

Table S1. The patients with stage 3 disease showed higher BMP5 levels than those of Stage 2.

| No. | Age | Pathology diagnosis (BR1507) | TNM | Grade | Stage | BMP5 |
|-----|-----|------------------------------|--------|-------|-------|------|
| A1 | 50 | Invasive ductal carcinoma | T2N0M0 | 1 | IIA | 2 |
| A2 | | | | | | 2 |
| A3 | | | | | | 2 |
| A4 | 45 | Invasive ductal carcinoma | T3N0N0 | 2 | IIB | 2 |
| A5 | | | | | | 2 |
| A6 | | | | | | 2 |
| A7 | 54 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 3 |
| A8 | | | | | | 2 |
| A9 | | | | | | 3 |
| A10 | 50 | Invasive ductal carcinoma | T3N0M0 | 1 | IIB | 2 |
| A11 | | | | | | 2 |
| A12 | | | | | | 1 |
| A13 | 71 | Invasive ductal carcinoma | T4N2M0 | 2 | IIIB | 2 |
| A14 | | | | | | 1 |
| A15 | | | | | | 3 |
| B1 | 52 | Invasive ductal carcinoma | T3N1M0 | 2 | IIIA | 0 |
| B2 | | | | | | 0 |
| B3 | | | | | | 1 |
| B4 | 70 | Invasive ductal carcinoma | T4N2M0 | 1 | IIIB | 2 |
| B5 | | | | | | 1 |
| B6 | | | | | | 1 |
| B7 | 55 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 2 |
| B8 | | | | | | 1 |
| B9 | | | | | | 1 |
| B10 | 48 | Invasive ductal carcinoma | T2N1M0 | 1 | IIB | 2 |
| B11 | | | | | | 2 |
| B12 | | | | | | 2 |
| B13 | 43 | Invasive ductal carcinoma | T2N1M0 | 1 | IIB | 3 |
| B14 | | | | | | 3 |
| B15 | | | | | | 3 |
| C1 | 52 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 1 |
| C2 | | | | | | 1 |
| C3 | | | | | | 1 |
| C4 | 23 | Invasive ductal carcinoma | T3N1M0 | 2 | IIIA | 1 |
| C5 | | | | | | 2 |
| C6 | | | | | | 2 |
| C7 | 61 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 1 |
| C8 | | | | | | 2 |
| C9 | | | | | | 1 |
| C10 | 51 | Invasive ductal carcinoma | T3N2M0 | 2 | IIIA | 2 |
| C11 | | | | | | 2 |
| C12 | | | | | | 3 |
| C13 | 68 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 3 |
| C14 | | | | | | 3 |
| C15 | | | | | | 3 |
| D1 | 51 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 2 |
| D2 | | | | | | 1 |
| D3 | | | | | | 2 |
| D4 | 52 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 3 |
| D5 | | | | | | n.d. |
| D6 | | | | | | 3 |
| D7 | 74 | Invasive ductal carcinoma | | | | 2 |

| | | | | | | |
|-----|----|---------------------------|--------|---|------|---|
| D8 | | | T2N1M0 | 1 | IIB | 2 |
| D9 | | | | | | 2 |
| D10 | | | | | | 2 |
| D11 | 56 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 2 |
| D12 | | | | | | 2 |
| D13 | | | | | | 2 |
| D14 | 49 | Invasive ductal carcinoma | T2N0M0 | 1 | IIA | 2 |
| D15 | | | | | | 2 |
| E1 | | | | | | 1 |
| E2 | 53 | Invasive ductal carcinoma | T4N0M0 | 2 | IIIB | 1 |
| E3 | | | | | | 0 |
| E4 | | | | | | 1 |
| E5 | 37 | Invasive ductal carcinoma | T4N0M0 | 1 | IIIB | 1 |
| E6 | | | | | | 2 |
| E7 | | | | | | 1 |
| E8 | 57 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 2 |
| E9 | | | | | | 3 |
| E10 | | | | | | 2 |
| E11 | 48 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 3 |
| E12 | | | | | | 2 |
| E13 | | | | | | 1 |
| E14 | 58 | Invasive ductal carcinoma | T3N1M0 | 2 | IIIA | 1 |
| E15 | | | | | | 1 |
| F1 | | | | | | 1 |
| F2 | 43 | Invasive ductal carcinoma | T2N0M0 | 1 | IIA | 2 |
| F3 | | | | | | 3 |
| F4 | | | | | | 2 |
| F5 | 62 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 2 |
| F6 | | | | | | 1 |
| F7 | | | | | | 3 |
| F8 | 61 | Invasive ductal carcinoma | T2N0M0 | 2 | IIIB | 3 |
| F9 | | | | | | 3 |
| F10 | | | | | | 3 |
| F11 | 55 | Invasive ductal carcinoma | T2N0M0 | 1 | IIA | 2 |
| F12 | | | | | | 2 |
| F13 | | | | | | 1 |
| F14 | 63 | Invasive ductal carcinoma | T4N0M0 | 2 | IIIB | 1 |
| F15 | | | | | | 1 |
| G1 | | | | | | 1 |
| G2 | 42 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 1 |
| G3 | | | | | | 2 |
| G4 | | | | | | 0 |
| G5 | 55 | Invasive ductal carcinoma | T2N2M0 | 2 | IIIA | 0 |
| G6 | | | | | | 1 |
| G7 | | | | | | 2 |
| G8 | 81 | Invasive ductal carcinoma | T2N2M0 | 2 | IIIA | 2 |
| G9 | | | | | | 2 |
| G10 | | | | | | 3 |
| G11 | 78 | Invasive ductal carcinoma | T4N0M0 | 2 | IIIB | 3 |
| G12 | | | | | | 3 |
| G13 | | | | | | 2 |
| G14 | 37 | Invasive ductal carcinoma | T2N2M0 | 2 | IIIA | 3 |
| G15 | | | | | | 2 |
| H1 | 34 | Invasive ductal carcinoma | | | | 0 |

| | | | | | | |
|-----|----|------------------------------|--------|---|------|---|
| H2 | | | T4N0M0 | 2 | IIIB | 0 |
| H3 | | | | | | 1 |
| H4 | | | | | | 0 |
| H5 | 69 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 0 |
| H6 | | | | | | 0 |
| H7 | | | | | | 2 |
| H8 | 41 | Invasive ductal carcinoma | T2N0M0 | 1 | IIA | 2 |
| H9 | | | | | | 2 |
| H10 | | | | | | 2 |
| H11 | 47 | Invasive ductal carcinoma | T4N1M0 | 2 | IIIB | 2 |
| H12 | | | | | | 2 |
| H13 | | | | | | 0 |
| H14 | 56 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 1 |
| H15 | | | | | | 2 |
| I1 | 50 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 1 |
| I2 | | | | | | 1 |
| I3 | | | | | | 1 |
| I4 | 40 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 1 |
| I5 | | | | | | 2 |
| I6 | | | | | | 1 |
| I7 | 38 | Invasive lobular carcinoma | T2N0M0 | - | IIA | 1 |
| I8 | | | | | | 2 |
| I9 | | | | | | 2 |
| I10 | 49 | Invasive lobular carcinoma | T2N0M0 | - | IIA | 3 |
| I11 | | | | | | 2 |
| I12 | | | | | | 3 |
| I13 | 49 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 3 |
| I14 | | | | | | 3 |
| I15 | | | | | | 2 |
| J1 | 43 | Invasive papillary carcinoma | T2N1M0 | - | IIB | 1 |
| J2 | | | | | | 1 |
| J3 | | | | | | 1 |
| J4 | 40 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 0 |
| J5 | | | | | | 0 |
| J6 | | | | | | 0 |
| J7 | 45 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 1 |
| J8 | | | | | | 1 |
| J9 | | | | | | 2 |
| J10 | 35 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 1 |
| J11 | | | | | | 1 |
| J12 | | | | | | 1 |
| J13 | 50 | Invasive ductal carcinoma | T4N2M0 | 2 | IIIB | 2 |
| J14 | | | | | | 2 |
| J15 | | | | | | 2 |

| No. | Age | Pathology diagnosis (BR1508) | TNM | Grade | Stage | BMP5 |
|-----|-----|------------------------------|--------|-------|-------|------|
| A1 | 42 | Invasive ductal carcinoma | T3N0N0 | 2 | IIB | 3 |
| A2 | | | | | | 3 |
| A3 | | | | | | 2 |
| A4 | 70 | Invasive ductal carcinoma | T3N0N0 | 2 | IIB | 1 |
| A5 | | | | | | 1 |
| A6 | | | | | | 2 |
| A7 | 48 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 3 |
| A8 | | | | | | 3 |

| | | | | | | |
|-----|----|---------------------------|--------|---|------|---|
| A9 | | | | | | 3 |
| A10 | 46 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 1 |
| A11 | | | | | | 2 |
| A12 | | | | | | 2 |
| A13 | | | | | | 3 |
| A14 | 46 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 2 |
| A15 | | | | | | 3 |
| B1 | | | | | | 3 |
| B2 | 54 | Invasive ductal carcinoma | T3N0N0 | 2 | IIB | 3 |
| B3 | | | | | | 3 |
| B4 | | | | | | 2 |
| B5 | 36 | Invasive ductal carcinoma | T3N0N0 | 1 | IIB | 2 |
| B6 | | | | | | 2 |
| B7 | | | | | | 2 |
| B8 | 52 | Invasive ductal carcinoma | T3N0N0 | 2 | IIB | 3 |
| B9 | | | | | | 3 |
| B10 | | | | | | 2 |
| B11 | 31 | Invasive ductal carcinoma | T4N2M0 | 1 | IIIB | 2 |
| B12 | | | | | | 3 |
| B13 | | | | | | 3 |
| B14 | 48 | Invasive ductal carcinoma | T2N0M0 | 1 | IIA | 3 |
| B15 | | | | | | 3 |
| C1 | | | | | | 2 |
| C2 | 48 | Invasive ductal carcinoma | T4N1M0 | 2 | IIIB | 2 |
| C3 | | | | | | 2 |
| C4 | | | | | | 3 |
| C5 | 37 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 3 |
| C6 | | | | | | 2 |
| C7 | | | | | | 2 |
| C8 | 60 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 3 |
| C9 | | | | | | 2 |
| C10 | | | | | | 2 |
| C11 | 75 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 2 |
| C12 | | | | | | 3 |
| C13 | | | | | | 3 |
| C14 | 58 | Invasive ductal carcinoma | T3N2M0 | 2 | IIIA | 3 |
| C15 | | | | | | 3 |
| D1 | | | | | | 3 |
| D2 | 50 | Invasive ductal carcinoma | T4N1M0 | 3 | IIIB | 2 |
| D3 | | | | | | 2 |
| D4 | | | | | | 1 |
| D5 | 28 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 2 |
| D6 | | | | | | 1 |
| D7 | | | | | | 1 |
| D8 | 40 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 1 |
| D9 | | | | | | 2 |
| D10 | | | | | | 3 |
| D11 | 36 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 3 |
| D12 | | | | | | 3 |
| D13 | | | | | | 3 |
| D14 | 46 | Invasive ductal carcinoma | T3N0M0 | 2 | IIB | 3 |
| D15 | | | | | | 3 |
| E1 | | | | | | 1 |
| E2 | 42 | Invasive ductal carcinoma | T4N0M0 | 2 | IIIB | 1 |

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|-----|----|---------------------------|--------|-----|------|---|
| E3 | | | | | | 1 |
| E4 | 42 | Invasive ductal carcinoma | T2N1M0 | 1-2 | IIB | 1 |
| E5 | | | | | | 2 |
| E6 | | | | | | 2 |
| E7 | | | | | | 3 |
| E8 | 36 | Invasive ductal carcinoma | T3N0M0 | 1 | IIB | 3 |
| E9 | | | | | | 3 |
| E10 | | | | | | 2 |
| E11 | 66 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 3 |
| E12 | | | | | | 3 |
| E13 | | | | | | 2 |
| E14 | 49 | Invasive ductal carcinoma | T4N0M0 | 2 | IIIB | 1 |
| E15 | | | | | | 2 |
| F1 | | | | | | 1 |
| F2 | 49 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 1 |
| F3 | | | | | | 0 |
| F4 | | | | | | 2 |
| F5 | 48 | Invasive ductal carcinoma | T2N2M0 | 3 | IIIA | 1 |
| F6 | | | | | | 2 |
| F7 | | | | | | 2 |
| F8 | 37 | Invasive ductal carcinoma | T3N0M0 | 3 | IIB | 3 |
| F9 | | | | | | 2 |
| F10 | | | | | | 1 |
| F11 | 48 | Invasive ductal carcinoma | T3N0M0 | 3 | IIB | 2 |
| F12 | | | | | | 1 |
| F13 | | | | | | 2 |
| F14 | 42 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 3 |
| F15 | | | | | | 2 |
| G1 | | | | | | 2 |
| G2 | 42 | Invasive ductal carcinoma | T4N2M0 | 1 | IIIB | 1 |
| G3 | | | | | | 1 |
| G4 | | | | | | 2 |
| G5 | | | | | | 1 |
| G6 | 50 | Invasive ductal carcinoma | T2N2M0 | 2 | IIIA | 3 |
| G7 | | | | | | 2 |
| G8 | | | | | | 2 |
| G9 | 63 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 2 |
| G10 | | | | | | 2 |
| G11 | | | | | | 3 |
| G12 | 34 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 3 |
| G13 | | | | | | 2 |
| G14 | | | | | | 3 |
| G15 | 50 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 3 |
| H1 | | | | | | 3 |
| H2 | | | | | | 2 |
| H3 | 39 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 2 |
| H4 | | | | | | 1 |
| H5 | | | | | | 2 |
| H6 | 54 | Invasive ductal carcinoma | T4N0M0 | 3 | IIIB | 0 |
| H7 | | | | | | 0 |
| H8 | | | | | | 0 |
| H9 | 49 | Invasive ductal carcinoma | T2N0M0 | 2 | IIA | 2 |
| H10 | | | | | | 2 |
| H11 | | | | | | 3 |
| | 55 | Invasive ductal carcinoma | T4N2M0 | 2 | IIIB | 0 |
| | | | | | | 0 |
| | | | | | | 0 |

| | | | | | | |
|-----|----|---|--------|-----|------|---|
| H12 | | | | | | 0 |
| H13 | | | | | | 1 |
| H14 | 32 | Invasive ductal carcinoma | T3N1M0 | 2 | IIIA | 1 |
| H15 | | | | | | 1 |
| I1 | | | | | | 0 |
| I2 | 53 | Invasive ductal carcinoma | T4N1M0 | 2-3 | IIIB | 0 |
| I3 | | | | | | 0 |
| I4 | | | | | | 1 |
| I5 | 44 | Invasive ductal carcinoma | T2N0M0 | 3 | IIA | 1 |
| I6 | | | | | | 1 |
| I7 | | | | | | 1 |
| I8 | 70 | Invasive ductal carcinoma | T4N2M0 | 2 | IIIB | 1 |
| I9 | | | | | | 1 |
| I10 | | | | | | 1 |
| I11 | 48 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 1 |
| I12 | | | | | | 1 |
| I13 | | | | | | 2 |
| I14 | 68 | Invasive ductal carcinoma | T2N1M0 | 2 | IIB | 2 |
| I15 | | | | | | 2 |
| J1 | | | | | | 0 |
| J2 | 28 | Invasive cribriform carcinoma | T3N0M0 | 2 | IIB | 1 |
| J3 | | | | | | 1 |
| J4 | | | | | | 0 |
| J5 | 48 | Squamous cell carcinoma | T4N0M0 | 2 | IIIB | 0 |
| J6 | | | | | | 0 |
| J7 | | | | | | 1 |
| J8 | 42 | Mixed invasive lobular and duct carcinoma | T2N1M0 | - | IIB | 1 |
| J9 | | | | | | 1 |
| J10 | | | | | | 1 |
| J11 | 48 | Medullary carcinoma | T3N0M0 | - | IIB | 1 |
| J12 | | | | | | 1 |
| J13 | | | | | | 3 |
| J14 | 41 | Medullary carcinoma | T2N1M0 | - | IIB | 3 |
| J15 | | | | | | 3 |

n.d. not determined

| Scoring | 0 | 1 | 2 | 3 | 4 | 5 |
|--------------------|------|--------|--------|--------|--------|---------|
| % of stained cells | <10% | 10~20% | 20~40% | 40~60% | 60~80% | 80~100% |