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|  | **Training set** |  | **Testing set** |  | **Validation set** |
|  | **112 Patients** |  | **112 Patients** |  | **48 Patients** |
| **Factor** | No/mean±SD | % |  | No/mean±SD | % |  | No/mean±SD | % |
| Age (years) | 42.1±11.6 |  |  | 39.3±11.7 |  |  | 41.2±9.8 |  |
| <45 | 63 | 56.3 |  | 77 | 68.8 |  | 27 | 56.3 |
| ≥45 to ≤55 >55 | 3514 | 31.312.5 |  | 2510 | 22.38.9 |  | 192 | 39.64.2 |
| Sex |  |  |  |  |  |  |  |  |
| Female | 76 | 67.9 |  | 79 | 70.5 |  | 35 | 72.9 |
| Male | 36 | 32.1 |  | 33 | 29.5 |  | 13 | 27.1 |
| BMI (kg/m2) | 23.3±3.4 |  |  | 23.4±3.0 |  |  | 23.7±3.6 |  |
|  <24 | 65 | 58.0 |  | 66 | 58.9 |  | 26 | 54.2 |
|  ≥24 | 47 | 42.0 |  | 46 | 41.1 |  | 22 | 45.8 |
| Largest tumor size | 28.7±10.0 |  |  | 28.1±8.6 |  |  | 28.0±9.9 |  |
| >4 cm | 16 | 14.3 |  | 13 | 11.6 |  | 11 | 22.9 |
| ≥2 cm to ≤4 cm<2 cm | 7818 | 69.616.1 |  | 8019 | 71.417.0 |  | 298 | 60.416.7 |
| Overall tumor size | 32.7±11.5 |  |  | 30.6±11.2 |  |  | 30.1±13.7 |  |
| >4 cm | 29 | 25.9 |  | 20 | 17.9 |  | 15 | 31.3 |
| ≥2 cm to ≤4 cm | 70 | 62.5 |  | 77 | 68.8 |  | 26 | 57.8 |
| <2 cm | 13 | 11.6 |  | 15 | 13.4 |  | 7 | 14.6 |
| Intra-thyroid PTC  |  |  |  |  |  |  |  |
|  Single | 94 | 83.9 |  | 96 | 85.7 |  | 39 | 81.2 |
| Multiple | 18 | 16.1 |  | 16 | 14.3 |  | 9 | 18.8 |
| BRAF V600E mutation |  |  |  |  |  |  |  |  |
| Positive | 40 | 35.7 |  | 40 | 35.7 |  | 12 | 25.0 |
| NegativeNot tested | 4824 | 42.921.4 |  | 4230 | 37.526.8 |  | 1917 | 39.635.4 |
| T classification |  |  |  |  |  |  |  |
| T1 | 2 | 1.8 |  | 3 | 2.7 |  | 1 | 2.0 |
| T2 | 10 | 8.9 |  | 10 | 8.9 |  | 4 | 8.3 |
| T3 | 24 | 21.4 |  | 22 | 19.6 |  | 11 | 2.3 |
| T4aT4b | 4333 | 38.429.5 |  | 4829 | 42.925.9 |  | 2111 | 43.822.9 |
| N classification |  |  |  |  |  |  |  |  |
| N0 | 7 | 6.3 |  | 3 | 2.7 |  | 2 | 4.2 |
| N1a | 21 | 18.8 |  | 18 | 16.1 |  | 6 | 12.5 |
| N1b | 84 | 75.0 |  | 91 | 81.3 |  | 40 | 83.3 |
| Distant metastasis |  |  |  |  |  |  |  |
| No | 86 | 76.8 |  | 87 | 77.7 |  | 36 | 75.0 |
| Yes | 26 | 23.2 |  | 25 | 22.3 |  | 12 | 25.0 |
| LMR | 5.7±2.1 |  |  | 5.9±2.0 |  |  | 5.4±2.8 |  |
| **Supplemental Table 1. Baseline demographics and clinicopathological characteristics of PTC patients.**Different age ratios may exist among these three set. Abbreviations: BMI, body mass index; T, tumor invasion depth; N, lymph node involvement, TNM, tumor node metastasis; LMR, lymphocyte-to-monocyte ratio. |

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|  |  | **PTC-free Survival** |
|  |  | **Training set** |  | **Testing set** |  | **Validation set** |
| Factors |  | HR (95% CI) | *P* | HR (95% CI) | *P* | HR (95% CI) |  *P* |
| Age (years) |  |  | 0.986 |  |  | 0.661 |  |  | 0.187 |
| ≤55 |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| >55 |  | 1.008 (0.419 to 2.423) |  |  | 1.232 (0.485 to 3.131) |  |  | 2.702 (0.617 to 11.840) |  |
| Gender |  |  | 0.705 |  |  | 0.200 |  |  | 0.475 |
| Female |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| Male |  | 1.147 (0.564 to 2.331) |  |  | 0.667 (0.359 to 1.239) |  |  | 0.715 (0.285 to 1.794) |  |
| BMI (kg/m2) |  | 0.791 |  |  | 0.304 |  |  | 0.962 |
| <24 | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| ≥24 | 1.093 (0.566 to 2.110) |  |  | 1.369 (0.752 to 2.494) |  |  | 1.022 (0.422 to 2.472) |  |
| Largest tumor size |  | 0.016\* |  |  | 0.017\* |  |  | 0.045\* |
|  <4 cm | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
|  ≥4 cm | 2.461 (1.184 to 5.114) |  |  | 1.430 (1.083 to 2.389) |  |  | 1.811(1.094 to 4.722) |  |
| Total tumor size  |  | 0.021\* |  |  | 0.863 |  |  | 0.557 |
|  <4 cm | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
|  ≥4 cm | 2.199 (1.123 to 4.306) |  |  | 1.070 (0.496 to 2.309) |  |  | 1.317 (0.525 to 3.306) |  |
| Intra-thyroid PTC |  |  | 0.160 |  |  | 0.138 |  |  | 0.694 |
| Single |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
|  Multiple |  | 1.609 (0.829 to 3.123) |  |  | 1.622 (0.857 to 3.073) |  |  | 1.226 (0.445 to 3.374) |  |
| T classification |  |  | 0.013\* |  |  | 0.259 |  |  | 0.948 |
| T1-T3 |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| T4 |  | 3.314 (1.288 to 8.529) |  |  | 1.484 (0.748 to 2.944) |  |  | 0.970 (0.386 to 2.436) |  |
| N classification   |  |  | 0.069 |  |  | 0.622 |  |  | 0.814 |
| N0/N1a |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| N1b |  | 2.401 (0.933 to 6.177) |  |  | 1.226 (0.545 to 2.755) |  |  | 1.158 (0.339 to 3.956) |  |
| Distant metastasis  |  |  | 0.031\* |  |  | <0.001\* |  |  | 0.023\* |
| No |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| Yes |  | 2.377(1.664 to 8.856) |  |  | 3.470 (1.853 to 6.496) |  |  | 2.850 (1.158 to 7.011) |  |
| LNM number |  |  | 0.086 |  |  | 0.228 |  |  | 0.278 |
|  <15 |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
|  ≥15 |  | 1.781 (0.922 to 3.442) |  |  | 1.463 (0.788 to 2.718) |  |  | 1.699 (0.652 to 4.430) |  |
| Largest LNM diameter |  |  | 0.008\* |  |  | 0.048\* |  |  | 0.011\* |
| <3 cm |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| ≥3 cm |  | 2.432 (1.259 to 4.699) |  |  | 1.689(1.180 to 3.238) |  |  | 2.909(1.641 to 4.036) |  |
| Preoperative LMR |  |  | 0.048\* |  |  | 0.018\* |  |  | 0.042\* |
| Low |  | 1 (reference) |  |  | 1 (reference) |  |  | 1 (reference) |  |
| High |  | 0.466 (0.219 to 0.993) |  |  | 0.436 (0.219 to 0.867) |  |  | 0.420 (0.174 to 0.915) |  |
|  |  |  |  |  |  |  |  |  |  |

**Supplemental Table 2.** Univariate Cox regression analyses of PTC-free survival in three sets of high-risk PTC patients. The largest tumor size, distant metastasis, largest LNM diameter,

and preoperative LMR were risk factors for PTC-free survival in the 3 sets, and the total tumor size and T classification were identified as risk factors in only the training set.

**Abbreviations:** HR, hazard ratio; 95% CI, 95% confidence interval; T, tumor invasion depth; N, lymph node involvement; LNM, lymph node metastasis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SetsVariables | **Training Set**HR 95% CI P value | **Testing Set**HR 95% CI P value | **Validation** **Set** HR 95% CI P value | **Combined Set**HR 95% CI P value |
| Largest tumor size (<4/≥4 cm)Total tumor size (<4/≥4 cm)T stage (T1-3/T4)Distant metastasis (No/Yes)Largest LNM diameter(<3/>3 cm)Preoperative LMR (High/low) | 1.1310.9862.5991.1481.9933.714 | 1.041-2.8520.295-3.2951.091-6.9551.146-4.2111.006-3.9471.724-12.441 | 0.049\*0.9810.047\*0.016\*0.048\*0.018\* | 2.4321.3751.2863.2131.5003.504 | 1.481-12.3011.108-6.6430.629-2.6291.690-6.1091.167-2.9541.236-11.077 | 0.038\*0.042\*0.491<0.001\*0.024\*0.037\* | 7.4116.9930.6253.7221.7262.449 | 1.001-73.9790.577-83.3330.220-1.7701.311-10.5681.154-7.1801.050-3.848 | 0.050\*0.1260.3760.014\*0.034\*0.049\* | 2.8810.6621.4591.9752.2343.754 | 1.794-4.4070.298-1.4750.903-2.3581.287-3.0311.065-4.6861.089-13.322 | 0.045\*0.3130.1230.002\*0.033\*0.021\* |

**Supplemental Table 3. Multivariate Cox regression analyses of PTC-free survival in the training, testing, validation, and combined sets.** The largest tumor size, distant metastasis, largest LNM diameter, and preoperative LMR were identified as independent prognostic factors associated with overall survival in the 3 sets and in the pooled analysis, respectively.