**Supplemental Figure 1.** Patient inclusion and exclusion criteria. TNBC: triple negative breast cancer; ALC: absolute lymphocyte count; nSES: neighborhood socioeconomic status.

All TNBC patients in Oncoshare

N=1498

Only stages I-III

N=1480

Patients not classified as ‘other’ race

N=1463

With available ALC data

N=759

With non-missing nSES

N=747

**Supplemental Figure 2a and 2b.** Association between minimum lymphocyte count (as percentage of total white blood cell count and absolute value) and stromal tumor infiltrating lymphocytes (sTILs), N=77. **Figure 2a.** sTILs were correlated with minimum % lymphocyte (p=0.02). **Figure 2b.** sTILs did not have a significant correlation with minimum absolute (abs) lymphocytes (p=0.36)



**Supplemental Figure 3.** Comparison between Absolute Lymphocyte Count (ALC) and percent peripheral lymphocytes



**Supplemental Figure 4.** Distribution of Absolute Lymphocyte Count (ALC) measures at baseline, defined as ALC value measured within the first three months of breast cancer diagnosis.



**Supplemental Figure 5.** Distribution of minimum Absolute Lymphocyte Count (ALC) values at any time point



**Supplemental Figure 6.** Distribution of overall minimum Absolute Lymphocyte Count (ALC) over time



**Supplemental Table 1.** Multivariable analysis of predictors of lymphopenia (absolute lymphocyte count [ALC] <1K/μL; n=747); statistically significant variables are in **bold font**.

|  | **Odds ratio** **(95% confidence interval)** |
| --- | --- |
| **Neoadjuvant/adjuvant chemotherapy use (versus [vs.] none)** | **2.66 (1.72, 4.15)** |
| Radiotherapy use (vs. none) | 0.98 (0.71, 1.37) |
| **Neighborhood socioeoconomic status (vs. 1=lowest)** | **1.18 (1.03, 1.36)** |
| Non-Hispanic (NH) Black (vs. NH White) | 0.95 (0.44, 2.10) |
| NH Asian (vs. NH White) | 1.10 (0.69, 1.79) |
| Hispanic (vs. NH White) | 1.13 (0.62, 2.10) |
| Positive for deleterious mutation in *BRCA1/2***†** (vs. negative/VUS**††**) | 1.20 (0.60, 2.45) |
| Age at diagnosis (per year) | 1.00 (0.99, 1.01) |
| **Ever neutropenic (ANC < 1 K/μL) ††† (vs. never neutropenic)** | **6.05 (3.46,11.35)** |
| Stage II (vs. Stage I) | 0.85 (0.59, 1.22) |
| **Stage III (vs. Stage I)** | **1.73 (1.02, 3.01)** |
| Grade 2 (vs. Grade 1) | 1.37 (0.52, 3.73) |
| Grade 3 (vs. Grade 1) | 1.74 (0.69, 4.56) |
| Unknown grade (vs. Grade 1) | 1.34 (0.42, 4.39) |

**†** *BRCA1/2* contains an additional ‘Untested’ category.

**††** VUS: Variant of uncertain significance.

††**†**ANC: absolute neutrophil count.

**Supplemental Table 2.** Multivariable analysis of the association between minimum absolute lymphocyte count (ALC) and breast cancer-specific mortality using complete case analysis (n=747) **†**

|  |  |
| --- | --- |
|  | **Hazard ratio****(95% confidence interval)** |
| Minimum ALC | 0.02 (0.00, 0.22) |
| Neoadjuvant/Adjuvant Chemotherapy use (versus [vs.] none) | 0.83 (0.70, 0.99) |
| Radiotherapy use (vs. none) | 1.61 (0.70, 3.71) |
| Neighborhood socioeconomic status (vs. 1=lowest) | 0.79 (0.43, 1.45) |
| Non-Hispanic (NH) Black (vs. NH White) | 1.39 (0.73, 2.65) |
| NH Asian (vs. NH White) | 0.99 (0.97, 1.01) |
| Hispanic (vs. NH White) | 1.02 (0.63, 1.64) |
| Positive for a deleterious *BRCA1/2* mutation**††** (vs. negative/VUS**†††**) | 1.38 (0.26, 7.32) |
| Untested for a deleterious *BRCA1/2* mutation**††** (vs. negative/VUS**†††**) | 0.59 (0.20, 1.76) |
| Minimum ALC x carriage of *BRCA1/2* mutation | 0.58 (0.30, 1.09) |
| Minimum ALC x untested *BRCA1/2* mutation | 0.67 (0.44, 1.03) |
| Age at diagnosis (per year) | 2.67 (1.40, 5.09) |
| Ever neutropenic (vs. never neutropenic) | 7.64 (3.86, 15.14) |
| Stage II (vs. Stage I) | 2.21 (0.28, 17.17) |
| Stage III (vs. Stage I) | 2.99 (0.40, 22.17) |
| Grade 2 (vs. Grade 1) | 1.00 (0.10, 9.88) |
| Grade 3 (vs. Grade 1) | 0.26 (0.00, 18.67) |
| Unknown grade (vs. Grade 1) | 10.85 (1.18,100.02) |

**†** Controlled for an interaction between minimum ALC and carriage of a deleterious *BRCA1/2* mutation.

**††** *BRCA1/2* contains an additional ‘Untested’ category.

**†††** VUS: Variant of uncertain significance

**Supplemental Table 3.** Multivariable analysis of the association between minimum absolute lymphocyte count (ALC) and breast cancer-specific mortality using multiple imputation methods

|  | **Imputed ALC** **(n=759)** | **Imputed ALC and *BRCA1/2* (n=1463)** |
| --- | --- | --- |
| **Hazard ratio**  **(95% confidence interval)** | **Hazard ratio**  **(95% confidence interval)** |
| Minimum ALC | 0.17 (0.08, 0.36) | 0.17 (0.08, 0.36) |
| Neoadjuvant/Adjuvant Chemotherapy use (versus [vs.] none) | 0.52 (0.27, 0.97) | 0.53 (0.35, 0.82) |
| Radiotherapy use (vs. none) | 0.68 (0.45, 1.04) | 0.86 (0.65, 1.15) |
| Neighborhood socioeconomic status(vs. 1=lowest) | 0.82 (0.69, 0.98) | 0.88 (0.78, 1.00) |
| Non-hispanic (NH) Black (vs. NH White) | 1.46 (0.62, 3.43) | 2.02 (1.17, 3.47) |
| NH Asian (vs. NH White) | 0.85 (0.46, 1.57) | 0.94 (0.60, 1.48) |
| Hispanic (vs. NH White) | 1.49 (0.77, 2.90) | 2.36 (1.53, 3.64) |
| Positive for a deleterious *BRCA1/2* mutation**†** (vs. negative/VUS**††**) | 0.86 (0.26, 2.86) | 0.90 (0.41, 2.01) |
| Minimum ALC by carriage of *BRCA1/2* mutation**†††** | 1.19 (0.22, 6.34) | 0.67 (0.18, 2.50) |
| Age at diagnosis (in years) | 1.00 (0.98, 1.02) | 1.00 (0.98, 1.01) |
| Ever neutropenic (vs. never neutropenic) | 0.99 (0.61, 1.61) | 1.05 (0.71, 1.56) |
| Stage II (vs. Stage I) | 2.75 (1.44, 5.26) | 2.34 (1.49, 3.65) |
| Stage III (vs. Stage I) | 8.24 (4.12,16.45) | 6.40 (3.97,10.30) |
| Grade 2 (vs. Grade 1) | 2.22 (0.28,17.30) | 3.71 (0.50,27.62) |
| Grade 3 (vs. Grade 1) | 2.95 (0.39,21.98) | 5.10 (0.70,37.12) |
| Unknown grade (vs. Grade 1) | 1.02 (0.10,10.10) | 5.02 (0.64,39.12) |

**†** *BRCA1/2* contains an additional ‘Untested’ category.

**††** VUS: Variant of uncertain significance.

**†††** Controlled for an interaction between minimum ALC and carriage of a deleterious *BRCA1/2* mutation.

| **Supplemental Table 4.** Multivariable analysis of the association between minimum ALC and OM with RT temporal consideration (n=747) |
| --- |
|  | **Hazard ratio** **(95% confidence interval)** |
| Minimum (min) ALC | 0.24 (0.13, 0.42) |
| Carriage of a positive *BRCA1/2* mutation | 0.83 (0.38, 1.82) |
| *BRCA1/2* untested | 1.36 (0.85, 2.17) |
| Neoadjuvant/adjuvant chemotherapy use | 0.63 (0.40, 1.00) |
| Neighborhood socioeconomic status | 0.88 (0.77, 1.00) |
| Non-hispanic (NH) Black | 1.68 (0.89, 3.15) |
| NH Asian | 0.99 (0.63, 1.56) |
| Hispanic | 1.19 (0.69, 2.05) |
| Age | 1.01 (1.00, 1.03) |
| Ever neutropenic | 0.99 (0.68, 1.46) |
| Stage II | 1.48 (0.98, 2.24) |
| Stage III | 4.17 (2.62, 6.65) |
| Grade 2 | 2.93 (0.68,12.58) |
| Grade 3 | 4.28 (1.04,17.68) |
| Unknown Grade | 2.58 (0.54,12.35) |
| Min ALC < radiotherapy (RT) | 0.12 (0.05, 0.30) |
| Min ALC > RT | 1.45 (0.82, 2.57) |
| Min ALC x (Min ALC < RT) | 4.58 (1.90,11.01) |
| Min ALC x (Min ALC > RT) | 0.49 (0.20, 1.15) |

| **Supplemental Table 5**. Multivariable analysis of the association between minimum ALC and BCM with RT temporal consideration (n=747) |
| --- |
|  | **Hazard ratio** **(95% confidence interval)** |
| Minimum (min) ALC | 0.21 (0.10, 0.45) |
| Carriage of a positive *BRCA1/2* mutation  | 0.95 (0.35, 2.58) |
| *BRCA1/2* untested | 1.83 (0.97, 3.45) |
| Neoadjuvant/adjuvant chemotherapy use | 0.61 (0.32, 1.14) |
| Neighborhood socio-economic status | 0.87 (0.73, 1.03) |
| Non-hispanic (NH) Black | 1.48 (0.65, 3.40) |
| NH Asian | 0.79 (0.43, 1.46) |
| Hispanic | 1.29 (0.68, 2.46) |
| Age | 1.00 (0.98, 1.01) |
| Ever neutropenic | 0.99 (0.61, 1.59) |
| Stage II | 2.58 (1.35, 4.92) |
| Stage III | 7.37 (3.70,14.68) |
| Grade 2 | 2.56 (0.33,19.96) |
| Grade 3 | 3.48 (0.47,25.93) |
| Unknown grade | 1.22 (0.12,12.05) |
| Min ALC < radiotherapy (RT) | 0.18 (0.06, 0.56) |
| Min ALC > RT | 1.25 (0.59, 2.66) |
| Min ALC x (min ALC < RT) | 3.17 (0.85,11.87) |
| Min ALC x (min ALC > RT) | 0.52 (0.16, 1.71) |

| **Supplemental Table 6**. Multivariable analysis of the association between minimum ALC and OM with neutropenia temporal consideration (n=747) |
| --- |
|  | **Hazard ratio** **(95% confidence interval)** |
| Minimum (min) ALC | 0.24 (0.16, 0.36) |
| Carriage of a positive *BRCA1/2* mutation | 0.89 (0.41, 1.95) |
| *BRCA1/2* untested | 1.45 (0.91, 2.30) |
| Neoadjuvant/adjuvant chemotherapy use | 0.53 (0.34, 0.83) |
| Radiotherapy (RT) use | 0.74 (0.54, 1.02) |
| Neighborhood socio-economic status | 0.85 (0.74, 0.97) |
| Non-hispanic (NH) Black | 1.69 (0.89, 3.18) |
| NH Asian | 0.98 (0.62, 1.54) |
| Hispanic | 1.28 (0.74, 2.22) |
| Age | 1.01 (1.00, 1.03) |
| Stage II | 1.46 (0.97, 2.22) |
| Stage III | 4.34 (2.74, 6.88) |
| Grade 2 | 2.56 (0.60,10.95) |
| Grade 3 | 3.85 (0.94,15.83) |
| Unknown grade | 2.18 (0.46,10.34) |
| Min ALC < neutropenia | 2.43 (0.61, 9.79) |
| Min ALC x (min ALC < neutropenia) | 0.25 (0.01, 4.48) |

| **Supplemental Table 7**. Multivariable analysis of the association between minimum ALC and BCM with neutropenia temporal consideration (n=747) |
| --- |
|  | **Hazard ratio** **(95% confidence interval)** |
| Minimum (min) ALC | 0.20 (0.12, 0.36) |
| Carriage of a positive BRCA1/2 mutation | 0.99 (0.37, 2.69) |
| BRCA1/2 untested | 1.88 (1.00, 3.54) |
| Neoadjuvant/adjuvant chemotherapy use | 0.53 (0.29, 0.99) |
| Radiotherapy use | 0.69 (0.46, 1.05) |
| Neighborhood socio-economic status | 0.84 (0.71, 1.00) |
| Nonhispanic (NH) Black | 1.52 (0.66, 3.49) |
| NH Asian | 0.79 (0.43, 1.45) |
| Hispanic | 1.33 (0.69, 2.56) |
| Age | 0.99 (0.98, 1.01) |
| Stage II | 2.59 (1.36, 4.93) |
| Stage III | 7.76 (3.92,15.37) |
| Grade 2 | 2.21 (0.28,17.19) |
| Grade 3 | 3.10 (0.42,22.97) |
| Unknown grade | 1.10 (0.11,10.79) |
| Min ALC < neutropenia | 3.29 (0.72,15.13) |
| min ALC x (min ALC < neutropenia) | 0.12 (0.00, 3.42) |

**Supplemental Table 8.** Multivariable analysis of the association between minimum percent lymphocyte count and overall mortality using complete case analysis (n=532).

|  |  |
| --- | --- |
|  | **Hazard ratio****(95% confidence interval)** |
| Minimum percent lymphocyte count | 0.92 (0.89, 0.94) |
| Neoadjuvant/Adjuvant Chemotherapy use (versus [vs.] none) | 0.49 (0.29, 0.82) |
| Radiotherapy use (vs. none) | 0.84 (0.59, 1.19) |
| Neighborhood socioeconomic status(vs. 1=lowest) | 0.86 (0.74, 0.99) |
| Non-Hispanic (NH) Black (vs. NH White) | 1.32 (0.64, 2.71) |
| NH Asian (vs. NH White) | 0.93 (0.56, 1.54) |
| Hispanic (vs. NH White) | 1.12 (0.64, 1.96) |
| Positive for a deleterious *BRCA1/2* mutation**†** (vs. negative/VUS**††**) | 0.99 (0.45, 2.16) |
| Minimum ALC by carriage of *BRCA1/2* mutation**†††** | 1.74 (1.07, 2.82) |
| Age at diagnosis (in years) | 1.00 (0.99, 1.02) |
| Ever neutropenic (vs. never neutropenic) | 1.26 (0.84, 1.88) |
| Stage II (vs. Stage I) | 1.62 (1.00, 2.61) |
| Stage III (vs. Stage I) | 4.33 (2.56, 7.32) |
| Grade 2 (vs. Grade 1) | 2.17 (0.49, 9.64) |
| Grade 3 (vs. Grade 1) | 3.29 (0.79, 13.70) |
| Unknown grade (vs. Grade 1) | 1.89 (0.37, 9.57) |

**†***BRCA1/2* contains an additional ‘Untested’ category.

**††** VUS: Variant of uncertain significance.

**†††** Controlled for an interaction between minimum percent lymphocyte count and carriage of a deleterious *BRCA1/2* mutation.

**Supplemental Table 9.** Multivariable analysis of the association between minimum percent lymphocyte count and breast-cancer specific mortality using complete case analysis (n=532)

|  |  |
| --- | --- |
|  | **Hazard ratio****(95% confidence interval)** |
| Minimum percent lymphocyte count | 0.91 (0.88, 0.95) |
| Neoadjuvant/Adjuvant Chemotherapy use (versus [vs.] none) | 0.52 (0.26, 1.05) |
| Radiotherapy use (vs. none) | 0.73 (0.47, 1.14) |
| Neighborhood socioeconomic status(vs. 1=lowest) | 0.84 (0.70, 1.00) |
| Non-hispanic (NH) Black (vs. NH White) | 1.02 (0.39, 2.69) |
| NH Asian (vs. NH White) | 0.74 (0.38, 1.45) |
| Hispanic (vs. NH White) | 1.17 (0.61, 2.24) |
| Positive for a deleterious *BRCA1/2* mutation**†** (vs. negative/VUS**††**) | 1.24 (0.45, 3.40) |
| Minimum ALC by carriage of *BRCA1/2* mutation**†††** | 2.41 (1.23, 4.70) |
| Age at diagnosis (in years) | 0.99 (0.97, 1.01) |
| Ever neutropenic (vs. never neutropenic) | 1.27 (0.77, 2.09) |
| Stage II (vs. Stage I) | 2.88 (1.38, 6.03) |
| Stage III (vs. Stage I) | 7.98 (3.65,17.43) |
| Grade 2 (vs. Grade 1) | 2.13 (0.26,17.22) |
| Grade 3 (vs. Grade 1) | 2.79 (0.37,21.07) |
| Unknown grade (vs. Grade 1) | 0.87 (0.08,10.06) |

**†***BRCA1/2* contains an additional ‘Untested’ category.

**††** VUS: Variant of uncertain significance.

**†††** Controlled for an interaction between minimum percent lymphocyte count and carriage of a deleterious *BRCA1/2* mutation.