Slow | 4.03 (1.13, 14.35) | 0.032 |
|  |  |  | Normal | 1.06 (0.71, 1.58) | 0.779 |  | Normal | 2.15 (0.63, 7.38) | 0.223 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Endocrine | 275 | 42 | Slow | 2.07 (0.83, 5.16) | 0.120 | 7\* | Slow | - | - |
|  |  |  | Normal | 1.23 (0.52, 2.91) | 0.640 |  | Normal | - | - |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Prostate | 11,801 | 1,942 | Slow | 2.00 (1.78, 2.25) | <0.001 | 301 | Slow | 1.67 (1.26, 2.23) | <0.001 |
|  |  |  | Normal | 1.25 (1.12, 1.39) | <0.001 |  | Normal | 1.14 (0.89, 1.47) | 0.297 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Oral | 451 | 132 | Slow | 1.98 (1.18, 3.35) | 0.010 | 23 | Slow | 0.71 (0.24, 2.10) | 0.538 |
|  |  |  | Normal | 1.64 (1.00, 2.71) | 0.052 |  | Normal | 1.22 (0.44, 3.39) | 0.705 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Colon | 2,026 | 425 | Slow | 1.93 (1.45, 2.57) | <0.001 | 102 | Slow | 1.23 (0.74, 2.04) | 0.429 |
|  |  |  | Normal | 1.18 (0.89, 1.55) | 0.252 |  | Normal | 0.95 (0.60, 1.52) | 0.839 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Respiratory | 1,257 | 551 | Slow | 1.91 (1.45, 2.52) | <0.001 | 303 | Slow | 1.88 (1.29, 2.74) | 0.001 |
|  |  |  | Normal | 1.31 (1.00, 1.71) | 0.048 |  | Normal | 1.49 (1.04, 2.15) | 0.031 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Endometrial | 784 | 101 | Slow | 1.42 (0.70, 2.85) | 0.330 | 20 | Slow | 0.76 (0.21, 2.71) | 0.671 |
|  |  |  | Normal | 0.89 (0.45, 1.79) | 0.750 |  | Normal | 0.58 (0.17, 1.94) | 0.375 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Vulva | 109 | 20 | Slow | 1.03 (0.16, 6.76) | 0.977 | 2\* | Slow | - | - |
|  |  |  | Normal | 2.11 (0.36, 12.37) | 0.409 |  | Normal | - | - |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |
| Stomach | 124 | 56 | Slow | 0.55 (0.24, 1.28) | 0.166 | 21 | Slow | 0.48 (0.11, 2.09) | 0.331 |
|  |  |  | Normal | 0.22 (0.09, 0.52) | 0.001 |  | Normal | 0.15 (0.03, 0.72) | 0.017 |
|  |  |  | Brisk (ref) | 1.00 | - |  | Brisk (ref) | 1.00 | - |

Covariates: age, sex, race, highest level of education, years of follow-up, body mass index, self-reported health status, leisure time physical activity, cancer treatment, frailty index, and time between cancer diagnosis and follow-up questionnaire

Sorted by all-cause mortality strength of association

**ǂ** also adjusted for cancer type

\* not reported if <10 deaths

*Supplementary Table 5. Detailed associations between mobility disability and mortality in cancer survivors*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **All-Cause Mortality** | | | **Cancer Mortality** | | |
| **Cancer** | **Cases, No.** | **Deaths, No.** | **Mobility Disability**  **HR (95% CI)** | **P value** | **Deaths, No.** | **Mobility Disability**  **HR (95% CI)** | **P value** |
| **All Cancers ǂ** | **30,403** | **6,194** | **1.80 (1.73, 1.88)** | **<0.001** | **1,547** | **1.64 (1.50, 1.80)** | **<0.001** |
| Non-Hodgkin’s Lymph | 659 | 177 | 2.08 (1.59, 2.72) | <0.001 | 64 | 1.80 (1.14, 2.83) | 0.012 |
| Rectum | 827 | 199 | 2.03 (1.58, 2.61) | <0.001 | 31 | 1.91 (1.01, 3.62) | 0.047 |
| Ovarian | 135 | 46 | 1.99 (1.04, 3.82) | 0.038 | 37 | 1.94 (0.91, 4.14) | 0.087 |
| Stomach | 128 | 58 | 1.99 (1.21, 3.27) | 0.006 | 21 | 2.21 (0.95, 5.12) | 0.065 |
| Urinary | 2,574 | 701 | 1.82 (1.60, 2.07) | <0.001 | 140 | 1.47 (1.10, 1.97) | 0.009 |
| Endometrial | 844 | 129 | 1.82 (1.27, 2.62) | 0.001 | 22 | 1.26 (0.55, 2.85) | 0.586 |
| Colon | 2,098 | 461 | 1.81 (1.54, 2.13) | <0.001 | 108 | 1.38 (0.98, 1.93) | 0.063 |
| Breast | 5,298 | 768 | 1.78 (1.55, 2.03) | <0.001 | 219 | 1.78 (1.40, 2.28) | <0.001 |
| Melanoma | 2,474 | 400 | 1.77 (1.49, 2.11) | <0.001 | 74 | 1.38 (0.90, 2.10) | 0.140 |
| Endocrine | 284 | 45 | 1.77 (1.00, 3.14) | 0.052 | 8\* | - | - |
| Prostate | 11,997 | 2,028 | 1.73 (1.60, 1.86) | <0.001 | 312 | 1.56 (1.28, 1.91) | <0.001 |
| Soft Tissue | 116 | 27 | 1.67 (0.67, 4.19) | 0.276 | 9\* | - | - |
| Respiratory | 1,317 | 593 | 1.61 (1.40, 1.86) | <0.001 | 320 | 1.37 (1.13, 1.66) | 0.001 |
| Oral | 469 | 141 | 1.34 (1.01, 1.78) | 0.040 | 25 | 0.61 (0.30, 1.21) | 0.155 |
| Vulva | 116 | 21 | 0.63 (0.25, 1.58) | 0.321 | 2\* | - | - |

Covariates: age, sex, race, highest level of education, years of follow-up, body mass index, self-reported health status, leisure time physical activity, cancer treatment, frailty index, and time between cancer diagnosis and follow-up questionnaire

Sorted by all-cause mortality strength of association

**ǂ** also adjusted for cancer type

\* not reported if <10 deaths