# Supplementary materials

**Table 1. Spearman correlation between relative eosinophil count and cancer characteristics.**

|  | Spearman correlation coefficient | P value |
|---|---|---|
| **Age** | 0.145 | < 0.0001 |
| **ER%** | 0.053 | 0.116 |
| **PgR%** | 0.050 | 0.135 |
| **Ki67** | -0.050 | 0.134 |
| **Size mm** | -0.036 | 0.273 |

ER: Estrogen Receptor; PgR: Progesteron Receptor.

**Table 2. Treatment details in the groups of patients REC-low and REC-high.**

| | REC < 1,5% (N 393) | | REC ≥ 1,5% (N 537) | |
|---|---|---|---|---|
| | N of patients | % | N of patients | % |
| *Neoadjuvant treatment* | | | | |
| Yes | 146 | 37.2% | 161 | 30% |
| No | 247 | 62.8% | 376 | 70% |
| *Type of neoadjuvant chemotherapy (N 307)* | | | | |
| EC --> Ptx/Txt | 89 | 61% | 81 | 50.3% |
| EC --> CBDCA-Ptx | 6 | 4.1% | 5 | 3.1% |
| FEC | 2 | 1.4% | 5 | 3.1% |
| FEC --> Ptx/Txt | 37 | 25.3% | 56 | 34.8% |
| THC | 1 | 0.7% | - | - |
| Hormonotherapy | 1 | 0.7% | 3 | 1.9% |
| Other | 9 | 6.2% | 11 | 6.8% |
| Unknown | 1 | 0.7% | - | - |
| *Adjuvant chemotherapy* | | | | |
| Yes | 117 | 29.8% | 154 | 28.7% |
| No | 274 | 69.7% | 382 | 71.1% |
| Unknown | 2 | 0.5% | 1 | 0.2% |
| *Type of adjuvant chemotherapy (N 271)* | | | | |
| EC --> Ptx/Txt | 15 | 12.8% | 22 | 14.3% |
| EC --> CBDCA-Ptx | 1 | 0.9% | - | - |
| FEC | 46 | 39.3% | 51 | 33.1% |
| FEC --> Ptx/Txt | 38 | 32.5% | 61 | 39.6% |
| THC/TC | - | - | 2 | 1.3% |
| Capecitabine | 7 | 6% | 1 | 0.6% |
| Endoxan | 2 | 1.7% | - | - |
| Other | 6 | 5.1% | 14 | 9.1% |
| Unknown | 2 | 1.7% | 3 | 1.9% |
| *Trastuzumab* | | | | |
| Yes | 70 | 1.8% | 86 | 16% |
| No | 322 | 81.9% | 451 | 84% |
| Unknown | 1 | 0.3% | - | - |
| *Radiotherapy* | | | | |
| Yes | 309 | 78.6% | 427 | 79.5% |
| No | 82 | 20.9% | 107 | 19.9% |
| Unknown | 2 | 0.5% | 3 | 0.6% |
| *Hormonotherapy* | | | | |
| Yes | 265 | 67.4% | 411 | 76.5% |
| No | 125 | 31.8% | 122 | 22.7% |
| Unknown | 3 | 0.8% | 4 | 0.7% |
| *Type of hormonotherapy (N 676)* | | | | |
| SERM | 106 | 40% | 155 | 37.7% |
| AI | 127 | 47.9% | 215 | 52.3% |
| SERM + AI | 30 | 11.3% | 35 | 8.5% |
| Unknown | 2 | 0.8% | 6 | 1.5% |

REC: Relative Eosinophil Count; N: Number; EC: Epirubicin-Cyclophosphamide; Ptx: Paclitaxel; Txt: Docetaxel; CBDCA: Carboplatin; FEC: 5-Fluorouracil- Epirubicin-Cyclophosphamide; THC: Docetaxel-Carboplatin-Herceptin; TC: Docetaxel-Carboplatin; SERM: Selective Estrogen Receptor Modulators; AI: Aromatase Inhibitor.

**Table 3. TTF and BCSS according to REC, RLC and ELP at baseline.**

| | | REC | | RLC | | ELP | |
|---|---|---|---|---|---|---|---|
| | | **< 1.5%** | **≥ 1.5%** | **< 17.5%** | **≥ 17.5%** | **< 36.5** | **≥ 36.5** |
| **TTF** | **5y-TTF** | 74% | 84% | 51% | 75% | 74% | 84% |
| | **10y-TTF** | 67% | 76% | 51% | 71% | 67% | 86% |
| | **P value (Log-Rank test)** | 0.001 | | < 0.0001 | | 0.003 | |
| | **HR (95% CI)** | 0.610 (0.458-0.812) | | 0.421 (0.262-0.677) | | 0.646 (0.484-0.861) | |
| **BCSS** | **5y-BCSS** | 86% | 90% | 74% | 89% | 86% | 90% |
| | **10y-BCSS** | 79% | 87% | 62% | 85% | 79% | 87% |
| | **P value (Log-Rank test)** | 0.021 | | < 0.0001 | | 0.003 | |
| | **HR (95% CI)** | 0.632 (0.433-0.923) | | 0.350 (0.200-0.614) | | 0.572 (0.392-0.834) | |

TTF: Time to Treatment Failure; BCSS: Breast Cancer Specific Survival; REC: Relative Eosinophil Count; RLC: Relative Lymphocyte Count; ELP: Eosinophil-Lymphocyte Product; y: years; HR: Hazard Ratio; CI: Confidence Interval.

**Table 4. Association of relapse with REC, RLC and ELP at baseline.**

|  | Relapse N of patients (%) | No relapse N of patients (%) | p value (Chi-Square test) |
|---|---|---|---|
| **REC < 1,5%** | 97 (24.7%) | 296 (75.3%) | 0.005 |
| **REC ≥ 1,5%** | 92 (17.1%) | 445 (82.9%) | |
| **RLC < 17.5%** | 19 (35.8%) | 34 (64.2%) | 0.004 |
| **RLC ≥ 17.5%** | 170 (19.4%) | 707 (80.6%) | |
| **ELP < 36,5** | 85 (24.8%) | 258 (75.2%) | 0.01 |
| **ELP ≥ 36.5** | 104 (17.7%) | 483 (82.3%) | |

N: Number; REC: Relative Eosinophil Count; RLC: Relative Lymphocyte Count; ELP: Eosinophil-Lymphocyte Product.

**Table 5. Multivariate analysis for relapse.**

| Variable | Chi Square test | Mann-Whitney U test/Kruskal Wallis test | Multivariate analysis | OR (95% CI) |
|---|---|---|---|---|
| **Age** | - | 0.664 | | |
| **ER (pos/neg)** | <0.0001* | - | 0.843 | |
| **ER%** | - | <0.0001¶* | | |
| **PgR (pos/neg)** | <0.0001* | - | 0.800 | |
| **PgR%** | - | <0.0001¶* | | |
| **HER2** | 0.176 | - | | |
| **Ki67 (</≥ 20%)** | 0.004* | - | 0.053 | |
| **Ki67%** | - | <0.0001¶* | | |
| **T stage** | <0.0001* | - | 0.434 | |
| **Size mm** | - | <0.0001¶* | | |
| **N stage** | <0.0001¶* | - | 0.004* | 2.392 (1.324-4.321) |
| **Tumor grade** | 0.023¶* | - | 0.857 | |
| **Histology** | 0.056¶ | - | 0.915 | |
| **Lymphovascular invasion** | <0.0001¶* | - | 0.449 | |
| **Chemotherapy** | 0.002¶* | - | 0.689 | |
| **Anti-HER2 treatment** | 0.092¶ | - | 0.232 | |
| **Radiotherapy** | 0.464 | - | | |
| **Hormonotherapy** | <0.0001¶* | - | 0.529 | |
| **BRCA mutation** | 0.082¶ | - | 0.100 | |
| **PLT** | - | 0.234 | | |
| **Relative neutrophils** | - | 0.053 | 0.979 | |
| **Absolute neutrophils** | - | 0.029*¶ | | |
| **Relative lymphocytes§** | - | 0.093 | 0.376 | |
| **Absolute lymphocytes** | - | 0.616 | | |
| **RLC§** | 0.004¶* | - | | |
| **Relative monocytes** | - | 0.236 | | |
| **Absolute monocytes** | - | 0.684 | | |
| **Relative eosinophils§** | - | 0.007* | 0.704 | |
| **Absolute eosinophils** | - | 0.037* | | |
| **REC§** | 0.005¶* | - | | |
| **Relative basophils** | - | 0.158 | | |
| **Absolute basophils** | - | 0.834 | | |

¶ Variables included in the multivariate analysis

*Statistically significant results

§Relative lymphocyte and relative eosinophils are considered as continuous variables, while RLC and REC are considered as dichotomic variables with 17.5% as cut-off for RLC and 1.5% for REC

OR: Odds Ratio; CI: Confidence Interval; ER: Estrogen Receptor; PgR: Progesteron Receptor; N: Number; PLT; Platelet; RLC: Relative Lymphocyte Count; REC: Relative Eosinophil Count.

**Table 6. TTF and BCSS according to REC, RLC and ELP after surgery.**

| | | REC | | RLC | | ELP | |
|---|---|---|---|---|---|---|---|
| | | < 1.5% | ≥ 1.5% | < 17.5% | ≥ 17.5% | < 36.5 | ≥ 36.5 |
| **TTF** | **5y-TTF** | 67% | 79% | 51% | 75% | 66% | 74% |
| | **10y-TTF** | 63% | 75% | 51% | 75% | 66% | 70% |
| | **Log-Rank test** | 0.187 | | 0.209 | | 0.179 | |
| | **HR (95% CI)** | 0.771 (0.526-1.129) | | 0.755 (0.487-1.172) | | 0.776 (0.535-1.125) | |
| **BCSS** | **5y-BCSS** | 78% | 86% | 69% | 86% | 79% | 86% |
| | **10y-BCSS** | 72% | 82% | 51% | 83% | 69% | 82% |
| | **Log-Rank test** | 0.025 | | 0.666 | | 0.018 | |
| | **HR (95% CI)** | 0.583 (0.361-0.940) | | 0.874 (0.472-1.616) | | 0.571 (0.357-0.913) | |

TTF: Time to Treatment Failure; BCSS: Breast Cancer Specific Survival; REC: Relative Eosinophil Count; RLC: Relative Lymphocyte Count; ELP: Eosinophil-Lymphocyte Product; y: years; HR: Hazard Ratio; CI: Confidence Interval.

**Table 7. RLC in the group of 741 patients without relapse.**

| | | RLC baseline | RLC post-surgery | RLC 1y follow-up | RLC 2y follow-up | RLC 5y follow-up | RLC 10y follow-up | Friedman test |
|---|---|---|---|---|---|---|---|---|
| **N pts** | | 741 | 532 | 600 | 554 | 408 | 172 | |
| **Median** | | 29% | 24.8% | 27.2% | 29.8% | 30.5% | 31% | < 0.0001 |
| **SD** | | 7.80 | 7.91 | 7.69 | 8.18 | 8.76 | 8.83 | |
| | | p value | | | | | | |
| **Bonferroni-Dunn test** | **RLC baseline** | - | < 0.0001 | 0.023 | 0.083 | 0.001 | 0.001 | NA |
| | **RLC post-surgery** | < 0.0001 | - | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 | NA |
| | **RLC 1y follow-up** | 0.023 | < 0.0001 | - | < 0.0001 | < 0.0001 | < 0.0001 | NA |
| | **RLC 2y follow-up** | 0.083 | < 0.0001 | < 0.0001 | - | 1 | 0.437 | NA |
| | **RLC 5y follow-up** | 0.001 | < 0.0001 | < 0.0001 | 1 | - | 1 | NA |
| | **RLC10y follow-up** | 0.001 | < 0.0001 | < 0.0001 | 0.437 | 1 | - | NA |

RLC: Relative Lymphocyte Count; y: years; N: Number; SD: Standard Deviation; NA: Not Applicable.

**Table 8. RLC in the group of 189 patients with relapse.**

| | | RLC baseline | RLC post-surgery | RLC 1y follow-up | RLC 2y follow-up | RLC 5y follow-up | RLC 10y follow-up | RLC relapse | Friedman test |
|---|---|---|---|---|---|---|---|---|---|
| **N pts** | | 189 | 142 | 123 | 97 | 45 | 4 | 158 | |
| **Median** | | 27.4% | 24.5% | 26.6% | 28.7% | 32.9% | 26.6% | 23.4% | < 0.0001 |
| **SD** | | 8.74 | 8.76 | 8.30 | 8.87 | 9.84 | 6.11 | 10.45 | |
| | | p value Bonferroni-Dunn test | | | | | | | |
| **Bonferroni-Dunn test** | **RLC baseline** | - | 0.055 | 1 | 1 | 0.264 | 1 | 0.001 | NA |
| | **RLC post-surgery** | 0.055 | - | 1 | 0.001 | < 0.0001 | 1 | 1 | NA |
| | **RLC 1y follow-up** | 1 | 1 | - | 0.551 | 0.063 | 1 | 0.103 | NA |
| | **RLC 2y follow-up** | 1 | 0.001 | 0.551 | - | 1 | 1 | < 0.0001 | NA |
| | **RLC 5y follow-up** | 0.264 | < 0.0001 | 0.063 | 1 | - | 1 | < 0.0001 | NA |
| | **RLC 10y follow-up** | 1 | 1 | 1 | 1 | 1 | - | 1 | NA |
| | **RLC relapse** | 0.001 | 1 | 0.103 | < 0.0001 | < 0.0001 | 1 | - | NA |

RLC: Relative Lymphocyte Count; y: years; N: Number; SD: Standard Deviation; NA: Not Applicable.