Supplementary Table 1: Multivariate Cox regression analysis for all cause mortality by different subgroups

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| **Patients < 60 years of age at diagnosis (N=1264)** |
|  | **N (%)** | **Unadj HR** **(95% CI)** | **Adj HRa****(95% CI)** | **C statistic****(95% CI)** |
| **pN stage**pN1pN2pN3 | 704 (55.7%)358 (28.3%)202 (16.0%) | 11.5 (1.2 to 1.9)2.7 (2.1 to 3.4) | 11.6 (1.3 to 2.1)2.6 (2.0 to 3.5) | 0.71 (0.68 to 0.74) |
| **Lymph Node Ratio**Low ≤0.20Intermediate >0.20 to ≤0.65High >0.65 | 612 (48.5%)462 (36.5%)190 (15.0%) | 11.4 (1.1 to 1.7)2.9 (2.2 to 3.6)  | 11.6 (1.2 to 2.2)2.9 (2.2 to 3.9) | 0.70 (0.66 to 0.72) |
| **Patients with ER positive tumors at diagnosis (N=844)** |
|  | **N (%)** | **Unadj HR** **(95% CI)** | **Adj HRb****(95% CI)** | **C statistic****(95% CI)** |
| **pN stage**pN1pN2pN3 | 485 (57.5%)222 (26.3%)137 (16.2%) |  11.5 (1.1 to 2.1)2.9 (2.1 to 3.8) | 11.6 (1.2 to 2.3)2.9 (2.1 to 4.1) | 0.74 (0.71 to 0.79) |
| **Lymph Node Ratio**Low ≤0.20 Intermediate >0.20 to ≤0.65High >0.65 | 423 (50.1%)307 (36.4%)114 (13.5%) | 11.6 (1.2 to 2.0)2.6 (1.9 to 3.6) | 11.8 (1.3 to 3.4)2.9 (2.0 to 4.2) | 0.75 (0.70 to 0.77) |
| **Patients with low grade tumors at diagnosis (N=89)** |
|  | **N (%)** | **Unadj HR** **(95% CI)** | **Adj HRc****(95% CI)** | **C statistic****(95% CI)** |
| **pN stage**pN1pN2pN3 | 61 (68.5%)21 (23.6%)7 (7.9%) | 13.1 (1.1 to 8.1)17.4 (4.3 to 69.0) | 12.9 (0.9 to 9.5)30.3 (5.4 to 171.7) | 0.68 (0.64 to 0.78) |
| **Lymph Node Ratio**Low ≤0.20 Intermediate >0.20 to ≤0.65High >0.65 | 53 (59.6%)28 (31.4%)8 (9.0%) | 12.0 (1.0 to 5.0)2.8 (0.7 to 10.7) | 12.9 (1.0 to 8.9)5.2 (1.0 to 25.4) | 0.67 (0.64 to 0.79) |
| **Patients with moderate grade tumors at diagnosis (N=699)** |
|  | **N (%)** | **Unadj HR** **(95% CI)** | **Adj HRc****(95% CI)** | **C statistic****(95% CI)** |
| **pN stage**pN1pN2pN3 | 402 (57.5%)192 (27.5%)105 (15.0%) | 11.8 (1.3 to 2.4)2.8 (2.0 to 3.9) | 12.0 (1.4 to 2.7)3.0 (2.1 to 4.3) | 0.70 (0.66 to 0.74) |
| **Lymph Node Ratio**Low ≤0.20 Intermediate >0.20 to ≤0.65High >0.65 | 347 (49.6%)253 (46.2%)99 (14.2%) | 11.7 (1.3 to 2.3)3.3 (2.4 to 4.7) | 11.9 (1.4 to 2.6)3.4 (2.3 to 5.0) | 0.71 (0.67 to 0.74) |
| a Model adjusted for age at diagnosis, chemotherapy, radiotherapy, surgery type, grade and tumor size and stratified by ER statusb Model adjusted for age at diagnosis, chemotherapy, , surgery type and tumor sizec Model adjusted for age at diagnosis, chemotherapy, radiotherapy, surgery type and tumor size and stratified by ER statusAll models were internally validated using bootstrap resampling. |