Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.
**Table 1.** Characteristics of SEER-Medicare Cohort by Screening Status (N = 3522)

| Variable                  | Screen-detected | Symptomatic | p-value |
|---------------------------|-----------------|-------------|---------|
| N                         | 1,555           | 1,967       |         |
| Characteristics           |                 |             |         |
| Age                       |                 |             |         |
| 66-70                     | 703 (45.2)      | 854 (43.4)  | 0.287   |
| 71-75                     | 852 (54.8)      | 1,113 (56.6)|        |
| Detailed Race             |                 |             |         |
| Black                     | <11             | <11         |         |
| East Asian                | 176 (11.3)      | 162 (8.2)   |         |
| Native Hawaiian           | 26 (1.7)        | 46 (2.3)    |         |
| Other/Unknown             | >15             | >25         |         |
| White                     | 1,328 (85.4)    | 1,721 (87.5)|         |
| Stage at diagnosis        |                 |             | <0.001  |
| I                         | 1,120 (72.0)    | 1,059 (53.8)|         |
| II                        | 421 (27.1)      | 863 (43.9)  |         |
| III                       | 14 (0.9)        | 45 (2.3)    |         |
| N Stage                   |                 |             | <0.001  |
| N0                        | 1,265 (81.3)    | 1,427 (72.5)|         |
| N1                        | 276 (17.7)      | 495 (25.2)  |         |
| N2+                       | 14 (1.0)        | 45 (2.3)    |         |
| SEER Registry             |                 |             | 0.125   |
| Hawaii                    | 281 (18.1)      | 317 (16.1)  |         |
| Iowa                      | 1,274 (81.9)    | 1,650 (83.9)|         |
| T Stage                   |                 |             | <0.001  |
| T1                        | 1,316 (84.6)    | 1,314 (66.8)|         |
| T2                        | 239 (15.4)      | 653 (33.2)  |         |
| Histology                 |                 |             | 0.286   |
| Ductal                    | 1,253 (80.6)    | 1,621 (82.4)|         |
| Ductal/Other              | 23 (1.5)        | 18 (0.9)    |         |
| Lobular                   | 173 (11.1)      | 197 (10.0)  |         |
| Lobular/Ductal            | 106 (6.8)       | 131 (6.7)   |         |
| Grade                     |                 |             | <0.001  |
| Low (1-2)                 | 1,154 (74.2)    | 1,230 (62.5)|         |
| High (3)                  | 299 (19.2)      | 534 (27.1)  |         |
| Missing                   | 102 (6.6)       | 203 (10.3)  |         |
| PR Status                 |                 |             | 0.415   |
| Borderline/Negative       | 252 (16.2)      | 350 (17.8)  |         |
| Missing                   | 13 (0.8)        | 19 (1.0)    |         |
| Positive                  | 1,290 (83.0)    | 1,598 (81.2)|         |
| Tumor size                |                 |             | <0.001  |
| 5-10 mm                   | 653 (42.0)      | 486 (24.7)  |         |
| 10-20 mm                  | 658 (42.3)      | 822 (41.8)  |         |
| 20-30 mm                  | 181 (11.6)      | 457 (23.2)  |         |
| 30+ mm                    | 63 (4.1)        | 202 (10.3)  |         |

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| Comorbidity score | Count (Percentage) | Count (Percentage) | p-value |
|-------------------|--------------------|--------------------|---------|
| 0                 | 1,045 (67.2)       | 1,258 (64.0)       | 0.005   |
| 1                 | 383 (24.6)         | 485 (24.6)         |         |
| 2+                | 127 (8.2)          | 224 (11.4)         |         |
| Hyperlipidemia    | 556 (35.8)         | 504 (25.6)         | <0.001  |
| Hypertension      | 777 (50.0)         | 855 (43.5)         | <0.001  |
| Diabetes          | 248 (15.9)         | 332 (16.9)         | 0.460   |
| Zip code: 4th QRTL % no HS | 321 (20.6) | 567 (28.8) | <0.001 |
| Zip code: 4th QRTL % black race | 405 (26.0) | 465 (23.6) | 0.100   |
| Zip code: 4th QRTL % living below poverty line | 393 (25.3) | 477 (24.2) | 0.415   |
| Married           | 973 (62.6)         | 1,143 (58.1)       | 0.007   |
| Lives in metropolitan area | 801 (51.5) | 910 (46.3) | 0.002   |
| Lives in rural area | 95 (6.1)    | 150 (7.6)         | 0.070   |
| Year of breast cancer dx |                   |                   | <0.001  |
| Before 2000       | 592 (38.1)         | 1,167 (59.3)       |         |
| 2000 or later     | 963 (61.9)         | 800 (40.7)         |         |
### eTable 2. Patient Characteristics Associated With Having a Symptomatic Tumor vs a Screening-Detected Tumor (N = 3522)

| Patient characteristics                                                                 | Unadjusted OR   | Multivariate-adjusted OR |
|----------------------------------------------------------------------------------------|----------------|--------------------------|
| Age at dx (ref = 66-70)                                                                 |                |                          |
| 71-75                                                                                   | 1.08 (0.94, 1.23) | 1.05 (0.91, 1.21)        |
| Stage at diagnosis (ref=II)                                                             |                |                          |
| I                                                                                      | **0.46 (0.40, 0.53)** | **0.47 (0.40, 0.54)** |
| III                                                                                    | 1.57 (0.85, 2.89)   | **1.92 (1.03, 3.58)**    |
| Grade (ref=Low)                                                                        |                |                          |
| High                                                                                   | **1.68 (1.42, 1.97)**  | **1.30 (1.09, 1.54)**    |
| Missing                                                                                | **1.87 (1.45, 2.40)**  | **1.53 (1.15, 2.02)**    |
| Black race (ref= other than Black)                                                      | 1.42 (0.48, 4.26)   | -                        |
| Detailed race (ref= White)                                                             |                |                          |
| Black                                                                                  | 1.23 (0.40, 3.78)   | 1.19 (0.37, 3.86)        |
| East Asian                                                                             | **0.71 (0.57, 0.89)**  | 0.80 (0.62, 1.02)        |
| Native Hawaiian                                                                        | 1.37 (0.84, 2.22)   | 1.50 (0.90, 2.51)        |
| Other                                                                                  | 1.16 (0.65, 2.05)   | 1.23 (0.67, 2.24)        |
| Comorbidity score (ref=0)                                                               |                |                          |
| 1                                                                                      | 1.05 (0.90, 1.23)   | 1.06 (0.90, 1.26)        |
| 2+                                                                                     | **1.47 (1.16, 1.85)**  | **1.59 (1.24, 2.03)**    |
| Zip code at diagnosis                                                                  |                |                          |
| Highest quartile- black race                                                           | 0.88 (0.75, 1.03)   | 1.02 (0.86, 1.22)        |
| Highest quartile- did not finish high school                                           | **1.56 (1.33, 1.82)**  | **1.19 (1.01, 1.42)**    |
| Highest quartile- household income below poverty line                                   | 0.95 (0.81, 1.10)   | 0.91 (0.77, 1.09)        |
| Married                                                                                | **0.83 (0.72, 0.95)**  | 0.89 (0.77, 1.03)        |
| Lives in metropolitan area                                                              | **0.81 (0.71, 0.93)**  | 0.90 (0.76, 1.05)        |
| Lives in rural area                                                                    | 1.27 (0.97, 1.66)   | 1.19 (0.89, 1.59)        |
| Histology (ref=Ductal)                                                                 |                |                          |
| Ductal/other                                                                            | 0.60 (0.33, 1.13)   | 0.87 (0.46, 1.66)        |
| Lobular                                                                                | 0.88 (0.71, 1.09)   | **0.76 (0.60, 0.98)**    |
| Lobular/Ductal                                                                         | 0.96 (0.73, 1.25)   | 1.02 (0.77, 1.35)        |
| PR Status (ref=Positive)                                                                |                |                          |
| Borderline/Negative                                                                    | 1.12 (0.94, 1.34)   | 1.07 (0.89, 1.29)        |
| Missing                                                                                | 1.18 (0.58, 2.40)   | 0.92 (0.44, 1.91)        |
| Year of diagnosis (reference=before 2000)                                              |                |                          |
| 2000 or later                                                                           | **0.42 (0.37, 0.48)**  | **0.44 (0.38, 0.51)**    |
**Table 3.** Baseline Characteristics of All Patients With Tumor Samples Passing QC and Included in Molecular Analysis (n = 130)

| Variable                           | Screen-detected | Symptomatic | p-value |
|------------------------------------|-----------------|-------------|---------|
| **N**                              | 60              | 70          |         |
| **Characteristics**                |                 |             |         |
| Age                                |                 |             | 0.011   |
| 66-70                              | 32 (53.3)       | 22 (31.4)   |         |
| 71-75                              | 28 (46.7)       | 48 (68.6)   |         |
| **Race**                           |                 |             | 0.410   |
| White                              | 49 (81.7)       | 53 (75.7)   |         |
| Black                              | 0               | 0           |         |
| East Asian/Native Hawaiian/Other   | 11 (18.3)       | 17 (24.3)   |         |
| **N Stage N1**                     |                 |             | 0.801   |
| High                               | 50 (83.3)       | 56 (80.0)   |         |
| Low                                | 16 (26.7)       | 18 (25.7)   | 0.299   |
| **SEER Registry**                  |                 |             | 0.418   |
| HI                                 | 15 (25.0)       | 22 (31.4)   |         |
| IA                                 | 45 (75.0)       | 48 (68.6)   |         |
| **T Stage**                        |                 | <0.001      |         |
| I                                  | 49 (81.7)       | 26 (37.1)   |         |
| II                                 | 11 (18.3)       | 44 (62.9)   |         |
| **Histology**                      |                 | 0.699       |         |
| Ductal and Ductal/Other            | 46 (76.7)       | 54 (77.1)   |         |
| Lobular and Lobular/Ductal         | 14 (23.3)       | 16 (22.9)   |         |
| **ER Status**                      |                 |             | 0.198   |
| Positive                           | 60 (100)        | 70 (100)    |         |
| PR Status                          |                 |             |         |
| Borderline/Missing/Negative        | <11             | 14 (20)     |         |
| Positive                           | >48             | 56 (80)     |         |
| **Tumor size**                     |                 | <0.001      |         |
| 5-10 mm                            | 15 (25.0)       | <11         |         |
| 10-20 mm                           | 34 (56.7)       | >17         |         |
| 20+ mm                             | 11 (18.3)       | 44 (62.8)   |         |
| **Patient zip code demographics:** |                 |             |         |
| % not finishing high school, Median (Q1, Q3) | 14.8 (12.6, 19.3) | 13.9 (11.2, 18.8) | 0.437 |
| % black race, Median (Q1, Q3)      | 1.0 (0.2, 2.5)  | 1.0 (0.3, 2.6) | 0.503 |
| % living below poverty line, Median (Q1, Q3) | 10.1 (6.7, 12.6) | 9.2 (6.0, 12.3) | 0.719 |
| **Married**                        |                 |             | 0.512   |
| Lives in metropolitan area         | 33 (55.0)       | 44 (62.8)   | 0.363   |
| Lives in rural area                |                 |             | 0.423   |
| No                                 | 57 (95.0)       | 64 (91.4)   |         |
| **Year of breast cancer dx**       |                 | <0.001      |         |
| Pre-2000                           | 19 (31.7)       | 45 (64.2)   |         |
|                                | 2000 or later | 2000 or later | <0.001 |
|--------------------------------|---------------|---------------|--------|
| Died of breast cancer within 10 years of diagnosis | 17 (28.3)     | 35 (50.0)     |        |
| Died of any cause within 10 years of diagnosis     | 24 (40.0)     | 51 (72.9)     | <0.001 |
### eTable 4. Patient Characteristics Associated With Having a Symptomatic Tumor vs a Screening-Detected Tumor Among Molecular Cohort Patients (n = 130)

| Characteristic                               | Univariable OR (95% CI) | Multivariable OR (95% CI) |
|----------------------------------------------|-------------------------|---------------------------|
| Stage N2+ vs N1                              | 1.76 (0.31, 9.95)       | 1.12 (0.10, 12.3)         |
| Stage T2 vs T1                               | **7.54 (3.34, 17.0)**   | **14.4 (4.86, 42.5)**     |
| High grade                                   | 0.95 (0.43, 2.08)       | 0.39 (0.12, 1.27)         |
| Aged 71-76 vs 66-70                          | 2.49 (1.22, 5.10)       | **3.27 (1.18, 9.10)**     |
| Comorbidity Score (ref=0)                    |                         |                           |
| 1                                            | 1.20 (0.48, 2.98)       | 0.56 (0.15, 2.06)         |
| 2+                                           | 0.75 (0.25, 2.24)       | 0.36 (0.07, 1.98)         |
| Patient zip code                             |                         |                           |
| Highest quartile- black race                 | 1.22 (0.58, 2.55)       | 0.65 (0.22, 1.93)         |
| Highest quartile- < HS education             | 0.88 (0.40, 1.95)       | 0.48 (0.13, 1.77)         |
| Highest quartile- households in poverty      | 0.82 (0.36, 1.85)       | 1.23 (0.36, 4.28)         |
| Married                                      | 0.79 (0.39, 1.59)       | 0.98 (0.37, 2.59)         |
| Lives in metro region                        | 1.38 (0.69, 2.80)       | 1.66 (0.53, 5.20)         |
| Lives in rural area                          | 1.78 (0.43, 7.45)       | 1.57 (0.18, 13.90)        |
| Hawaii Tumor Registry                        | 1.37 (0.64, 2.98)       | 1.40 (0.43, 4.59)         |
| Other race vs White*                         | 1.43 (0.61, 3.35)       | -                         |
| PR Borderline/Negative vs Positive           | 1.89 (0.71, 5.05)       | 2.23 (0.59, 8.47)         |
| Subtype Luminal B vs Luminal A               | 1.50 (0.73, 3.07)       | 1.52 (0.54, 4.25)         |
| Diagnosed in 2000 or later                   | **0.26 (0.12, 0.53)**   | **0.16 (0.06, 0.45)**     |

*collinear with Hawaii Tumor Registry in this set; excluded from multivariable analysis
SEER-Medicare and Molecular cohort creation by application of inclusion and exclusion criteria. In order to apply inclusion/exclusion criteria that require both 1) SEER-Medicare based data (stage, part A&B coverage, etc.) and 2) tissue availability we used the following approach: A) SEER-RTR PIs (Hawaii and Iowa) provided the NCI a list of all SEER IDs for breast cancer patients age 65 or older for which they had tissue. B) NCI linked all Iowa and Hawaii SEER patients with Medicare data for any patients with Medicare enrollment and created an encrypted SEER-Medicare ID for each beneficiary, with a crosswalk file provided to each registry in order to be able to link encrypted SEER-Medicare IDs with specific SEER cases. C) After the encrypted SEER-Medicare data were received by the research team, our team applied inclusion/exclusion criteria and selected a subset of patients that have available tissues, stratified to ensure a roughly equal mix of patients with screening vs. non-screening detected tumors. This list included more than the number of samples we ultimately anticipated processing, as it was presumed that some banked samples might not have adequate tissue amount or quality for analysis when pulled and examined by the SEER-RTR PIs. D) A list of requested samples indexed by encrypted SEER-Medicare ID was sent to the NCI. E) The NCI provided a crosswalk file to link SEER IDs with encrypted SEER-Medicare IDs. F) The SEER-RTR PIs pulled corresponding samples and sent them to the research team labeled with the encrypted SEER-Medicare IDs. This approach allowed pulling samples stratified by the key independent variable of interest (screening vs. clinically detected (i.e. non-screened) cancers and avoided unnecessary and costly pulling of tumor blocks that would not be used in the final analysis.
Figure 2. Proportion of Screen-Detected Tumors by Year of Diagnosis (N = 3522)
eAppendix. Gene Expression Data and Survival Analyses

**Overall Survival** – Genes with \( p \leq 0.05 \) shown for all Tables below.

**Survival Analyses (Overall Survival & Breast Cancer-Specific Survival):** Multivariable expression analysis of genes associated with increased all-cause or breast cancer-specific mortality. Hazard ratios > 1 indicate increased mortality.

**Changes in gene expression** (linear regression):

**Symptomatic vs. Screen-detected disease**

**N2 vs. N1-0 disease**

**T2 vs. T1 tumors**

**T2 vs. T1 limited to Luminal A tumors**

**T2 vs. T1 limited to Luminal B tumors**

**List of all genes on the Nanostring platform:** An alphabetical list of all 752 gene symbols analyzed by the Nanostring BC360 panel is provided to allow users to know the full set of genes that were investigated.

| Obs | Estimate | ProbChiSq | HazardRatio | gene    | Hochberg | FalseDiscoveryRate |
|-----|----------|-----------|-------------|---------|----------|--------------------|
| 1   | 0.3009   | 0.001     | 1.351       | AREG    | 0.7883   | 0.3975             |
| 2   | -0.94338 | 0.0012    | 0.389       | PARP4   | 0.8891   | 0.3975             |
| 3   | 1.26123  | 0.0016    | 3.53        | NCAPH2  | 0.998    | 0.3975             |
| 4   | 0.80401  | 0.0025    | 2.234       | MCM2    | 0.998    | 0.4757             |
| 5   | -0.79438 | 0.0032    | 0.452       | RBL2    | 0.998    | 0.486              |
| 6   | 1.1461   | 0.0039    | 3.146       | PSMB7   | 0.998    | 0.49               |
| 7   | 0.61405  | 0.0056    | 1.848       | UBE2C   | 0.998    | 0.5415             |
| 8   | -0.44321 | 0.0058    | 0.642       | WNT2    | 0.998    | 0.5415             |
| 9   | 0.45573  | 0.0092    | 1.577       | ALDOA   | 0.998    | 0.5984             |

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|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| 10 | -0.52366 | 0.01 | 0.592 | AR | 0.998 | 0.5984 |
| 11 | -0.4145 | 0.0104 | 0.661 | HLA_DOB | 0.998 | 0.5984 |
| 12 | 0.34934 | 0.0125 | 1.418 | PKMYT1 | 0.998 | 0.5984 |
| 13 | -0.39303 | 0.0139 | 0.675 | ALDH1A1 | 0.998 | 0.5984 |
| 14 | -0.68016 | 0.0148 | 0.507 | TLR4 | 0.998 | 0.5984 |
| 15 | 1.03315 | 0.0157 | 2.81 | MCM3 | 0.998 | 0.5984 |
| 16 | 0.53722 | 0.0158 | 1.711 | CDC7 | 0.998 | 0.5984 |
| 17 | 0.47037 | 0.0158 | 1.601 | RRM2 | 0.998 | 0.5984 |
| 18 | 0.54111 | 0.0164 | 1.718 | UBE2T | 0.998 | 0.5984 |
| 19 | 0.48087 | 0.0165 | 1.617 | TYMS | 0.998 | 0.5984 |
| 20 | -0.67349 | 0.0167 | 0.51 | ATM | 0.998 | 0.5984 |
| 21 | 0.50151 | 0.0185 | 1.651 | CXXC5 | 0.998 | 0.5984 |
| 22 | -0.48306 | 0.0189 | 0.617 | TUBA4A | 0.998 | 0.5984 |
| 23 | -0.56197 | 0.0202 | 0.57 | IL6R | 0.998 | 0.5984 |
| 24 | -0.80032 | 0.0206 | 0.449 | TAPBP | 0.998 | 0.5984 |
| 25 | 0.29513 | 0.0215 | 1.343 | ST6GALNA C2 | 0.998 | 0.5984 |
| 26 | -0.46994 | 0.022 | 0.625 | PIK3R5 | 0.998 | 0.5984 |
| 27 | -0.239 | 0.0222 | 0.787 | ZBTB16 | 0.998 | 0.5984 |
| 28 | 0.42061 | 0.0234 | 1.523 | KIFC1 | 0.998 | 0.5984 |
| 29 | -0.45293 | 0.0236 | 0.636 | PIK3CG | 0.998 | 0.5984 |
| 30 | -0.31578 | 0.024 | 0.729 | HLA_DRA | 0.998 | 0.5984 |
| 31 | -0.61392 | 0.0247 | 0.541 | FLI1 | 0.998 | 0.5984 |
| 32 | 0.50417 | 0.0267 | 1.656 | CCNB1 | 0.998 | 0.5984 |
| 33 | 0.4097 | 0.0268 | 1.506 | CDC25A | 0.998 | 0.5984 |
| 34 | -0.28751 | 0.0301 | 0.75 | IL7R | 0.998 | 0.666 |
| 35 | 0.34719 | 0.0319 | 1.415 | EXO1 | 0.998 | 0.6811 |
| 36 | -0.24081 | 0.033 | 0.786 | ASPN | 0.998 | 0.6811 |
| 37 | 0.40164 | 0.0343 | 1.494 | MT1G | 0.998 | 0.6811 |

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|   | 0.28045 | 0.0344 | 1.324 | CCND1 | 0.998 | 0.6811 |
|---|---|---|---|---|---|---|
| 39 | -0.46792 | 0.0383 | 0.626 | CBLC | 0.998 | 0.7058 |
| 40 | 0.33656 | 0.0392 | 1.4 | TTK | 0.998 | 0.7058 |
| 41 | 0.20586 | 0.0392 | 1.229 | DUSP4 | 0.998 | 0.7058 |
| 42 | -0.48679 | 0.0408 | 0.615 | NPEPPS | 0.998 | 0.7058 |
| 43 | -0.40428 | 0.0418 | 0.667 | HLA_DMA | 0.998 | 0.7058 |
| 44 | 0.50497 | 0.0425 | 1.657 | GRB2 | 0.998 | 0.7058 |
| 45 | -0.27047 | 0.0431 | 0.763 | FLT3 | 0.998 | 0.7058 |
| 46 | 0.3777 | 0.0439 | 1.459 | HELLS | 0.998 | 0.7058 |
| 47 | -0.24177 | 0.0462 | 0.785 | CCL3L1 | 0.998 | 0.7058 |
| 48 | 0.17817 | 0.0463 | 1.195 | FGFR4 | 0.998 | 0.7058 |
| 49 | -0.39093 | 0.0463 | 0.676 | BNC2 | 0.998 | 0.7058 |
| 50 | -0.25611 | 0.0469 | 0.774 | CCL4 | 0.998 | 0.7058 |
| 51 | -0.28218 | 0.048 | 0.754 | FGL2 | 0.998 | 0.7083 |
| 52 | -0.3843 | 0.0498 | 0.681 | HIF1A | 0.998 | 0.7203 |
## Breast Cancer (BC) Specific Survival – Genes with p ≤ 0.05 shown

| Obs | Estimate | ProbChiSq | HazardRatio | gene    | Hochberg | FalseDiscoveryRate |
|-----|----------|-----------|-------------|---------|----------|--------------------|
| 1   | 1.77738  | <.0001    | 5.914       | KIFC1   | 0.0551   | 0.0522             |
| 2   | 1.87014  | 0.0001    | 6.489       | FAM83D  | 0.1042   | 0.0522             |
| 3   | 1.80857  | 0.0003    | 6.102       | UBE2C   | 0.2343   | 0.0625             |
| 4   | 1.31367  | 0.0004    | 3.72        | CLDN4   | 0.3066   | 0.0625             |
| 5   | 1.75     | 0.0004    | 5.755       | GRB7    | 0.311    | 0.0625             |
| 6   | 0.95237  | 0.0009    | 2.592       | PKMYT1  | 0.6714   | 0.1005             |
| 7   | 1.42166  | 0.001     | 4.144       | POLQ    | 0.7772   | 0.1005             |
| 8   | 1.57382  | 0.0011    | 4.825       | RRM2    | 0.7964   | 0.1005             |
| 9   | 0.63664  | 0.0015    | 1.89        | ZIC2    | 0.9995   | 0.1253             |
| 10  | 0.82158  | 0.0017    | 2.274       | MYBL2   | 0.9995   | 0.1253             |
| 11  | 0.99747  | 0.0018    | 2.711       | FOXM1   | 0.9995   | 0.1253             |
| 12  | 1.06974  | 0.0022    | 2.915       | NSD3    | 0.9995   | 0.1282             |
| 13  | 1.64817  | 0.0022    | 5.197       | MCM2    | 0.9995   | 0.1282             |
| 14  | -1.3627  | 0.0024    | 0.256       | MSR1    | 0.9995   | 0.1282             |
| 15  | 1.85766  | 0.0029    | 6.409       | CCNB1   | 0.9995   | 0.1413             |
| 16  | 1.02994  | 0.0034    | 2.801       | CEP55   | 0.9995   | 0.1413             |
| 17  | 1.13513  | 0.0036    | 3.112       | RAD51   | 0.9995   | 0.1413             |
| 18  | 0.89656  | 0.0039    | 2.451       | CDC25C  | 0.9995   | 0.1413             |
| 19  | -1.60656 | 0.0039    | 0.201       | PARP4   | 0.9995   | 0.1413             |
| 20  | 1.29396  | 0.0039    | 3.647       | TOP2A   | 0.9995   | 0.1413             |
| 21  | 1.36824  | 0.0039    | 3.928       | BAIAP2L1| 0.9995   | 0.1413             |
| 22  | 0.92504  | 0.0046    | 2.522       | TTK     | 0.9995   | 0.1523             |
| 23  | 0.7774   | 0.0051    | 2.176       | EXO1    | 0.9995   | 0.1523             |
| 24  | 1.56106  | 0.0053    | 4.764       | HIST1H1C| 0.9995   | 0.1523             |
| 25  | 0.89081  | 0.0057    | 2.437       | E2F1    | 0.9995   | 0.1523             |
| 26  | 0.94697  | 0.0058    | 2.578       | ESPL1   | 0.9995   | 0.1523             |
| Gene   | Log2 Fold Change | p-value  | q-value | OR   | p-value  | q-value |
|--------|------------------|----------|---------|------|----------|---------|
| ORC6   | 2.482            | 0.9995   | 0.1523  |      |          |         |
| AURKA  | 2.793            | 0.9995   | 0.1523  |      |          |         |
| MKI67  | 3.112            | 0.9995   | 0.1523  |      |          |         |
| SFRP2  | 0.444            | 0.9995   | 0.1523  |      |          |         |
| MELK   | 2                | 0.9995   | 0.1523  |      |          |         |
| FAP    | 0.385            | 0.9995   | 0.1523  |      |          |         |
| CXXC5  | 2.956            | 0.9995   | 0.154   |      |          |         |
| CDCA5  | 2.794            | 0.9995   | 0.1596  |      |          |         |
| HIST1H3H | 2.891         | 0.9995   | 0.1596  |      |          |         |
| CDC6   | 2.885            | 0.9995   | 0.1652  |      |          |         |
| NUDT1  | 6.323            | 0.9995   | 0.1783  |      |          |         |
| CDKN3  | 2.64             | 0.9995   | 0.18    |      |          |         |
| HIST1H2BH | 3.06           | 0.9995   | 0.1838  |      |          |         |
| KIF11  | 2.469            | 0.9995   | 0.1838  |      |          |         |
| RFC4   | 3.49             | 0.9995   | 0.1838  |      |          |         |
| NUF2   | 1.783            | 0.9995   | 0.1863  |      |          |         |
| FGFR4  | 1.548            | 0.9995   | 0.1864  |      |          |         |
| ASPN   | 0.532            | 0.9995   | 0.1864  |      |          |         |
| MAD2L1 | 2.601            | 0.9995   | 0.1864  |      |          |         |
| AURKB  | 2.725            | 0.9995   | 0.1864  |      |          |         |
| BIRC5  | 1.823            | 0.9995   | 0.2105  |      |          |         |
| VEGFA  | 1.869            | 0.9995   | 0.2563  |      |          |         |
| ATAD2  | 2.969            | 0.9995   | 0.2563  |      |          |         |
| RAD54L | 2.454            | 0.9995   | 0.2563  |      |          |         |
| BRCA1  | 2.728            | 0.9995   | 0.2563  |      |          |         |
| RBL1   | 6.97             | 0.9995   | 0.2563  |      |          |         |
| HDAC2  | 4.558            | 0.9995   | 0.2563  |      |          |         |
|   |    |    |    |  |
|---|----|----|----|---|
| 55 | 1.23554 | 0.019 | 3.44 | MIS18A | 0.9995 | 0.2563 |
| 56 | 1.35955 | 0.0194 | 3.894 | DDX39A | 0.9995 | 0.2563 |
| 57 | 0.80633 | 0.0197 | 2.24 | CDC25A | 0.9995 | 0.2563 |
| 58 | 0.90425 | 0.0198 | 2.47 | SPC25 | 0.9995 | 0.2563 |
| 59 | 0.60807 | 0.0229 | 1.837 | ELF3 | 0.9995 | 0.292 |
| 60 | 0.733 | 0.0242 | 2.081 | KIF14 | 0.9995 | 0.3011 |
| 61 | 1.13335 | 0.0246 | 3.106 | SUV39H2 | 0.9995 | 0.3011 |
| 62 | -1.43438 | 0.0248 | 0.238 | ADD1 | 0.9995 | 0.3011 |
| 63 | 0.88361 | 0.0255 | 2.42 | CENPF | 0.9995 | 0.304 |
| 64 | 0.78402 | 0.026 | 2.19 | KIF2C | 0.9995 | 0.3052 |
| 65 | -0.58613 | 0.0283 | 0.556 | HLA_DPB1 | 0.9995 | 0.3271 |
| 66 | 0.81839 | 0.0298 | 2.267 | ANLN | 0.9995 | 0.3391 |
| 67 | 0.66298 | 0.0319 | 1.941 | EIF4EBP1 | 0.9995 | 0.3509 |
| 68 | 0.80687 | 0.0319 | 2.241 | NDC80 | 0.9995 | 0.3509 |
| 69 | 0.97587 | 0.0322 | 2.653 | SLC2A1 | 0.9995 | 0.3509 |
| 70 | -0.89322 | 0.0335 | 0.409 | AR | 0.9995 | 0.3601 |
| 71 | -0.58506 | 0.0349 | 0.557 | HLA_DRA | 0.9995 | 0.3684 |
| 72 | 0.84182 | 0.0353 | 2.321 | ID2 | 0.9995 | 0.3684 |
| 73 | -0.63214 | 0.0359 | 0.531 | ALDH1A1 | 0.9995 | 0.3697 |
| 74 | -1.43528 | 0.0368 | 0.238 | JAK1 | 0.9995 | 0.3725 |
| 75 | -0.9599 | 0.0375 | 0.383 | LRRC32 | 0.9995 | 0.3725 |
| 76 | 0.76908 | 0.0386 | 2.158 | ASPM | 0.9995 | 0.3725 |
| 77 | 0.66593 | 0.0387 | 1.946 | POLD1 | 0.9995 | 0.3725 |
| 78 | 0.594 | 0.039 | 1.811 | NEIL3 | 0.9995 | 0.3725 |
| 79 | -0.79756 | 0.0391 | 0.45 | TUBA4A | 0.9995 | 0.3725 |
| 80 | 0.64688 | 0.0402 | 1.91 | HIST3H2BB | 0.9995 | 0.3776 |
| 81 | 0.86112 | 0.0419 | 2.366 | CCNE2 | 0.9995 | 0.3803 |
| 82 | -0.75038 | 0.0421 | 0.472 | ITGA6 | 0.9995 | 0.3803 |
|   |   |   |   |   |
|---|---|---|---|---|
|   |   |   |   |   |
| 83 | 0.55359 | 0.0424 | 1.739 | EDN1 |
| 84 | -0.62066 | 0.0432 | 0.538 | FAM198B |
| 85 | 0.88908 | 0.0433 | 2.433 | UBE2T |
| 86 | -0.5973 | 0.0444 | 0.55 | MMP14 |
| 87 | -0.41315 | 0.0447 | 0.662 | ZBTB16 |
| 88 | -0.45944 | 0.0447 | 0.632 | FST |
| 89 | 0.91463 | 0.0451 | 2.496 | CCNA2 |
| 90 | -0.79166 | 0.0457 | 0.453 | COL6A3 |
| 91 | 0.87758 | 0.046 | 2.405 | CDC20 |
| 92 | -0.65998 | 0.0478 | 0.517 | TBC1D9 |
| 93 | -0.79405 | 0.0486 | 0.452 | JCAD |
| 94 | 0.69837 | 0.0493 | 2.01 | HELLS |
| 95 | 0.67327 | 0.0498 | 1.961 | BNIP3 |
| 96 | -0.7707 | 0.05 | 0.463 | PIK3R1 |

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Symptomatic vs. Screen-detected – Genes with $p \leq 0.05$ shown

| Obs | Estimate | ProbChiSq | Gene   | FDR   |
|-----|----------|-----------|--------|-------|
| 1   | 0.38524  | 0.0032    | NUPR1  | 0.5795|
| 2   | -0.53802 | 0.0033    | EGLN3  | 0.5795|
| 3   | -0.3511  | 0.0059    | IL3RA  | 0.5795|
| 4   | 0.30569  | 0.0083    | PRKDC  | 0.5795|
| 5   | -0.26429 | 0.0086    | ZEB2   | 0.5795|
| 6   | -0.2024  | 0.0123    | BORCS7 | 0.5795|
| 7   | -0.30525 | 0.0132    | MYCT1  | 0.5795|
| 8   | -0.49628 | 0.0138    | RELN   | 0.5795|
| 9   | 0.32274  | 0.0138    | GRB7   | 0.5795|
| 10  | -0.56868 | 0.0151    | NGFR   | 0.5795|
| 11  | -0.19413 | 0.0151    | ITGB1  | 0.5795|
| 12  | -0.57363 | 0.0158    | ABCA8  | 0.5795|
| 13  | -0.53322 | 0.016     | PLCE1  | 0.5795|
| 14  | -0.35187 | 0.0165    | CAV1   | 0.5795|
| 15  | -0.70516 | 0.0171    | MMP9   | 0.5795|
| 16  | -0.39561 | 0.0185    | MARCO  | 0.5795|
| 17  | -0.29183 | 0.0194    | VIM    | 0.5795|
| 18  | -0.47678 | 0.0202    | TGFB2  | 0.5795|
| 19  | -0.40802 | 0.0207    | SCARA5 | 0.5795|
| 20  | 0.6254   | 0.0212    | CD24   | 0.5795|
| 21  | -0.23047 | 0.0213    | MAF    | 0.5795|
| 22  | -0.29359 | 0.0216    | PDGFRA | 0.5795|
| 23  | 0.23085  | 0.0217    | FOXA1  | 0.5795|
| 24  | -0.32478 | 0.0218    | TGFB2  | 0.5795|
| 25  | 0.30045  | 0.0226    | BAG1   | 0.5795|
| 26  | -0.67423 | 0.0244    | KRT7   | 0.5795|
| 27  | -0.44184 | 0.0251    | FHL1   | 0.5795|
| 28  | -0.58409 | 0.0283    | LEP    | 0.5795|
| 29  | -0.37266 | 0.0291    | LEPR   | 0.5795|
| 30  | -0.23155 | 0.0303    | ACVRL1 | 0.5795|
| 31  | 0.15828  | 0.0305    | ACVR1B | 0.5795|
| 32  | 0.23181  | 0.0306    | BBC3   | 0.5795|
| 33  | -0.39449 | 0.031     | DCN    | 0.5795|
| 34  | -0.27359 | 0.0323    | CD34   | 0.5795|
| 35  | -0.31823 | 0.0328    | FSTL1  | 0.5795|
| 36  | -0.28082 | 0.0328    | CXorf36| 0.5795|
| 37  | -0.3104  | 0.0343    | RAC2   | 0.5795|
| 38  | -0.2626  | 0.0347    | MAML2  | 0.5795|
| 39  | -0.35867 | 0.0348    | GZMH   | 0.5795|
| 40  | -0.64975 | 0.0358    | AGR2   | 0.5795|
|   |   |   | Gene   |   |
|---|---|---|--------|---|
| 41 | -0.24961 | 0.0377 | CCND2  | 0.5795 |
| 42 | -0.34019 | 0.0379 | PRKCB  | 0.5795 |
| 43 | -0.24066 | 0.0382 | SMO    | 0.5795 |
| 44 | -0.38023 | 0.0384 | GZMA   | 0.5795 |
| 45 | -0.32137 | 0.0385 | FGF7   | 0.5795 |
| 46 | -0.27276 | 0.0397 | JCAD   | 0.5795 |
| 47 | 0.16706  | 0.0403 | SUV39H2| 0.5795 |
| 48 | -0.16607 | 0.0408 | ITGAV  | 0.5795 |
| 49 | -0.2618  | 0.0409 | PIK3CG | 0.5795 |
| 50 | -0.22504 | 0.0423 | EPAS1  | 0.5795 |
| 51 | 0.22331  | 0.0427 | IFT140 | 0.5795 |
| 52 | -0.48021 | 0.0443 | ASPN   | 0.5795 |
| 53 | -0.47756 | 0.0443 | CD36   | 0.5795 |
| 54 | -0.31396 | 0.0451 | DTX1   | 0.5795 |
| 55 | -0.31331 | 0.0464 | CCL2   | 0.5795 |
| 56 | -0.33955 | 0.0467 | FGL2   | 0.5795 |
| 57 | -0.51133 | 0.0484 | SPP1   | 0.5795 |
| 58 | -0.58948 | 0.0485 | SCUBE2 | 0.5795 |
| 59 | -0.3085  | 0.049  | PPARG  | 0.5795 |
| 60 | -0.33366 | 0.0494 | CLEC5A | 0.5795 |
| 61 | -0.32223 | 0.0497 | MMP14  | 0.5795 |
| 62 | -0.29661 | 0.0497 | FLNC   | 0.5795 |
| 63 | 0.51651  | 0.0498 | FUT3   | 0.5795 |
N2 vs. N1-0 – Genes with p ≤ 0.05 shown

| Obs | Estimate | ProbChiSq | Gene   | FDR  |
|-----|----------|-----------|--------|------|
| 1   | -0.66739 | 0.0002    | SMAD5  | 0.1651 |
| 2   | -0.73249 | 0.0079    | SERPINH1 | 0.9998 |
| 3   | -0.57282 | 0.0096    | PTEN   | 0.9998 |
| 4   | 1.70934  | 0.0189    | PROM1  | 0.9998 |
| 5   | 0.64057  | 0.0202    | ERBB2  | 0.9998 |
| 6   | -0.24177 | 0.0219    | PRKACA | 0.9998 |
| 7   | -0.43885 | 0.0236    | BMPR1A | 0.9998 |
| 8   | -0.84642 | 0.0288    | PBX3   | 0.9998 |
| 9   | -0.66526 | 0.0291    | NSD3   | 0.9998 |
| 10  | 0.65417  | 0.0324    | HLA_C  | 0.9998 |
| 11  | 0.60513  | 0.0401    | BLVRA  | 0.9998 |
| 12  | 1.16188  | 0.0426    | SLPI   | 0.9998 |
| 13  | -0.8085  | 0.0444    | OCLN   | 0.9998 |
| 14  | 1.17493  | 0.0445    | CKMT1A | 0.9998 |
| 15  | 0.54845  | 0.0448    | RAC3   | 0.9998 |
| 16  | -0.7366  | 0.0466    | GTF2H2 | 0.9998 |
| 17  | 0.36365  | 0.0474    | BAD    | 0.9998 |
| 18  | -0.43461 | 0.0481    | ELK3   | 0.9998 |
### T2 vs. T1 – Genes with p ≤ 0.05 shown

| Obs | Estimate | ProbChiSq | Gene   | FDR  |
|-----|----------|-----------|--------|------|
| 1   | -0.53309 | <.0001    | NFATC1 | 0.0279 |
| 2   | -0.61138 | <.0001    | PIM1   | 0.0279 |
| 3   | -0.56472 | 0.0003    | DTX1   | 0.0279 |
| 4   | -0.56196 | 0.0003    | CCL2   | 0.0279 |
| 5   | -0.41531 | 0.0003    | RORA   | 0.0279 |
| 6   | -0.70251 | 0.0003    | FHL1   | 0.0279 |
| 7   | -0.45303 | 0.0004    | PIK3CG | 0.0279 |
| 8   | -0.60237 | 0.0004    | LEPR   | 0.0279 |
| 9   | -0.32853 | 0.0004    | ELK3   | 0.0279 |
| 10  | -0.49502 | 0.0005    | SPRY2  | 0.0279 |
| 11  | -0.81859 | 0.0005    | NGFR   | 0.0279 |
| 12  | -0.55592 | 0.0005    | FOSL1  | 0.0279 |
| 13  | -0.49395 | 0.0005    | ICAM1  | 0.0279 |
| 14  | -0.35242 | 0.0005    | PSMB10 | 0.0283 |
| 15  | -0.90901 | 0.0006    | LEP    | 0.0307 |
| 16  | -0.48407 | 0.0007    | RUNX3  | 0.031 |
| 17  | -0.67117 | 0.0007    | CRYAB  | 0.031 |
| 18  | -0.44188 | 0.0008    | CXorf36| 0.0314 |
| 19  | -0.51666 | 0.0009    | PPARG  | 0.0357 |
| 20  | -0.78543 | 0.0009    | ABCA8  | 0.0357 |
| 21  | -0.80347 | 0.001    | THBS4  | 0.037 |
| 22  | -0.58951 | 0.0011    | IGF1   | 0.037 |
| 23  | 0.32002  | 0.0012    | HDAC2  | 0.037 |
| 24  | -0.37565 | 0.0013    | CDC14B | 0.037 |
| 25  | -0.39179 | 0.0013    | PIK3CD | 0.037 |
| 26  | -0.38603 | 0.0013    | CCND2  | 0.037 |
| 27  | 0.43649  | 0.0015    | CCNB1  | 0.0371 |
| 28  | -0.66585 | 0.0016    | F3     | 0.0371 |
| 29  | -0.54935 | 0.0016    | EGFR   | 0.0371 |
| 30  | -0.6706  | 0.0016    | LPL    | 0.0371 |
| 31  | -0.43957 | 0.0017    | ID1    | 0.0371 |
| 32  | -0.53283 | 0.0017    | GZMH   | 0.0371 |
| 33  | -0.46093 | 0.0017    | CAV1   | 0.0371 |
| 34  | -0.56416 | 0.0017    | SOCS3  | 0.0371 |
| 35  | -0.38133 | 0.0017    | CDH5   | 0.0371 |
| 36  | -0.65904 | 0.0018    | CACNA1D| 0.0376 |
| 37  | -0.59356 | 0.0019    | IL1B   | 0.0389 |
| 38  | -0.47797 | 0.002    | BCL2A1 | 0.0403 |
| 39  | -0.32229 | 0.0022    | HLA_E  | 0.0418 |
| 40  | -0.37134 | 0.0022    | CBLC   | 0.0418 |
|   |   |   | Gene  | p-value |
|---|---|---|-------|---------|
| 41 | -0.33055 | 0.0024 | ZEB2  | 0.0424  |
| 42 | -0.60253 | 0.0025 | CACNA2D3 | 0.0424 |
| 43 | -0.49021 | 0.0025 | TWIST2 | 0.0424 |
| 44 | -0.45629 | 0.0025 | FLNC  | 0.0424 |
| 45 | 0.36095  | 0.0025 | ALDOA | 0.0424 |
| 46 | -0.38224 | 0.0028 | LRRC32| 0.0452 |
| 47 | -0.54292 | 0.0029 | COL27A1| 0.0463 |
| 48 | -0.4854  | 0.003  | TGFβ3 | 0.0474 |
| 49 | -0.49802 | 0.0035 | TSPAN7| 0.053  |
| 50 | -0.30149 | 0.0035 | PLD1  | 0.053  |
| 51 | -0.40602 | 0.0037 | S1PR1 | 0.0538 |
| 52 | -0.68332 | 0.0041 | CD36  | 0.0538 |
| 53 | -0.31768 | 0.0041 | PECAM1| 0.0538 |
| 54 | -0.44288 | 0.0041 | ITGB3 | 0.0538 |
| 55 | -0.32579 | 0.0041 | PIK3R1| 0.0538 |
| 56 | 0.4907   | 0.0042 | HIST3H2BB| 0.0538 |
| 57 | -0.42438 | 0.0043 | CXCL12| 0.0538 |
| 58 | -0.3537  | 0.0043 | MYCT1 | 0.0538 |
| 59 | -0.52145 | 0.0043 | PTGS2 | 0.0538 |
| 60 | -0.53059 | 0.0043 | MEOX2 | 0.0538 |
| 61 | -0.44651 | 0.0044 | SNAI1 | 0.0538 |
| 62 | -0.41411 | 0.0045 | JAM2  | 0.054  |
| 63 | -0.38915 | 0.0046 | SPN   | 0.054  |
| 64 | -0.78836 | 0.0047 | SFRP1 | 0.054  |
| 65 | -0.64358 | 0.0048 | IL6   | 0.054  |
| 66 | -0.499   | 0.0049 | SCARA5| 0.054  |
| 67 | -0.28689 | 0.0049 | TGFβ1 | 0.054  |
| 68 | -0.34639 | 0.0049 | MFNG  | 0.054  |
| 69 | -0.39924 | 0.005  | TGFβR2| 0.054  |
| 70 | -0.40818 | 0.005  | IL1R2 | 0.054  |
| 71 | -0.27827 | 0.0051 | NOTCH1| 0.0544 |
| 72 | -0.29917 | 0.0053 | ACVRL1| 0.0551 |
| 73 | -0.36763 | 0.0054 | BNC2  | 0.0551 |
| 74 | -0.46897 | 0.0055 | MARCO | 0.0551 |
| 75 | -0.31018 | 0.0055 | IL6R  | 0.0551 |
| 76 | -0.75035 | 0.0056 | DUSP4 | 0.0551 |
| 77 | -0.14048 | 0.0056 | SP1   | 0.0551 |
| 78 | -0.36347 | 0.0059 | PDE9A | 0.0568 |
| 79 | -0.40547 | 0.006  | PLA2G4A| 0.0571 |
| 80 | -0.54627 | 0.0061 | SOX17 | 0.0571 |
| 81 | -0.27175 | 0.0062 | FLI1  | 0.0578 |
| 82 | -0.54724 | 0.0063 | GPX3  | 0.0581 |
| 83 | -0.55214 | 0.0066 | CCL21 | 0.0593 |
|   |   |   |   |   |
|---|---|---|---|---|
|   |   |   |   |   |
| 84 | 0.22304 | 0.0066 | PSMB7 | 0.0593 |
| 85 | -0.3273 | 0.0067 | ROBO4 | 0.0593 |
| 86 | -0.32814 | 0.0071 | HLA_DMB | 0.0616 |
| 87 | -0.44584 | 0.0071 | ENPP2 | 0.0616 |
| 88 | -0.80713 | 0.0074 | KRT7 | 0.0623 |
| 89 | -0.20573 | 0.0074 | PARP2 | 0.0623 |
| 90 | -0.30183 | 0.0075 | CLEC14A | 0.0623 |
| 91 | -0.33266 | 0.0077 | MAML2 | 0.0623 |
| 92 | 0.45277 | 0.0078 | UBE2C | 0.0623 |
| 93 | -0.50659 | 0.0079 | CD8A | 0.0623 |
| 94 | -0.47941 | 0.0079 | GDF5 | 0.0623 |
| 95 | -0.48167 | 0.0079 | LIF | 0.0623 |
| 96 | -0.38172 | 0.008 | CD274 | 0.0623 |
| 97 | -0.77177 | 0.0081 | WNT11 | 0.0623 |
| 98 | 0.58424 | 0.0081 | BIRC5 | 0.0623 |
| 99 | -0.48839 | 0.0082 | SOX9 | 0.0624 |
| 100 | -0.60331 | 0.0086 | CHIT1 | 0.0648 |
| 101 | -0.4941 | 0.0088 | TNN | 0.0655 |
| 102 | -0.30528 | 0.0089 | SMO | 0.0655 |
| 103 | -0.40543 | 0.0091 | SRPX | 0.0657 |
| 104 | -0.78161 | 0.0092 | SCUBE2 | 0.0657 |
| 105 | -0.44363 | 0.0093 | CLEC5A | 0.0657 |
| 106 | -0.49266 | 0.0093 | INHBB | 0.0657 |
| 107 | -0.39084 | 0.0093 | SOCS1 | 0.0657 |
| 108 | -0.48482 | 0.0094 | GZMB | 0.0657 |
| 109 | -0.62719 | 0.0097 | NR4A3 | 0.0667 |
| 110 | -0.39145 | 0.01 | MLLT3 | 0.0686 |
| 111 | -0.42017 | 0.0103 | PALMD | 0.0698 |
| 112 | -0.24644 | 0.0105 | TLR4 | 0.0705 |
| 113 | 0.23331 | 0.0106 | PCNA | 0.0706 |
| 114 | -0.36298 | 0.0107 | TEK | 0.0708 |
| 115 | -0.5096 | 0.0111 | WNT10A | 0.0727 |
| 116 | -0.34022 | 0.0113 | IL10RA | 0.0729 |
| 117 | -0.37667 | 0.0114 | EMCN | 0.0729 |
| 118 | -0.5135 | 0.0116 | DPT | 0.0729 |
| 119 | -0.32507 | 0.0116 | PDGFRA | 0.0729 |
| 120 | -0.46105 | 0.0116 | CCL4 | 0.0729 |
| 121 | -0.31872 | 0.012 | PIK3R5 | 0.0747 |
| 122 | -0.67196 | 0.0121 | SERPINB5 | 0.0747 |
| 123 | -0.32679 | 0.0123 | HLA_C | 0.0748 |
| 124 | -0.31176 | 0.0123 | DUSP6 | 0.0748 |
| 125 | -0.39487 | 0.0127 | NPR1 | 0.0764 |
| 126 | -0.63836 | 0.0129 | GABRP | 0.0767 |
|   |   |   |   |   |
|---|---|---|---|---|
| 127 | -0.51892 | 0.013 | 0.0782 |
| 128 | -0.2501 | 0.0132 | 0.0774 |
| 129 | -0.64267 | 0.0135 | 0.0782 |
| 130 | -0.51821 | 0.0135 | 0.0782 |
| 131 | -0.33638 | 0.0137 | 0.0786 |
| 132 | -0.26537 | 0.0139 | 0.0791 |
| 133 | -0.59506 | 0.0142 | 0.0791 |
| 134 | -0.46492 | 0.0142 | 0.0791 |
| 135 | 0.39031 | 0.0143 | 0.0791 |
| 136 | -0.45043 | 0.0143 | 0.0791 |
| 137 | -0.31432 | 0.0146 | 0.0795 |
| 138 | -0.50282 | 0.0149 | 0.0795 |
| 139 | -0.75877 | 0.0155 | 0.0802 |
| 140 | -0.49937 | 0.0151 | 0.0802 |
| 141 | -1.32093 | 0.0154 | 0.0802 |
| 142 | -3.6175 | 0.0154 | 0.0802 |
| 143 | -3.2844 | 0.0154 | 0.0802 |
| 144 | -3.5813 | 0.0157 | 0.0802 |
| 145 | -3.8586 | 0.0158 | 0.0802 |
| 146 | -3.4547 | 0.0161 | 0.0802 |
| 147 | -3.1575 | 0.0161 | 0.0802 |
| 148 | -3.4969 | 0.0161 | 0.0802 |
| 149 | -0.24541 | 0.0162 | 0.0802 |
| 150 | 0.34353 | 0.0163 | 0.0802 |
| 151 | -3.2973 | 0.0164 | 0.0802 |
| 152 | -3.4329 | 0.0165 | 0.0802 |
| 153 | -3.4304 | 0.0165 | 0.0802 |
| 154 | 0.43048 | 0.0166 | 0.0802 |
| 155 | -0.3772 | 0.0166 | 0.0802 |
| 156 | 0.55923 | 0.0171 | 0.082 |
| 157 | 0.53286 | 0.0173 | 0.0823 |
| 158 | 0.3454 | 0.0174 | 0.0823 |
| 159 | 0.49152 | 0.0176 | 0.0825 |
| 160 | 0.36375 | 0.0178 | 0.0828 |
| 161 | 0.37841 | 0.0179 | 0.0828 |
| 162 | -0.39013 | 0.0193 | 0.0851 |
| 163 | 0.482 | 0.0199 | 0.09 |
| 164 | 0.38122 | 0.0199 | 0.0874 |
| 165 | -0.27726 | 0.0193 | 0.0881 |
| 166 | -0.44978 | 0.0204 | 0.0917 |
| 167 | -0.39013 | 0.0205 | 0.092 |
| 168 | -0.36398 | 0.0208 | 0.0922 |

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|   |   |   |   |   |
|---|---|---|---|---|
| 170 | -0.44145 | 0.0209 | ITGB6 | 0.0922 |
| 171 | -0.34845 | 0.021 | FOXC1 | 0.0922 |
| 172 | 0.69382 | 0.0214 | SIX1 | 0.0936 |
| 173 | -0.28113 | 0.0215 | CYBB | 0.0936 |
| 174 | -0.29385 | 0.022 | LIFR | 0.095 |
| 175 | 0.27796 | 0.0224 | HIST1H2BH | 0.0964 |
| 176 | -0.44178 | 0.0229 | KCNB1 | 0.0972 |
| 177 | 0.26557 | 0.023 | RAC3 | 0.0972 |
| 178 | -0.41912 | 0.0231 | DPN | 0.0972 |
| 179 | -0.30798 | 0.0231 | HGF | 0.0972 |
| 180 | -0.40729 | 0.0235 | VEGFD | 0.098 |
| 181 | 0.40819 | 0.024 | CEP55 | 0.0993 |
| 182 | -0.43345 | 0.024 | LEMD1 | 0.0993 |
| 183 | -0.3321 | 0.0242 | ZFPM2 | 0.0996 |
| 184 | -0.415 | 0.0245 | PPARGC1A | 0.1 |
| 185 | -0.36934 | 0.0247 | HLA_DPB1 | 0.1004 |
| 186 | -0.54963 | 0.0249 | SLPI | 0.1004 |
| 187 | -0.5077 | 0.025 | HSPA2 | 0.1004 |
| 188 | -0.43661 | 0.0251 | TMEM45B | 0.1004 |
| 189 | -0.37118 | 0.0254 | CCR5 | 0.1009 |
| 190 | -0.38757 | 0.0261 | PDCD1 | 0.1032 |
| 191 | -0.36886 | 0.0262 | CXCR6 | 0.1032 |
| 192 | -0.37918 | 0.0276 | FGL2 | 0.1076 |
| 193 | -0.18035 | 0.0276 | ITGAV | 0.1076 |
| 194 | -0.41173 | 0.0281 | CLDN1 | 0.1082 |
| 195 | -0.32538 | 0.0283 | ITGA6 | 0.1082 |
| 196 | 0.35806 | 0.0283 | TYMS | 0.1082 |
| 197 | -0.80849 | 0.0283 | FGF10 | 0.1082 |
| 198 | -0.27975 | 0.0288 | BCL6B | 0.1094 |
| 199 | 0.35072 | 0.029 | CENPF | 0.1096 |
| 200 | -0.32484 | 0.0293 | FGF18 | 0.1103 |
| 201 | -0.35884 | 0.0297 | DTX4 | 0.1112 |
| 202 | -0.39738 | 0.0299 | CCR2 | 0.1114 |
| 203 | -0.41908 | 0.0301 | PTGER3 | 0.1115 |
| 204 | 0.18061 | 0.0305 | PI3K3CA | 0.1123 |
| 205 | -0.34325 | 0.0309 | RORB | 0.1135 |
| 206 | -0.30999 | 0.0318 | CDKN1C | 0.116 |
| 207 | 0.36408 | 0.0319 | CDK1 | 0.116 |
| 208 | -0.26528 | 0.0323 | DLL1 | 0.1169 |
| 209 | -0.40047 | 0.0326 | FOXC2 | 0.1173 |
| 210 | 0.17483 | 0.0336 | PI3K3R2 | 0.1201 |
| 211 | -0.38761 | 0.0338 | ARNT2 | 0.1201 |
| 212 | 0.36576 | 0.034 | ESR1 | 0.1201 |
|   | Value 1  | Value 2  | Gene   | Value 3  |
|---|---------|---------|--------|---------|
| 213| -0.2382 | 0.0342  | ID2    | 0.1201  |
| 214| -0.3747 | 0.0343  | ADAM12 | 0.1201  |
| 215| 0.3452  | 0.0343  | MKI67  | 0.1201  |
| 216| -0.3405 | 0.0352  | HAS1   | 0.1222  |
| 217| 0.3422  | 0.0353  | HIST1H3H | 0.1222 |
| 218| -0.4303 | 0.0355  | IL22RA2| 0.1226  |
| 219| -0.4107 | 0.0358  | GADD45G| 0.1228  |
| 220| -0.2795 | 0.0368  | PDCD1LG2| 0.1258 |
| 221| -0.5021 | 0.0371  | ASPN   | 0.1258  |
| 222| -0.3197 | 0.0375  | GRIN2A | 0.1258  |
| 223| -0.5542 | 0.0375  | IRX1   | 0.1258  |
| 224| -0.4329 | 0.0375  | OGN    | 0.1258  |
| 225| 0.2398  | 0.0378  | HIST1H1C| 0.1262 |
| 226| -0.3027 | 0.0379  | TNF    | 0.1262  |
| 227| -0.4746 | 0.039   | LTB    | 0.1291  |
| 228| -0.3517 | 0.0395  | MET    | 0.1304  |
| 229| -0.2465 | 0.0399  | HEG1   | 0.1309  |
| 230| 0.7761  | 0.0404  | PPP2R2C| 0.1312  |
| 231| -0.3721 | 0.0406  | RARRES3| 0.1312  |
| 232| -0.4593 | 0.0406  | PLCe1  | 0.1312  |
| 233| -0.3232 | 0.0406  | FAP    | 0.1312  |
| 234| -0.3411 | 0.0419  | HLA_DPA1| 0.1346 |
| 235| 0.1688  | 0.0425  | BMPR1A | 0.136   |
| 236| -0.2999 | 0.0431  | RAC2   | 0.1372  |
| 237| 0.3053  | 0.0434  | PTTG1  | 0.1376  |
| 238| 0.4224  | 0.0439  | PKMYT1 | 0.1383  |
| 239| -0.4009 | 0.044   | BBOX1  | 0.1383  |
| 240| -0.3259 | 0.0442  | HLA_DRA| 0.1386  |
| 241| -0.2527 | 0.0457  | VIM    | 0.1423  |
| 242| -0.509  | 0.0458  | PLA2G3 | 0.1423  |
| 243| -0.3301 | 0.0461  | PRKCB  | 0.1427  |
| 244| -0.2993 | 0.0464  | ECM2   | 0.1429  |
| 245| -0.1661 | 0.0472  | PARP4  | 0.1436  |
| 246| -0.3906 | 0.0472  | EFNA5  | 0.1436  |
| 247| -0.3869 | 0.0473  | CCL3L1 | 0.1436  |
| 248| -0.4423 | 0.0474  | WNT5A  | 0.1436  |
| 249| -0.2244 | 0.0484  | HLA_DMA| 0.1459 |
| 250| -0.2662 | 0.0486  | ZEB1   | 0.1459  |
| 251| -0.4026 | 0.0488  | RELN   | 0.1459  |
| 252| -0.1959 | 0.0489  | SMAD3  | 0.1459  |
| 253| -0.3819 | 0.0498  | TTYH1  | 0.148   |

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T2 vs. T1 limited to Luminal A tumors – Genes with $p \leq 0.05$ shown

| Obs | Estimate | ProbChiSq | Gene  | FDR  |
|-----|----------|-----------|-------|------|
| 1   | -0.92388 | 0.0002    | SOCS3 | 0.0706 |
| 2   | -0.92278 | 0.0003    | CXCL8 | 0.0706 |
| 3   | -0.80081 | 0.0003    | SOX9  | 0.0706 |
| 4   | 0.61725  | 0.0005    | PBX3  | 0.0852 |
| 5   | -0.73515 | 0.0008    | FOSL1 | 0.1116 |
| 6   | -0.82402 | 0.0009    | SELE  | 0.1116 |
| 7   | -0.55833 | 0.0021    | ICAM1 | 0.1746 |
| 8   | -0.75574 | 0.0021    | GZMB  | 0.1746 |
| 9   | -0.70354 | 0.0021    | PTGS2 | 0.1746 |
| 10  | -0.64701 | 0.0025    | CCL2  | 0.1746 |
| 11  | -0.19592 | 0.0032    | NCAPH2| 0.1746 |
| 12  | -1.05219 | 0.0032    | KRT7  | 0.1746 |
| 13  | -0.61319 | 0.0032    | PIM1  | 0.1746 |
| 14  | -0.50051 | 0.0035    | NFATC1| 0.1746 |
| 15  | -0.92743 | 0.0036    | NR4A3 | 0.1746 |
| 16  | -0.53422 | 0.0045    | TNFAIP6| 0.1746 |
| 17  | -0.58287 | 0.0045    | SNAI1 | 0.1746 |
| 18  | -0.60182 | 0.0048    | BCL2A1| 0.1746 |
| 19  | -0.61829 | 0.0048    | INHBB | 0.1746 |
| 20  | -0.87846 | 0.005     | IL6   | 0.1746 |
| 21  | -0.65049 | 0.005     | GPC4  | 0.1746 |
| 22  | -0.63949 | 0.0054    | KIT   | 0.1746 |
| 23  | -0.71278 | 0.0055    | TMEM45B| 0.1746 |
| 24  | -0.58807 | 0.0056    | TWIST2| 0.1746 |
| 25  | -0.45174 | 0.0071    | CXCL12| 0.2064 |
| 26  | -0.24474 | 0.0071    | BORCS7| 0.2064 |
| 27  | -0.5138  | 0.0084    | RORB  | 0.2285 |
| 28  | -0.81887 | 0.0085    | SERPINB5| 0.2285 |
| 29  | 0.40246  | 0.0091    | CCNB1 | 0.2301 |
| 30  | -0.59156 | 0.0092    | MARCO | 0.2301 |
| 31  | -0.55666 | 0.0097    | CACNG1| 0.2347 |
| 32  | -0.58689 | 0.0112    | TMPRSS2| 0.2641 |
| 33  | -0.45916 | 0.0126    | PLA2G4A| 0.2712 |
| 34  | -0.70765 | 0.0126    | HSPA2 | 0.2712 |
| 35  | -0.56931 | 0.0134    | PPARGC1A| 0.2712 |
| 36  | -0.63463 | 0.0139    | SOX17 | 0.2712 |
| 37  | -0.45456 | 0.0139    | SYTL4 | 0.2712 |
| 38  | -0.44563 | 0.0142    | CD274 | 0.2712 |
| 39  | -0.35289 | 0.0146    | SMO   | 0.2712 |
| 40  | -0.38857 | 0.0148    | SPRY2 | 0.2712 |
|   |   |   |   |   |
|---|---|---|---|---|
| 41 | -0.56854 | 0.0148 | LIF | 0.2712 |
| 42 | -0.21923 | 0.0153 | EIF4E2 | 0.2712 |
| 43 | -0.54521 | 0.0159 | LAMB3 | 0.2712 |
| 44 | -0.5159 | 0.0163 | PDCD1 | 0.2712 |
| 45 | 0.30529 | 0.0167 | HDAC2 | 0.2712 |
| 46 | -0.39568 | 0.0169 | PDE9A | 0.2712 |
| 47 | -0.24049 | 0.0171 | PARP2 | 0.2712 |
| 48 | -0.7818 | 0.0175 | WNT11 | 0.2712 |
| 49 | -0.74101 | 0.0179 | SLPI | 0.2712 |
| 50 | -0.34412 | 0.0184 | IL4R | 0.2712 |
| 51 | -0.48445 | 0.0185 | SOCS1 | 0.2722 |
| 52 | -0.48064 | 0.0191 | HAS1 | 0.2766 |
| 53 | -0.63191 | 0.0206 | CACNA2D3 | 0.2909 |
| 54 | -0.24916 | 0.0209 | DDX39A | 0.2909 |
| 55 | -0.52533 | 0.0214 | IL1RN | 0.2925 |
| 56 | -0.5141 | 0.0219 | CCR1 | 0.2942 |
| 57 | -0.3393 | 0.0252 | ID2 | 0.3324 |
| 58 | -0.7231 | 0.0263 | KRT17 | 0.3324 |
| 59 | -0.58499 | 0.0267 | CCNA1 | 0.3324 |
| 60 | -0.44901 | 0.0277 | LEPR | 0.3324 |
| 61 | -0.5046 | 0.0278 | TNN | 0.3324 |
| 62 | -0.43673 | 0.0279 | EGFR | 0.3324 |
| 63 | -0.57117 | 0.0285 | LAD1 | 0.3324 |
| 64 | -0.5079 | 0.0287 | DKK1 | 0.3324 |
| 65 | -0.60124 | 0.0291 | IL22RA2 | 0.3324 |
| 66 | -0.51483 | 0.0292 | PTGER3 | 0.3324 |
| 67 | -0.83724 | 0.0308 | CHAD | 0.3447 |
| 68 | -0.48802 | 0.0312 | CLEC5A | 0.3447 |
| 69 | -0.42656 | 0.0325 | DTX1 | 0.3509 |
| 70 | -0.38309 | 0.0331 | FOXC1 | 0.3509 |
| 71 | 0.28737 | 0.0331 | CDKN1B | 0.3509 |
| 72 | -0.48263 | 0.0337 | GDF5 | 0.3521 |
| 73 | -0.63647 | 0.0362 | GABRP | 0.3725 |
| 74 | 0.17318 | 0.0374 | SKP2 | 0.3805 |
| 75 | 0.25383 | 0.0388 | PTEN | 0.3862 |
| 76 | -0.44387 | 0.039 | PPARC | 0.3862 |
| 77 | -0.58527 | 0.0395 | WNT5A | 0.3862 |
| 78 | -0.5371 | 0.0409 | LEMD1 | 0.3929 |
| 79 | -0.51071 | 0.0413 | BBOX1 | 0.3929 |
| 80 | -0.41605 | 0.0419 | PLCB4 | 0.3936 |
| 81 | 0.21902 | 0.044 | SKP1 | 0.4074 |
| 82 | 0.69943 | 0.0449 | DNAJC12 | 0.4074 |
| 83 | -0.30025 | 0.0457 | MYCT1 | 0.4074 |

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|   | Correlation | p-value | Gene   | FDR   |
|---|-------------|---------|--------|-------|
| 84| -0.63464    | 0.0464  | NR4A1 | 0.4074|
| 85| -0.52554    | 0.0466  | GADD45G| 0.4074|
| 86| -0.41496    | 0.0466  | TNF   | 0.4074|
| 87| -0.50466    | 0.0473  | FHL1  | 0.4085|
| 88| -0.34918    | 0.0483  | FZD9  | 0.4124|
T2 vs. T1 limited to Luminal B tumors – Genes with p ≤ 0.05 shown

| Obs | Estimate | ProbChiSq | Gene     | FDR   |
|-----|----------|-----------|----------|-------|
| 1   | -0.95083 | 0.0005    | HLA_DPA1 | 0.1324|
| 2   | -0.65546 | 0.0007    | CYBB     | 0.1324|
| 3   | -0.89046 | 0.0008    | HLA_DPB1 | 0.1324|
| 4   | -0.56965 | 0.0012    | FLI1     | 0.1324|
| 5   | -0.58995 | 0.0013    | KAT2B    | 0.1324|
| 6   | -0.71312 | 0.0016    | RORA     | 0.1324|
| 7   | -1.01917 | 0.0018    | GPX3     | 0.1324|
| 8   | -0.52235 | 0.0019    | ELK3     | 0.1324|
| 9   | 0.7043   | 0.0022    | RAC3     | 0.1324|
| 10  | -0.70144 | 0.0024    | HLA_DRA  | 0.1324|
| 11  | -0.52006 | 0.0026    | PECAM1   | 0.1324|
| 12  | -0.58599 | 0.0027    | CD84     | 0.1324|
| 13  | -0.5996  | 0.0028    | PIK3CG   | 0.1324|
| 14  | -0.66377 | 0.0029    | RUNX3    | 0.1324|
| 15  | -0.54271 | 0.003    | HLA_DMB  | 0.1324|
| 16  | -0.52639 | 0.0032    | ZEB2     | 0.1324|
| 17  | -0.62834 | 0.0034    | CD68     | 0.1324|
| 18  | -0.83612 | 0.0034    | GZMH     | 0.1324|
| 19  | -0.58239 | 0.0036    | CCND2    | 0.1324|
| 20  | -0.53026 | 0.0037    | HLA_E    | 0.1324|
| 21  | 2.43033  | 0.0037    | DHRS2    | 0.1324|
| 22  | -1.12471 | 0.0046    | CACNA1D  | 0.1586|
| 23  | -0.73102 | 0.0055    | FGL2     | 0.1814|
| 24  | -2.09267 | 0.0058    | CEACAM5  | 0.1831|
| 25  | -0.56171 | 0.0075    | PIK3R5   | 0.2232|
| 26  | -0.48895 | 0.0081    | PSMB10   | 0.2232|
| 27  | -0.39279 | 0.0082    | SMAD5    | 0.2232|
| 28  | -0.43917 | 0.0089    | TLR4     | 0.2232|
| 29  | -0.4195  | 0.0091    | ATM      | 0.2232|
| 30  | -0.55892 | 0.0091    | TGFBR2   | 0.2232|
| 31  | -0.78703 | 0.0092    | LPL      | 0.2232|
| 32  | -0.72116 | 0.0106    | CCR2     | 0.2305|
| 33  | -1.27924 | 0.0106    | CXCL9    | 0.2305|
| 34  | -0.60568 | 0.0108    | RAC2     | 0.2305|
| 35  | -0.95365 | 0.0112    | LEP      | 0.2305|
| 36  | -0.72227 | 0.0112    | CCL3L1   | 0.2305|
| 37  | 1.22061  | 0.0114    | SIX1     | 0.2305|
| 38  | -1.25593 | 0.0117    | DUSP4    | 0.2305|
| 39  | -0.42991 | 0.012     | HLA_DMA  | 0.2305|
| 40  | 1.22563  | 0.0127    | AREG     | 0.2332|
|   | 41  | -0.51381 | 0.0127 | PIK3R1  | 0.2332 |
|---|-----|----------|--------|---------|--------|
|   | 42  | -0.8067  | 0.013  | CD8A    | 0.2334 |
|   | 43  | -0.65148 | 0.0141 | CCR5    | 0.2431 |
|   | 44  | 0.9666   | 0.0145 | EREG    | 0.2431 |
|   | 45  | -0.85347 | 0.0148 | CCL5    | 0.2431 |
|   | 46  | -0.40943 | 0.0149 | CD34    | 0.2431 |
|   | 47  | -0.48316 | 0.0157 | PRKCA   | 0.2494 |
|   | 48  | 0.55698  | 0.0161 | HES1    | 0.2494 |
|   | 49  | -0.75381 | 0.0165 | GZMA    | 0.2494 |
|   | 50  | -0.83981 | 0.0166 | NKG7    | 0.2494 |
|   | 51  | -0.38138 | 0.0169 | MAF     | 0.2497 |
|   | 52  | 0.25544  | 0.0186 | PALB2   | 0.2634 |
|   | 53  | -0.70357 | 0.0186 | HLA_B   | 0.2634 |
|   | 54  | -0.56569 | 0.0194 | HLA_C   | 0.2704 |
|   | 55  | -0.58043 | 0.0201 | CBLC    | 0.275  |
|   | 56  | 0.54461  | 0.0212 | ALDOA   | 0.2846 |
|   | 57  | -0.81171 | 0.0222 | IL2RB   | 0.2901 |
|   | 58  | 0.84863  | 0.0233 | SOCS2   | 0.2943 |
|   | 59  | -0.68583 | 0.0236 | CCL4    | 0.2943 |
|   | 60  | -0.37947 | 0.0242 | ACVRL1  | 0.2943 |
|   | 61  | 0.47565  | 0.0244 | UBE2C   | 0.2943 |
|   | 62  | 0.46548  | 0.0247 | FAM83D  | 0.2943 |
|   | 63  | -0.49821 | 0.025  | SPN     | 0.2943 |
|   | 64  | -0.50173 | 0.0252 | MFNG    | 0.2943 |
|   | 65  | -0.47623 | 0.0254 | PIK3CD  | 0.2943 |
|   | 66  | -0.45819 | 0.026  | CAV1    | 0.2947 |
|   | 67  | 0.36935  | 0.0266 | SLC2A1  | 0.2947 |
|   | 68  | -0.77279 | 0.0266 | F3      | 0.2947 |
|   | 69  | 0.48818  | 0.0288 | TYMS    | 0.3139 |
|   | 70  | -0.46497 | 0.0293 | IL10RA  | 0.315  |
|   | 71  | -0.93275 | 0.0305 | HOXB3   | 0.3184 |
|   | 72  | -0.58278 | 0.0305 | ITGA6   | 0.3184 |
|   | 73  | 0.71083  | 0.0309 | BIRC5   | 0.3184 |
|   | 74  | 1.20579  | 0.0319 | BAMBI   | 0.3237 |
|   | 75  | 0.4602   | 0.0343 | E2F5    | 0.3417 |
|   | 76  | -0.35608 | 0.0356 | MSR1    | 0.3417 |
|   | 77  | -0.84039 | 0.0356 | PLA2G2A | 0.3417 |
|   | 78  | -0.61307 | 0.0358 | CRYAB   | 0.3417 |
|   | 79  | 0.4872   | 0.036  | CEP55   | 0.3417 |
|   | 80  | 0.30895  | 0.0364 | MAD2L1  | 0.3417 |
|   | 81  | -0.77988 | 0.0373 | TIGIT   | 0.3465 |
|   | 82  | 0.49124  | 0.0386 | BNIP3   | 0.3524 |
|   | 83  | -0.41096 | 0.0395 | CDC14B  | 0.3524 |
|   |   |   |   |   |
|---|---|---|---|---|
| 84 | -0.79515 | 0.0398 | THBS4 | 0.3524 |
| 85 | -0.50847 | 0.0398 | ENPP2 | 0.3524 |
| 86 | -0.3216 | 0.0412 | RBL2 | 0.3578 |
| 87 | -0.74399 | 0.0417 | COL27A1 | 0.3578 |
| 88 | -0.68869 | 0.0421 | RARRES3 | 0.3578 |
| 89 | -0.32187 | 0.0423 | PTEN | 0.3578 |
| 90 | -0.50152 | 0.0434 | DTX1 | 0.3626 |
| 91 | 0.41044 | 0.0439 | AXIN2 | 0.3627 |
| 92 | -1.26982 | 0.0451 | AGTR1 | 0.3643 |
| 93 | -0.61532 | 0.046 | PSMB9 | 0.3643 |
| 94 | 0.37399 | 0.0463 | HIST1H2BH | 0.3643 |
| 95 | 0.86764 | 0.0463 | CACNG4 | 0.3643 |
| 96 | -0.57634 | 0.0473 | FHL1 | 0.3643 |
| 97 | -0.66755 | 0.0476 | WNT10A | 0.3643 |
| 98 | 0.85601 | 0.0494 | WT1 | 0.3643 |
| 99 | 0.33127 | 0.0496 | CDC20 | 0.3643 |
| 100 | -0.40392 | 0.0498 | CMKLR1 | 0.3643 |
| 1 | -0.95083 | 0.0005 | HLA_DPA1 | 0.1324 |
| 2 | -0.65546 | 0.0007 | CYBB | 0.1324 |
| 3 | -0.89046 | 0.0008 | HLA_DPBI | 0.1324 |
| 4 | -0.56965 | 0.0012 | FLI1 | 0.1324 |
| 5 | -0.58995 | 0.0013 | KAT2B | 0.1324 |
| 6 | -0.71312 | 0.0016 | RORA | 0.1324 |
| 7 | -1.01917 | 0.0018 | GPX3 | 0.1324 |
| 8 | -0.52235 | 0.0019 | ELK3 | 0.1324 |
| 9 | 0.7043 | 0.0022 | RAC3 | 0.1324 |
| 10 | -0.70144 | 0.0024 | HLA_DRA | 0.1324 |
| 11 | -0.52006 | 0.0026 | PECAM1 | 0.1324 |
| 12 | -0.58599 | 0.0027 | CD84 | 0.1324 |
List of all gene symbols (N = 752) analyzed using the Nanostring BC360 panel.

| Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol | Gene Symbol |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ABCA8       | BCAS1       | CCL7        | CDKN1A      | CXADR       | EIF2AK3     | FHL1        | GREM1       | HLA_E       |
| ACTR3B      | BCL11A      | CCL8        | CDKN1B      | CXCL10      | EIF3B       | FLI1        | GRIA3       | HMGA1       |
| ACVR1B      | BCL2        | CCNA1       | CDKN1C      | CXCL12      | EIF4E2      | FLNC        | GRIN1       | HNF1A       |
| ACVR1C      | BCL2A1      | CCNA2       | CDKN2A      | CXCL13      | EIF4EBP1    | FLRT3       | GRIN2A      | HOXA5       |
| ACVRL1      | BCL2L1      | CNB1        | CDKN2B      | CXCL5       | ELF3        | FLT3        | GSK3B       | HOXA7       |
| ADAM12      | BCL6B       | CCND1       | CDKN2C      | CXCL8       | ELK3        | FNBP1       | GTF2H2      | HOX9        |
| ADCY9       | BDNF        | CCND2       | CDKN2D      | CXCL9       | ELOVL2      | FOS         | GZMA        | HOXB13      |
| ADD1        | BIRC5       | CENK1       | CDKN3       | CXCR6       | EMCN        | FOSL1       | GZMB        | HOXB3       |
| ADM         | BLM         | CCNE1       | CEACAM5     | CXorf36     | ENO1        | FOA1        | GZMH        | HSPA2       |
| AGR2        | BLVR2       | CCR1        | CEACAM6     | CXCC5       | ENP2        | FOXC1       | GZMM        | IBSP        |
| AGT         | BMP2        | CCR2        | CENPF       | CYBB        | EP300       | FOXC2       | HAPLN1      | ICAM1       |
| AGTR1       | BMP4        | CCR5        | CEP55       | CYP4F3      | EPAS1       | FOXM1       | HAS1        | ID1         |
| AKT3        | BMP5        | CDF5        | CFDP1       | DCR        | EREG        | FST         | HDAC10      | IDO1        |
| ALDH1A1     | BMP6        | CD19        | CHAD        | DDB2        | ERBB2       | FOXP3       | HBB         | ID2         |
| ALDOA       | BMP7        | CD1E        | CHEK2       | DDR2        | EREG        | FST         | HDAC10      | IDO1        |
| ANGPT1      | BMP8A       | CD24        | CHI3L1      | DDX39A      | ESPL1       | FSTL1       | HDAC11      | IFT140      |
| ANLN        | BMPR1A1     | CD27        | CHIT1       | DEPDC1      | ESR1        | FSTL3       | HDAC22      | IG1F        |
| ANXA9       | BMPR1B      | CD274       | CHRNA5      | DHR52       | ETV4        | FUT3        | HDAC5       | IGF1R       |
| APH1B       | BMPR2       | CD276       | CKB         | DKK1        | ETV7        | FXYD3       | HDAC6       | IKZF3       |
| APOD        | BNC2        | CD34        | CKMT1A      | DKK2        | EXO1        | FZD10       | HCC         | IL10RA      |
| APOE        | BNP3        | CD36        | C5K5B       | DFGAP5      | EYA1        | FZD7        | HEG1        | I11RA       |
| AR          | BORCS7      | CD44        | CLDN1       | DLL1        | EYA2        | FZD8        | HELLS       | IL12RB2     |
| AREG        | BRCA1       | CD68        | CLDN3       | DLL3        | EYA4        | FZD9        | HEMK1       | I13RA       |
| ARID1A      | BRCA2       | CD84        | CLDN4       | DLL4        | F3          | GABRP       | HES1        | I1B         |
| ARNT2       | BTG2        | CD8A        | CLDN7       | DNAJC12     | FAM124B     | GADD45A     | HGF         | I1R2        |
| ASPM        | C5orf38     | CD6B        | CLEC14A     | DPT         | FAM198B     | GADD45B     | HIF1A       | I1RN        |
| ASPN        | CA12        | CDC14A      | CLEC5A      | DSC2        | FAM214A     | GADD45G     | HIST1H1C    | I120RA      |
| ATAD2       | CACNA1D     | CDC14B      | CMKLR1      | DTX1        | FAM83D      | GAS1        | HIST1H2B    | IL2RB       |
| ATM          | CACNA1H     | CDC20       | CNTFR       | DTX3        | FANCF       | GATA3       | HIST1H3     | IL22RA      |
| ATP10B      | CACNA2D1    | CDC25A      | COL11A1     | DTX4        | FAP         | GATA4       | HIST3H2BB   | IL24        |
| AURKA       | CACNA2D3    | CDC25B      | COL27A1     | DUSP4       | FBN1        | GDF15       | HK2         | IL2RA       |
| AURKB       | CACNG1      | CDC25C      | COL2A1      | DUSP6       | GF1         | GDF5        | HLA_A       | IL2RB       |
| AXIN1       | CACNG4      | CDC6        | COL4A6      | E2F1        | GF10        | GGH         | HLA_B       | IL3RA       |
| AXIN2       | CACNG6      | CDC7        | COL6A3      | E2F5        | GF12        | GHR         | HLA_C       | IL4R        |
| B3GNT3      | CALML5      | CDC8A       | COL7A1      | ECM2        | GF13        | GJB2        | HLA_DMA     | IL6         |
| BAD         | CAMK2B      | CDCA7L      | COL9A3      | EDN1        | GF18        | GLI3        | HLA_DMB     | IL6R        |
| BAG1        | CAV1        | COLEC12     | EDNRB       | FGF2        | GNG4        | HLA_DOB     | IL7R        |
| BAIAP2L1    | CBLC        | CDH1        | COMP        | EFNA3       | FGF7        | GNLY        | HLA_DPA     | INHBA       |
| BAIAP3      | CCL2        | CDH2        | CPA3        | EFNA5       | FGF9        | GPC4        | HLA_DPB1    | INHBB       |
| BAMBI       | CCL21       | CDH3        | CREBBP      | EGF         | FGFR2       | GPR160      | HLA_DQA1    | IRF6        |
| BAX         | CCL3L1      | CDH5        | CRYAB       | EGFR        | FGFR3       | GPX3        | HLA_DQB1    | IRX1        |

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| BBC3  | CCL4  | CDK1  | CSF3R | EGLN2 | FGFR4 | GRB2 | HLA_DRA | ISG15 |
|-------|-------|-------|-------|-------|-------|-------|---------|-------|
| BBOX1 | CCL5  | CDK6  | CTSW  | EGLN3 | FGL2  | GRB7 | HLA_DRB1 | ISM1  |
| ITGA6 | LINC02381 | MUC1 | PALB2 | POPDC3 | RBX1 | SMAD3 | TGFBR3 | WEE1  |
| ITGAV | LPL   | MUS81 | PALMD | PPARG  | RELN | SMAD4 | TGFBR2 | WIFI1 |
| ITGB1 | LRP2  | MYBL2 | PARP1 | PPARGC1A | RFC4 | SMAD5 | THBS1 | WNT10A |
| ITGB3 | LRRC32 | MYC   | PARP2 | PPP2CB | RNASE2 | SMC1B | THBS2 | WNT11 |
| ITGB6 | LTB   | MYCN  | PARP4 | PPP2R1A | RNF103 | SMO  | THBS4 | WNT2  |
| ITPR1 | LTBP1 | MYCT1 | PA5X  | PPP2R2C | ROB04 | SMURF2 | THY1  | WNT4  |
| JAG1  | MAD2L1 | NASP  | PAX8  | PRC1   | ROCK1 | SNA11 | TIE1   | WNT5A |
| JAG2  | MAF   | NAT1  | PBX3  | PREP   | ROCK2 | SNA12 | TIGIT  | WNT5B |
| JAK1  | MAML2 | NCAM1 | PCK1  | PRF1   | RORA  | SOCS1 | TIPM4  | WNT6  |
| JAK2  | MAP2K4 | NCAPH2 | PCNA  | PRKAA2 | RORB  | SOCS2 | TLE3   | WNT7B |
| JAK3  | MAP3K12 | NDC80 | PDCD1 | PRKACA | RPS6KA5 | SOCS3 | TLR4   | WRN   |
| JAM2  | MAPK1 | NDP   | PDCD1L2 | PRKACB | RPS6KB1 | SOX10 | TLX1   | WT1   |
| JCAD  | MAPK10 | NEIL1 | PDE9A | PRKCA  | RPS6KB2 | SOX17 | TMEM45B | XRCC2 |
| JUN   | MAPK3 | NEIL3 | PDGFB | PRKCB  | RRM2   | SOX2  | TMPRSS2 | XRCC3 |
| KAT2B | MAPK8| IP2 | NEO1 | PDGFRB | PRKDC | RUNX3 | SOX9   | TMPRSS4 | ZBTB16 |
| KCNB1 | MAPT  | NETO2 | PDGFRB | PRKX  | S100A14 | SP1   | TNF    | ZEB1  |
| KDR   | MARCO | NFACT1 | PDK4 | PRLR   | S100A7 | SPC25 | TNFAIP6 | ZEB2  |
| KIAA0040 | MCM2 | NFKBIZ | PECAM1 | PROM1 | S1PR1 | SPDEF | TNFSF10 | ZFPM2 |
| KIF11 | MCM3  | NGFR  | PFDN2 | PSAT1  | SCARA5 | SPN  | TNKS   | ZFYVE9 |
| KIF14 | MDM2 | NGK7  | PGK1  | PSMB10 | SCUBE2 | SPP1  | TNKS2  | ZIC2  |
| KIF23 | MED1  | NOD2  | PGR   | PSMB7  | SELE   | SPRY1 | TNN    | ZNF205 |
| KIF2C | MELK  | NOTCH1 | PHGDH | PSMB9  | SERBP1 | SPRY2 | TOP2A  |       |
| KIFC1 | MEOX2 | NOTCH2 | PIK3CA | PTCH1  | SERPINB5 | SPRY4 | TP53   |       |
| KIT   | MET   | NOTCH3 | PIK3CD | PTEN  | SERPINH1 | SRPX  | TPSAB1 |       |
| KLRK1 | MFNG  | NPEPSS | PIK3CG | PTGDS  | SFN    | ST6GALNAC2 | TRIP13 |
| KRT14 | MIA   | NPR1  | PIK3R1 | PTGER3 | SFRP1  | STAT1 | TSPAN1 |       |
| KRT17 | MIS18A | NR4A1 | PIK3R2 | PTG52  | SFRP2  | STC1  | TSPAN7 |       |
| KRT5  | MKI67 | NR4A3 | PIK3R3 | PTGT1  | SFRP4  | SUV39H2 | TTK   |
| KRT6B | MLH1  | NRCAM | PIK3R5 | PYCARD | SHC2   | SYTL4 | TTYH1  |       |
| KRT7  | MLLT3 | NRXN1 | PIM1  | RAC2   | SHC4   | TAP1  | TUBA4A |       |
| LAD1  | MLPH  | NRXN3 | PIP   | RAC3   | SHE    | TAP2  | TWIST1 |       |
| LAG3  | MME   | NSD1  | PKMYT1 | RAD51  | SHMT2  | TAPBP | TWIST2 |       |
| LAMA3 | MMP11 | NSD3  | PLA2G2A | RAD51C | SIDD1 | TBC1D9 | TYK2  |       |
| LAMB3 | MMP14 | NTRK2 | PLA2G3 | RAD52  | SIGIRR | TBX1  | TYMP   |       |
| LAMC2 | MMP3  | NUDT1 | PLA2G4A | RAD54L | SIX1   | TCEAL1 | TYMS  |       |
| LEF1  | MMP7  | NU2F  | PLA2G4F | RARRES3 | SKA3  | TCF4  | UBE2C  |       |
| LEFTY2 | MMP9 | NUMBL | PLAT  | RASAL1 | SKP1  | TCF7L1 | UBE2T  |       |
| LEMD1 | MMNR2 | NUPR1 | PLCB1 | RASGRF1 | SKP2  | TEK   | VCAN   |       |
| LEP   | MRE11 | OAS3  | PLCB4 | RASGRF2 | SLC2A1 | TFDP1 | VEGFA  |       |
| LEPR  | MS4A2 | OCLN  | PLCE1 | RASGRP1 | SLC39A6 | TFF1  | VEGFD  |       |
| LFNG  | MSR1  | OGN   | PLD1  | RB1    | SLC44A4 | TFF3  | VIM    |       |

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| LIF  | MT1G | OLFML2B | POLD1 | RBL1 | SLPI | TGFB1 | VIT |
|------|------|---------|-------|------|------|-------|-----|
| LIFR | MTOR | ORC6    | POLQ  | RBL2 | SMAD1| TGFB2 | WDR77|