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| Table-1. Patient and tumor characteristics. |  |  |  |
| Characteristic | All (N=1401) | Normal Preoperative CEA (N=1188) | Normalized Postoperative CEA (N=139) | Elevated Postoperative CEA (N=74) |
|
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|
| Gende, no. (%) of patients |  |  |  |  |
|
|  Male | 859 (61.3) | 748 (63.0) | 74 (53.2) | 37 (50.0) |
|  Female | 542 (38.7) | 440 (37.0) | 65 (46.8) | 37 (50.0) |
| Age, years |  |  |  |  |
|  Median (IQR) | 58 (52.0-64.0) | 58 (52.3-64.0) | 57 (51.0-64.0) | 58 (51.8-63.0) |
|  Mean (SD) | 57.9 (8.6) | 58.0 (8.5) | 55.6 (9.4) | 57.4 (7.8） |
| Smoking |  |  |  |  |
|  Yes | 793 (56.6) | 694 (58.4) | 69 (49.6) | 30 (40.5) |
|  No | 608 (43.4) | 494 (41.6) | 70 (50.4) | 44 (59.5) |
| Family History |  |  |  |  |
|  Yes | 230 (16.4) | 205 (17.3) | 13 (9.4) | 12 (16.2) |
|  No | 1171 (83.6) | 983 (82.7) | 126 (90.6) | 62 (83.8) |
| Pathology，no. (%) of patients |  |  |  |  |
|  ADC | 864 (61.7) | 696 (58.6) | 102 (73.4) | 66 (89.2) |
|  SCC | 480 (34.3) | 454 (38.2) | 23 (16.5) | 3 (4.1) |
|  Others | 57 (4.1) | 38 (3.2) | 14 (10.1) | 5 (6.8) |
| T Stage，no. (%) of patients |  |  |  |  |
|  T1 | 648 (46.3) | 595 (50.1) | 38 (27.3) | 15 (20.3) |
|  T2 | 561 (40.0) | 438 (36.9) | 79 (56.8) | 44 (59.5) |
|  T3 | 96 (6.9) | 80 (6.7) | 13 (9.4) | 3 (4.1) |
|  T4 | 96 (6.9) | 75 (6.3) | 9 (6.5) | 12 (16.2) |
| N Stage，no. (%) of patients |  |  |  |  |
|  N0 | 922 (65.8) | 837 (70.5) | 64 (46) | 21 (28.4) |
|  N1 | 182 (13) | 149 (12.5) | 24 (17.3) | 9 (12.2) |
|  N2 | 294 (21) | 199 (16.8) | 51 (36.7) | 44 (59.5) |
|  N3 | 3 (0.2) | 3 (0.3) | 0 (0) | 0 (0) |
| AJCC 7th ed. stage, no. (%) of patients  |  |  |  |  |
|  |  |  |  |
|  IA1 | 66 (4.7) | 66 (5.6) | 0 (0) | 0 (0) |
|  IA2 | 235 (16.8) | 224 (18.9) | 9 (6.5) | 2 (2.7) |
|  IA3 | 190 (13.6) | 178 (15.0) | 8 (5.8) | 4 (5.4) |
|  IB | 265 (18.9) | 227 (19.1) | 27 (19.4) | 11 (14.9) |
|  IIA | 55 (3.9) | 47 (4.0) | 7 (5) | 1 (1.4) |
|  IIB | 219 (15.6) | 183 (15.3) | 31 (22.3) | 6 (8.1) |
|  IIIA | 310 (22.1) | 221 (18.6) | 49 (35.3) | 40 (54.1) |
|  IIIB | 61 (4.4) | 43 (3.6) | 8 (5.8) | 10 (13.5) |
| Preoperative CEA, ng/mL  |  |  |  |  |
|  Median (IQR) | 2.7 (1.8-4.1) | 2.4 (1.6-3.4) | 8.6 (6.2-15.1) | 26.9 (9.6-77.5) |
|  Mean (SD) | 7.2 (33.3) | 2.5 (1.1) | 15.6 (29.2) | 67.9 (124.0) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Adjuvant chemotherapy, no. (%) of patients |  |  |  |  |
|  Yes | 560 (40.0) | 402 (33.8) | 109 (78.4) | 49 (66.2) |
|  No | 802 (57.2) | 755 (63.6) | 25 (18) | 22 (29.7) |
|  Unknown | 39 (2.8) | 31 (2.6) | 5 (3.6) | 3 (4.1) |

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| Table-2. Patient with postoperative CEA characteristics.  |
| Characteristic | All (N=608) | Normal Preoperative CEA (N=395) | Normalized Postoperative CEA (N=139) | Elevated Postoperative CEA (N=74) |
|  |
|  |
|  |
| Postoperative CEA, ng/mL  |  |  |  |  |  |
|  Median (IQR) | 2.1 (1.3-3.5) | 1.67 (1.2-2.4) | 2.6 (1.7-3.5) | 11.1 (6.4-31.6) |  |
|  Mean (SD) | 10.6 (63.5) | 3.8 (15.7) | 2.6 (1.1) | 62.0 (170.6) |  |
| Days from surgery to CEA testing |  |  |  |  |  |
|  Median (IQR) | 38 (32.0-54.8) | 38 (32.0-54.0) | 37 (32.0-55.0) | 39.5 (33.0-54.3) |  |
|  Mean (SD) | 43.7 (16.1) | 43.5 (16.4) | 43.7 (15.6) | 44.6 (16.0) |  |

|  |  |
| --- | --- |
| Table-3. Univariate and multivariate analyses of overall survival  |  |
| Variable | Univariate | Multivariate |
| 5-year OS (%) | 95%CI | P | Hazard ratio | 95%CI | P |
| Gender |  |  | 0.001  |  |  |  |
|  Male | 61.8  | 58.5-65.0 |  | Ref |  |  |
|  Female | 71.6  | 67.9-75.3 |  | 0.7  | 0.6-0.9 | 0.005  |
|  |  |  |  |  |  |  |
| Age |  |  | 0.285  |  |  |  |
|  <65 | 66.4  | 63.7-69.1 |  |  |  |  |
|  ≥65 | 62.7  | 57.2-68.2 |  |  |  |  |
|  |  |  |  |  |  |  |
| Smoking |  |  | 0.026  |  |  |  |
|  No | 69.6  | 65.9-73.3 |  | Ref |  |  |
|  Yes | 62.5  | 59.2-65.8 |  | 1.1  | 0.9-1.4 | 0.268  |
|  |  |  |  |  |  |  |
| Family History |  |  | 0.667  |  |  |  |
|  No | 65.3  | 62.6-68.0 |  |  |  |  |
|  Yes | 67.0  | 60.9-73.1 |  |  |  |  |
| Pathology |  |  |  |  |  |  |
|  |  | 0.134  |  |  |  |
|  ADC | 67.2  | 64.1-70.3 |  |  |  |  |
|  SCC | 64.0  | 59.7-68.3 |  |  |  |  |
|  Others | 54.4  | 41.5-67.3 |  |  |  |  |
|  |  |  |  |  |  |  |
| TNM stage |  |  | <0.001 |  |  |  |
|  I | 75.9  | 72.8-79.0 |  | Ref |  |  |
|  II | 65.0  | 59.3-70.7 |  | 1.5  | 1.2-1.9 | 0.002  |
|  III | 45.0  | 39.9-50.1 |  | 2.7  | 2.2-3.2 | <0.001 |
|  |  |  |  |  |  |  |
| CEA group |  |  | <0.001 |  |  |  |
|  Normal preoperative CEA (A) | 68.4  | 65.9-70.9 |  | Ref |  |  |
|  Normalized Postoperative CEA (B) | 59.0  | 50.8-67.2 |  | 1.2  | 0.9-1.5 | 0.270  |
|  Elevated Postoperative CEA © | 32.4  | 21.8-43.0 |  | 2.0  | 1.5-2.7 | <0.001 |

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| --- | --- |
| Table-4. Univariate and multivariate analyses of overall survival in ADC |  |
| Variable | Univariate | Multivariate |
| 5-year OS (%) | 95%CI | P | Hazard ratio | 95%CI | P |
| Gender |  |  | 0.002  |  |  |  |
|  Male | 62.0  | 57.3-66.7 |  | Ref |  |  |
|  Female | 72.0  | 67.9-76.1 |  | 0.7  | 0.6-0.9 | 0.001  |
|  |  |  |  |  |  |  |
| Age |  |  | 0.335  |  |  |  |
|  <65 | 68.0  | 64.5-71.5 |  |  |  |  |
|  ≥65 | 64.4  | 57.3-71.5 |  |  |  |  |
|  |  |  |  |  |  |  |
| Smoking |  |  | 0.183  |  |  |  |
|  No | 69.4  | 65.5-73.3 |  |  |  |  |
|  Yes | 64.1  | 59.2-69.0 |  |  |  |  |
|  |  |  |  |  |  |  |
| Family History |  |  | 0.341  |  |  |  |
|  No | 66.8  | 63.5-70.1 |  |  |  |  |
|  Yes | 70.8  | 62.2-79.4 |  |  |  |  |
|  |  |  |  |  |  |  |
| TNM stage |  |  | <0.001 |  |  |  |
|  I | 78.1  | 74.6-81.6 |  | Ref |  |  |
|  II | 62.0  | 53.4-70.6 |  | 1.8  | 1.3-2.5 | 0.001  |
|  III | 45.4  | 38.9-51.9 |  | 3.1  | 2.4-4.0 | <0.001 |
|  |  |  |  |  |  |  |
| CEA group |  |  | <0.001 |  |  |  |
|  Normal preoperative CEA (A) | 71.6  | 68.3-74.9 |  | Ref |  |  |
|  Normalized Postoperative CEA (B) | 60.8  | 51.4-70.2 |  | 1.1  | 0.8-1.5 | 0.676  |
|  Elevated Postoperative CEA (C)) | 31.8  | 20.6-43.0 |  | 1.9  | 1.4-2.7 | <0.001 |