# Supplementary Tables

## Supplementary Table 1: Correlation of baseline patient and tumor characteristics with EVI1 expression among BC subtypes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subgroup/Parameter** | **Category** | **EVI1-Low (≤112.16)**  **N (%)** | **High (≥112.17)**  **N (%)** | **Overall (N=882)**  **N** | **p-value** |
| **HR+/HER2- (N=448)** |  |  |  |  |  |
| **Age, years** |  |  |  | **448** |  |
|  | ≤50 | 109 (47.0%) | 123 (53.0%) | 232 | 0.850 |
|  | >50 | 104 (48.1%) | 112 (51.9%) | 216 |  |
| **Tumor size** |  |  |  | **447** |  |
|  | cT1-2 | 140 (43.2%) | 184 (56.8%) | 324 | 0.004 |
|  | cT3-4a-d | 72 (58.5%) | 51 (41.5%) | 123 |  |
|  | missing | 1 | 0 | 1 |  |
| **Nodal status** |  |  |  | **439** |  |
|  | cN-negative | 99 (48.5%) | 105 (51.5%) | 204 | 0.924 |
|  | cN-positive | 112 (47.7%) | 123 (52.3%) | 235 |  |
|  | missing | 2 | 7 | 9 |  |
| **Tumor grade** |  |  |  | **436** |  |
|  | G1-2 | 162 (50.6%) | 158 (49.4%) | 320 | 0.066 |
|  | G3 | 47 (40.5%) | 69 (59.5%) | 116 |  |
|  | missing | 4 | 8 | 12 |  |
| **Histological type** |  |  |  | **448** |  |
|  | Ductal invasive | 194 (48.1% | 209 (51.9% | 403 | 0.530 |
|  | Non-ductal | 19 (42.2%) | 26 (57.8%) | 45 |  |
| **HR+/HER2+ (N=132)** |  |  |  |  |  |
| **Age, years** |  |  |  | **132** |  |
|  | ≤50 | 43 (55.8%) | 34 (44.2%) | 77 | 1.000 |
|  | >50 | 30 (54.5%) | 25 (45.5%) | 55 |  |
| **Tumor size** |  |  |  | **130** |  |
|  | cT1-2 | 45 (51.7% | 42 (48.3%) | 87 | 0.358 |
|  | cT3-4a-d | 26 (60.5%) | 17 (39.5%) | 43 |  |
|  | missing | 2 | 0 | 2 |  |
| **Nodal status** |  |  |  | **129** |  |
|  | cN-negative | 31 (52.5%) | 28 (47.5%) | 59 | 0.723 |
|  | cN-positive | 40 (57.1%) | 30 (42.9%) | 70 |  |
|  | missing | 2 | 1 | 3 |  |
| **Tumor grade** |  |  |  | 127 |  |
|  | G1-2 | 49 (59.0%) | 34 (41.0%) | 83 | 0.353 |
|  | G3 | 22 (50.0%) | 22 (50.0%) | 44 |  |
|  | missing | 2 | 3 | 5 |  |
| **Histological type** |  |  |  | 132 |  |
|  | Ductal invasive | 68 (54.4%) | 57 (45.6%) | 125 | 0.460 |
|  | Non-ductal | 5 (71.4%) | 2 (28.6%) | 7 |  |
| **HR-/HER2+ (N=86)** |  |  |  |  |  |
| **Age, years** |  |  |  | **86** |  |
|  | ≤50 | 24 (54.5%) | 20 (45.5%) | 44 | 0.291 |
|  | >50 | 18 (42.9%) | 24 (57.1%) | 42 |  |
| **Tumor size** |  |  |  | **86** |  |
|  | cT1-2 | 24 (46.2%) | 28 (53.8%) | 52 | 0.660 |
|  | cT3-4a-d | 18 (52.9%) | 16 (47.1%) | 34 |  |
| **Nodal status** |  |  |  | **86** |  |
|  | cN-negative | 15 (53.6%) | 13 (46.4%) | 28 | 0.647 |
|  | cN-positive | 27 (46.6%) | 31 (53.4%) | 58 |  |
| **Tumor grade** |  |  |  | **78** |  |
|  | G1-2 | 18 (50.0%) | 18 (50.0%) | 36 | 1.000 |
|  | G3 | 21 (50.0%) | 21 (50.0%) | 42 |  |
|  | missing | 3 | 5 | 8 |  |
| **Histological type** |  |  |  | 86 |  |
|  | Ductal invasive | 39 (50.6%) | 38 (49.4%) | 77 | 0.485 |
|  | Non-ductal | 3 (33.3%) | 6 (66.7%) | 9 |  |
| **TNBC (N=216)** |  |  |  |  |  |
| **Age, years** |  |  |  | **216** |  |
|  | ≤50 | 55 (44.4%) | 69 (55.6%) | 124 | 0.338 |
|  | >50 | 47 (51.1%) | 45 (48.9%) | 92 |  |
| **Tumor size** |  |  |  | **216** |  |
|  | cT1-2 | 65 (63.7%) | 83 (72.8%) | 148 | 0.187 |
|  | cT3-4a-d | 37 (36.3%) | 31 (27.2%) | 68 |  |
| **Nodal status** |  |  |  | **213** |  |
|  | cN-negative | 47 (45.6%) | 56 (54.4%) | 103 | 0.784 |
|  | cN-positive | 53 (48.2%) | 57 (51.8%) | 110 |  |
|  | missing | 2 | 1 | 3 |  |
| **Tumor grade** |  |  |  | **202** |  |
|  | G1-2 | 33 (42.9%) | 44 (57.1%) | 77 | 0.310 |
|  | G3 | 64 (51.2%) | 61 (48.8%) | 125 |  |
|  | missing | 5 | 9 | 14 |  |
| **Histological type** |  |  |  | **216** |  |
|  | Ductal invasive | 84 (45.2%) | 102 (54.8%) | 186 | 0.168 |
|  | Non-ductal | 18 (60.0%) | 12 (40.0%) | 30 |  |

Abbreviations: HR, hormone receptor; HER2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer

## Supplementary Table 2: Multivariate analysis of EVI1 prognostic value in the entire cohort

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Category** | **pCR** | | **DFS** | | **OS** | |
| **Odds ratio (95%CI)** | **p-value** | **Hazard ratio (95%CI)** | **p-value** | **Hazard ratio (95%CI)** | **p-value** |
| **EVI1 continuous expression** | - | 1.13  (0.77-1.65) | 0.542 | 0.92  (0.72-1.17) | 0.488 | 0.85  (0.63-1.13) | 0.250 |
| age | >50 vs ≤ 50 | 0.53  (0.36-0.78) | 0.001 | 1.14  (0.90-1.45) | 0.287 | 1.14  (0.85-1.55) | 0.382 |
| cT | cT3-4 vs cT1-2 | 0.70  (0.46-1.08) | 0.110 | 1.84  (1.44-2.36) | <0.001 | 1.86  (1.36-2.53) | <0.001 |
| cN | cN+ vs cN- | 1.27  (0.87-1.86) | 0.212 | 1.84  (1.42-2.38) | <0.001 | 2.04  (1.46-2.85) | <0.001 |
| Tumor grade | G3 vs G1-2 | 2.52  (1.74-3.64) | <0.001 | 1.10  (0.85-1.40) | 0.502 | 1.23  (0.90-1.68) | 0.194 |
| Histological type | Non-ductal vs ductal invasive | 0.88  (0.46-1.70) | 0.707 | 1.52  (1.05-2.22) | 0.028 | 1.41  (0.87-2.27) | 0.160 |
| pCR | Yes vs no | - | - | 0.42  (0.27-0.66) | <0.001 | 0.27  (0.14-0.53) | <0.001 |
| **EVI1 dichotomized expression** | High vs low | 1.10  (0.76-1.60) | 0.606 | 0.96  (0.76-1.23) | 0.767 | 0.92  (0.68-1.25) | 0.606 |
| age | >50 vs ≤ 50 | 0.53  (0.36-0.78) | 0.001 | 1.14  (0.89-1.45) | 0.301 | 1.14  (0.84-1.54) | 0.406 |
| cT | cT3-4 vs cT1-2 | 0.70  (0.45-1.08) | 0.107 | 1.85  (1.44-2.37) | 0.000 | 1.88  (1.38-2.55) | <0.001 |
| cN | cN+ vs cN- | 1.27  (0.87-1.86) | 0.212 | 1.84  (1.42- 2.38) | 0.000 | 2.04  (1.46-2.84) | <0.001 |
| Grading | G3 vs G1-2 | 2.52  (1.74-3.65) | <0.001 | 1.09  (0.85-1.40) | 0.516 | 1.23  (0.90-1.68) | 0.194 |
| Histological type | Non-ductal vs ductal invasive | 0.89  (0.46-1.71) | 0.720 | 1.52  (1.04-2.21) | 0.029 | 1.40  (0.87-2.25) | 0.172 |
| pCR | Yes vs no | - | - | 0.42  (0.27-0.66) | <0.001 | 0.27  (0.14-0.53) | <0.001 |

Note, for regression analyses EVI1 continuous expression was transformed at units log10 increase;

CI, confidence interval; pCR, pathological complete response, DFS, disease-free survival, OS, overall survival

## Supplementary Table 3: pCR (ypT0 ypN0) rates overall and among breast cancer subtypes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **EVI1-low**  **N (%)** | **EVI1-high**  **N (%)** | **Overall**  **N** | **p-value** |
| **Entire cohort** | **N=497** | **N=496** | **N=993** | 0.202 |
| No pCR | 422 (84.9%) | 406 (81.9%) | 828 |  |
| Yes pCR | 75 (15.1%) | 90 (18.1%) | 165 |  |
|  |  |  |  |  |
| **BC subtypes** |  |  | **N=882** |  |
| **HR+/HER2-** | **N=213** | **N=235** | **N=448** | 1.000 |
| No pCR | 196 (92.0%) | 216 (91.9%) | 412 |  |
| Yes pCR | 17 (8.0%) | 19 (8.1%) | 36 |  |
| **HR+/HER2+** | **N=73** | **N=59** | **N=132** | 1.000 |
| No pCR | 64 (87.7%) | 52 (88.1%) | 116 |  |
| Yes pCR | 9 (12.3%) | 7 (11.9%) | 16 |  |
| **HR-/HER2+** | **N=42** | **N=44** | **N=86** | 0.639 |
| No pCR | 31 (73.8%) | 30 (68.2%) | 61 |  |
| Yes pCR | 11 (26.2%) | 14 (31.8%) | 25 |  |
| **TNBC** | **N=102** | **N=114** | **N=216** | 0.114 |
| No pCR | 74 (72.5%) | 71 (62.3%) | 145 |  |
| Yes pCR | 28 (27.5%) | 43 (37.7%) | 71 |  |
| **Unknown** | N=67 | N=44 | **N=111** |  |
| No pCR | 57 (85.1%) | 37 (84.1%) | 94 |  |
| Yes pCR | 10 (14.9%) | 7 (15.9%) | 17 |  |

Note, pCR rates in the entire cohort and among breast cancer subtypes were estimated by 2-sided chi-square test.

## Supplementary Table 4: Multivariate analysis of EVI1 prognostic value across BC subtypes

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **BC subtype/parameter** | **Category** | **pCR** | | **DFS** | | **OS** | |
| **Odds ratio (95% CI)** | **p-value** | **Hazard ratio**  **(95% CI)** | **p-value** | **Hazard ratio**  **(95% CI)** | **p-value** |
| ***EVI1 continuous*** |  |  |  |  |  |  |  |
| **HR+/HER2-** |  |  |  |  |  |  |  |
| EVI1 | continuous | 0.98  (0.46-2.11) | 0.959 | 1.14  (0.74-1.76) | 0.562 | 0.96  (0.56-1.67) | 0.896 |
| age | >50 vs ≤50 | 0.41  (0.19-0.91) | 0.028 | 1.57  (1.06-2.34) | 0.025 | 2.45 (1.43-4.20) | 0.001 |
| cT | cT3-4 vs cT1-2 | 1.38  (0.60-3.16) | 0.445 | 1.73  (1.14-2.64) | 0.010 | 1.90  (1.12-3.23) | 0.018 |
| cN | cN+ vs cN- | 0.77  (0.36-1.64) | 0.492 | 2.05  (1.34-3.12) | 0.001 | 2.31  (1.31-4.08) | 0.004 |
| Grading | G3 vs G1-2 | 3.40  (1.61-7.19) | 0.001 | 0.87  (0.55-1.40) | 0.569 | 1.19  (0.63-2.00) | 0.705 |
| Histological type | Non-ductal vs ductal-invasive | 0.64  (0.14-2.88) | 0.564 | 1.22  (0.67-2.24) | 0.519 | 0.82  (0.33-2.06) | 0.669 |
| pCR | Yes vs no | - | - | 0.39  (0.12-1.26) | 0.115 | 0.47  (0.11-1.95) | 0.298 |
| **HR+/HER2+** |  |  |  |  |  |  |  |
| EVI1 | - | 0.91  (0.31-2.70) | 0.862 | 0.91  (0.52-1.61) | 0.754 | 0.84  (0.40-1.73) | 0.627 |
| age | >50 vs ≤50 | 1.25  (0.35-4.50) | 0.734 | 1.27  (0.67-2.45) | 0.461 | 0.76  (0.31-1.86) | 0.552 |
| cT | cT3-4 vs cT1-2 | 0.85  (0.23-3.11) | 0.802 | 1.84  (0.98-3.48) | 0.059 | 1.60  (0.69-3.71) | 0.278 |
| cN | cN+ vs cN- | 1.03  (0.29-3.68) | 0.961 | 1.15  (0.61-2.16) | 0.674 | 1.80  (0.76-4.18) | 0.172 |
| Grading | G3 vs G1-2 | 0.33  (0.07-1.61) | 0.170 | 0.81  (0.41-1.61) | 0.551 | 0.83  (0.34-2.02) | 0.683 |
| Histological type | Non-ductal vs ductal-invasive | 2.65  (0.25-28.51) | 0.422 | 2.66  (0.60-11.68) | 0.196 | 3.58  (0.79-16.36) | 0.099 |
| pCR | Yes vs no | - | - | 0.85  (0.26-2.80) | 0.788 | 0.60  (0.08-4.65) | 0.629 |
| **HR-/HER2+** |  |  |  |  |  |  |  |
| EVI1 | - | 1.00  (0.995-1.01) | 0.293 | 0.69  (0.33-1.45) | 0.328 | 0.63  (0.28-1.41) | 0.260 |
| age | >50 vs ≤50 | 0.54  (0.17-1.71) | 0.030 | 0.94 (0.43-2.08) | 0.883 | 0.85  (0.32-2.27) | 0.741 |
| cT | cT3-4 vs cT1-2 | 0.21  (0.05-0.86) | 0.836 | 0.72  (0.30-1.68) | 0.443 | 1.04  (0.36-3.04) | 0.944 |
| cN | cN+ vs cN- | 1.14  (0.33-3.90) | 0.729 | 3.01  (1.01-9.01) | 0.049 | 2.01  (0.57-7.15) | 0.281 |
| Grading | G3 vs G1-2 | 1.22  (0.39-3.84) | 0.999 | 0.75  (0.34-1.66) | 0.485 | 0.87  (0.33-2.30) | 0.773 |
| Histological type | Non-ductal vs ductal-invasive | <0.01  <0.01-n.a.) | 0.293 | 2.76  (0.67-11.28) | 0.158 | 3.48  (0.77-15.81) | 0.106 |
| pCR | Yes vs no | - | - | 0.35  (0.12-1.07) | 0.065 | 0.32  (0.07-1.50) | 0.149 |
| **TNBC** |  |  |  |  |  |  |  |
| EVI1 | - | 1.00  (0.999-1.01) | 0.128 | 0.82  (0.51-1.31) | 0.399 | 0.85  (0.50-1.46) | 0.556 |
| age | >50 vs ≤50 | 0.41  (0.21-0.80) | 0.009 | 0.81  (0.49-1.33) | 0.406 | 0.67  (0.37-1.19) | 0.169 |
| cT | cT3-4 vs cT1-2 | 0.45  (0.21-0.96) | 0.040 | 2.00  (1.21-3.29) | 0.007 | 1.93  (1.08-3.45) | 0.027 |
| cN | cN+ vs cN- | 2.05  (1.05-3.98) | 0.034 | 1.90  (1.13-3.18) | 0.015 | 1.96  (1.07-3.58) | 0.030 |
| Grading | G3 vs G1-2 | 2.08  (1.04-4.16) | 0.039 | 0.74  (0.45-1.20) | 0.224 | 0.66  (0.37-1.17) | 0.156 |
| Histological type | Non-ductal vs ductal-invasive | 1.36  (0.52-3.58) | 0.530 | 2.11  (1.09-4.06) | 0.026 | 1.68  (0.74-3.85) | 0.219 |
| pCR | Yes vs no | - | - | 0.24  (0.12-0.49) | <0.001 | 0.11  (0.03-0.35) | <0.001 |
| ***EVI1 dichotomized*** |  | **pCR** |  | **DFS** |  | **OS** |  |
| **HR+/HER2-** |  |  |  |  |  |  |  |
| EVI1 | High vs low | 0.76  (0.36-1.61) | 0.476 | 1.14  (0.76-1.70) | 0.529 | 1.16  (0.69-1.95) | 0.586 |
| age | >50 vs ≤50 | 0.41  (0.19-0.91) | 0.028 | 1.58  (1.06-2.35) | 0.024 | 2.46  (1.44-4.23) | 0.001 |
| cT | cT3-4 vs cT1-2 | 1.33  (0.58-3.04) | 0.502 | 1.74  (1.14-2.65) | 0.010 | 1.96  (1.15-3.33) | 0.014 |
| cN | cN+ vs cN- | 0.77  (0.36-1.65) | 0.498 | 2.05  (1.35-3.13) | 0.001 | 2.28  (1.29-4.00) | 0.004 |
| Grading | G3 vs G1-2 | 3.47  (1.64-7.33) | 0.001 | 0.87  (0.55-1.40) | 0.574 | 1.09  (0.61-1.94) | 0.766 |
| Histological type | Non-ductal vs ductal-invasive | 0.64  (0.14-2.87) | 0.561 | 1.20  (0.65-2.21) | 0.556 | 0.79  (0.31-2.00) | 0.623 |
| pCR | Yes vs no | - | - | 0.39  (0.12-1.26) | 0.117 | 0.48  (0.12-2.00) | 0.314 |
| **HR+/HER2+** |  |  |  |  |  |  |  |
| EVI1 | High vs low | 0.99  (0.29-3.42) | 0.987 | 1.17  (0.62-2.20) | 0.622 | 0.95  (0.40-2.28) | 0.914 |
| age | >50 vs ≤50 | 1.25  (0.35-4.49) | 0.736 | 1.30  (0.68-2.50) | 0.429 | 0.77  (0.31-1.87) | 0.559 |
| cT | cT3-4 vs cT1-2 | 0.84  (0.23-3.11) | 0.794 | 1.83  (0.98-3.44) | 0.059 | 1.55  (0.68-3.57) | 0.301 |
| cN | cN+ vs cN- | 1.04  (0.29-3.71) | 0.948 | 1.14  (0.61-2.15) | 0.678 | 1.79  (0.77-4.17) | 0.176 |
| Grading | G3 vs G1-2 | 0.33  (0.07-1.60) | 0.168 | 0.79  (0.39-1.58) | 0.500 | 0.82  (0.34-2.02) | 0.668 |
| Histological type | Non-ductal vs ductal-invasive | 2.64  (0.24-28.63) | 0.424 | 2.87  (0.64-12.85) | 0.169 | 3.64  (0.76-17.40) | 0.106 |
| pCR | Yes vs no | - | - | 0.88  (0.27-2.90) | 0.835 | 0.63  (0.08-4.82) | 0.655 |
| **HR-/HER2+** |  |  |  |  |  |  |  |
| EVI1 | High vs low | 1.38  (0.46-4.14) | 0.570 | 0.74  (0.34-1.62) | 0.444 | 0.52  (0.19-1.38) | 0.189 |
| age | >50 vs ≤50 | 0.55  (0.17-1.74) | 0.311 | 0.90  (0.41-1.95) | 0.785 | 0.78  (0.30-2.03) | 0.616 |
| cT | cT3-4 vs cT1-2 | 0.21  (0.05-0.83) | 0.027 | 0.77  (0.34-1.75) | 0.528 | 1.09  (0.39-3.08) | 0.871 |
| cN | cN+ vs cN- | 1.15  (0.34-3.93) | 0.828 | 3.03  (1.01-9.07) | 0.048 | 2.31  (0.64-8.39) | 0.204 |
| Grading | G3 vs G1-2 | 1.26  (0.41-3.93) | 0.688 | 0.78  (0.35-1.71) | 0.529 | 0.87  (0.33-2.33) | 0.786 |
| Histological type | Non-ductal vs ductal-invasive | <0.01 (<0.01-n.a.) | 0.999 | 2.64  (0.65-10.70) | 0.175 | 3.62  (0.78-16.73) | 0.100 |
| pCR | Yes vs no | - | - | 0.34  (0.11-1.05) | 0.061 | 0.30  (0.06-1.43) | 0.131 |
| **TNBC** |  |  |  |  |  |  |  |
| EVI1 | High vs low | 1.55  (0.81-2.96) | 0.188 | 1.04  (0.63-1.73) | 0.874 | 0.99  (0.55-1.78) | 0.980 |
| age | >50 vs ≤50 | 0.41  (0.21-0.80) | 0.009 | 0.80  (0.49-1.31) | 0.369 | 0.66  (0.37-1.17) | 0.153 |
| cT | cT3-4 vs cT1-2 | 0.44  (0.21-0.95) | 0.037 | 2.05  (1.24-3.39) | 0.005 | 1.97  (1.10-3.54) | 0.022 |
| cN | cN+ vs cN- | 2.02  (1.04-3.91) | 0.038 | 1.93  (1.15-3.23) | 0.012 | 1.99  (1.09-3.64) | 0.025 |
| Grading | G3 vs G1-2 | 2.15  (1.07-4.32) | 0.032 | 0.74 (0.45-1.21) | 0.233 | 0.67  (0.38-1.19) | 0.173 |
| Histological type | Non-ductal vs ductal-invasive | 1.43  (0.54-3.77) | 0.471 | 2.14  (1.10-4.19) | 0.026 | 1.68  (0.72-3.89) | 0.228 |
| pCR | Yes vs no | - | - | 0.23  (0.11-0.48) | <0.001 | 0.10  (0.03-0.34) | <0.001 |

Note, for regression analyses EVI1 continuous expression was transformed at units log10 increase;

CI, confidence interval; pCR, pathological complete response, DFS, disease-free survival, OS, overall survival; HR, hormone receptor; HER2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer

## Supplementary Table 5: Univariate analysis of EVI1 prognostic value in patients with residual disease overall and among BC subtypes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **BC subtype** | **Category** | **DFS** | | **OS** | |
| **Hazard ratio (95% CI)** | **log-rank p-value** | **Hazard ratio (95% CI)** | **log-rank p-value** |
| **overall** | EVI1 high vs low | 0.94  (0.73-1.22) | 0.660 | 0.91  (0.67-1.26) | 0.585 |
| **HR+/HER2-** | EVI1 high vs low | 1.07  (0.73-1.58) | 0.731 | 1.03  (0.63-1.70) | 0.895 |
| **HR+/HER2+** | EVI1 high vs low | 1.07  (0.57-2.00) | 0.833 | 0.92  (0.41-2.07) | 0.833 |
| **HR-/HER2+** | EVI1 high vs low | 0.74  (0.34-1.64) | 0.456 | 0.55  (0.21-1.49) | 0.234 |
| **TNBC** | EVI1 high vs low | 0.85  (0.51-1.42) | 0.537 | 0.93  (0.53-1.63) | 0.796 |

CI, confidence interval; DFS, disease-free survival, OS, overall survival; HR, hormone receptor; HER2, human epidermal growth factor receptor 2; TNBC, triple-negative breast cancer