### Table S1. Baseline clinicopathologic characteristics by surgery type

|                                | Subtotal colectomy/hemicolectomy N=13262 | Total colectomy/proctocolectomy N=783 | Partial colectomy/segmental/Local excision N=11706 | Colectomy, NOS N=550 | P.overall | P.trend |
|--------------------------------|------------------------------------------|----------------------------------------|-----------------------------------------------|----------------------|-----------|---------|
| **Year at diagnosis. median [IQR]** |                                            |                                        |                                               |                      |           |         |
| 2000-2009                       | 6013 (45.3%)                             | 330 (42.1%)                            | 5458 (46.6%)                                  | 267 (48.5%)          | 0.017     | 0.022   |
| 2010-2018                       | 7249 (54.7%)                             | 453 (57.9%)                            | 6248 (53.4%)                                  | 283 (51.5%)          |           |         |
| **Age at diagnosis. median [IQR]** |                                            |                                        |                                               |                      |           |         |
| ≤ 49                            | 1806 (13.6%)                             | 167 (21.3%)                            | 1996 (17.1%)                                  | 129 (23.5%)          | <0.001    | <0.001  |
| 50-59                           | 2700 (20.4%)                             | 166 (21.2%)                            | 2682 (22.9%)                                  | 136 (24.7%)          | <0.001    | <0.001  |
| 60-69                           | 3337 (25.2%)                             | 209 (26.7%)                            | 3032 (25.9%)                                  | 132 (24.0%)          | <0.001    | <0.001  |
| 70-79                           | 3056 (23.0%)                             | 133 (17.0%)                            | 2397 (20.5%)                                  | 99 (18.0%)           | <0.001    |         |
| ≥ 80                            | 2363 (17.8%)                             | 108 (13.8%)                            | 1599 (13.7%)                                  | 54 (9.82%)           | <0.001    |         |
| **Race. n (%)**                 |                                            |                                        |                                               |                      | 0.13      |         |
| White                           | 9987 (75.3%)                             | 601 (76.8%)                            | 9027 (77.1%)                                  | 410 (74.5%)          |           |         |
| Black                           | 2239 (16.9%)                             | 133 (17.0%)                            | 1444 (12.3%)                                  | 77 (14.0%)           |           |         |
| Other                           | 1011 (7.62%)                             | 48 (6.13%)                             | 1214 (10.4%)                                  | 61 (11.1%)           |           |         |
| Missing                         | 25 (0.19%)                               | 1 (0.13%)                              | 21 (0.18%)                                    | 2 (0.36%)            | <0.001    | 0.007   |
| **Sex. n (%)**                  |                                            |                                        |                                               |                      |           |         |
| Female                          | 6552 (49.4%)                             | 359 (45.8%)                            | 5348 (45.7%)                                  | 381 (69.3%)          | <0.001    | 0.007   |
| Male                            | 6710 (50.6%)                             | 424 (54.2%)                            | 6358 (54.3%)                                  | 169 (30.7%)          | 0.001     | 0.004   |
| **Marital status. n (%)**       |                                            |                                        |                                               |                      |           |         |
| Never married                   | 2324 (17.5%)                             | 149 (19.0%)                            | 2031 (17.4%)                                  | 111 (20.2%)          | 0.017     | 0.022   |
| Married                         | 6989 (52.7%)                             | 408 (52.1%)                            | 6457 (55.2%)                                  | 289 (52.5%)          |            |         |
| Widowed/Divorced/Separated      | 3434 (25.9%)                             | 204 (26.1%)                            | 2814 (24.0%)                                  | 125 (22.7%)          |           |         |
| NA                              | 515 (3.88%)                              | 22 (2.81%)                             | 404 (3.45%)                                    | 25 (4.55%)           | 0.017     | 0.001   |
| **Previous tumor history. n (%)** |                                            |                                        |                                               |                      |           |         |
| No                              | 11579 (87.3%)                            | 669 (85.4%)                            | 10369 (88.6%)                                 | 498 (90.5%)          | 0.001     | 0.001   |
| Yes                             | 1683 (12.7%)                             | 114 (14.6%)                            | 1337 (11.4%)                                  | 52 (9.45%)           |           |         |
| **Lifetime number of tumors. n (%)** |                                            |                                        |                                               |                      |           |         |
| 1                               | 10650 (80.3%)                            | 566 (72.3%)                            | 9710 (82.9%)                                  | 460 (83.6%)          | <0.001    | <0.001  |
| 2                               | 2183 (16.5%)                             | 160 (20.4%)                            | 1664 (14.2%)                                  | 74 (13.5%)           | <0.001    | <0.001  |
| 3+                              | 429 (3.23%)                              | 57 (7.28%)                             | 332 (2.84%)                                    | 16 (2.91%)           | <0.001    | <0.001  |
| **Site of the tumor. n (%)**    |                                            |                                        |                                               |                      |           |         |
| Ascending Colon                 | 5385 (40.6%)                             | 133 (17.0%)                            | 794 (6.78%)                                    | 85 (15.5%)           | <0.001    |         |
| Hepatic Flexure                 | 1357 (10.2%)                             | 37 (4.73%)                             | 201 (1.72%)                                    | 21 (3.82%)           | <0.001    |         |
| Transverse Colon                | 1839 (13.9%)                             | 109 (13.9%)                            | 1247 (10.7%)                                  | 68 (12.4%)           | <0.001    | <0.001  |
| Splenic Flexure                 | 734 (5.53%)                              | 43 (5.49%)                             | 586 (5.01%)                                    | 22 (4.00%)           | <0.001    |         |
| Descending Colon                | 1403 (10.6%)                             | 83 (10.6%)                             | 727 (6.21%)                                    | 35 (6.36%)           | <0.001    |         |
| Sigmoid Colon                   | 1860 (14.0%)                             | 322 (41.1%)                            | 7899 (67.5%)                                  | 286 (52.0%)          | <0.001    |         |
| Large Intestine, NOS            | 684 (5.16%)                              | 56 (7.15%)                             | 252 (2.15%)                                    | 33 (6.00%)           | <0.001    |         |
| **CEA level. n (%)**            |                                            |                                        |                                               |                      |           | <0.001  |
| Normal/borderline               | 2136 (16.1%)                             | 122 (15.6%)                            | 1611 (13.8%)                                  | 78 (14.2%)           | <0.001    | 0.046   |
| Elevated                       | 6766 (51.0%)                             | 396 (50.6%)                            | 6373 (54.4%)                                  | 268 (48.7%)          |           |         |
| Missing                         | 4360 (32.9%)                             | 265 (33.8%)                            | 3722 (31.8%)                                  | 204 (37.1%)          |           |         |
|                          | 5.00 [4.00;7.00] | 5.00 [4.00;7.00] | 5.00 [3.70;6.00] | 5.40 [4.00;7.00] |
|--------------------------|------------------|------------------|------------------|------------------|
| **Size of tumor. median [IQR]** |                  |                  |                  |                  |
| > 5 cm                   | 6246 (47.1%)     | 355 (45.3%)      | 4601 (39.3%)     | 260 (47.3%)      |
| ≤ 5 cm                   | 6410 (48.3%)     | 358 (45.7%)      | 6487 (55.4%)     | 237 (43.1%)      |
| Missing                  | 606 (4.5%)       | 70 (8.94%)       | 618 (5.28%)      | 53 (9.64%)       |
| **Histology. n (%)**     |                  |                  |                  |                  |
| Adenocarcinoma           | 12647 (95.4%)    | 733 (93.6%)      | 11380 (97.2%)    | 516 (93.8%)      |
| Non-adenocarcinoma       | 615 (4.64%)      | 50 (6.39%)       | 6481 (2.78%)     | 34 (6.18%)       |
| **T stage. n (%)**       |                  |                  |                  |                  |
| T1                       | 121 (0.91%)      | 19 (2.43%)       | 133 (1.14%)      | 7 (1.27%)        |
| T2                       | 316 (2.38%)      | 15 (1.92%)       | 299 (2.55%)      | 7 (1.27%)        |
| T3                       | 7555 (57.0%)     | 378 (48.3%)      | 6899 (58.9%)     | 178 (32.4%)      |
| T4                       | 5270 (39.7%)     | 371 (47.4%)      | 4375 (37.4%)     | 358 (65.1%)      |
| **N stage. n (%)**       |                  |                  |                  |                  |
| N0                       | 2227 (16.8%)     | 159 (20.3%)      | 2298 (19.6%)     | 111 (20.2%)      |
| N1                       | 4508 (34.0%)     | 276 (35.2%)      | 4111 (35.1%)     | 193 (35.1%)      |
| N2                       | 6527 (49.2%)     | 348 (44.4%)      | 5297 (45.3%)     | 246 (44.7%)      |
| **M stage. n (%)**       |                  |                  |                  |                  |
| M1a                      | 4093 (30.9%)     | 215 (27.5%)      | 3796 (32.4%)     | 111 (20.2%)      |
| M1b                      | 2636 (19.9%)     | 204 (26.1%)      | 2111 (18.0%)     | 147 (26.7%)      |
| M1c                      | 153 (1.15%)      | 10 (1.28%)       | 100 (0.85%)      | 10 (1.82%)       |
| nM1                      | 6380 (48.1%)     | 354 (45.2%)      | 5699 (48.7%)     | 282 (51.3%)      |
| **Bone metastasis. n (%)** |                  |                  |                  |                  |
| No                       | 6941 (52.3%)     | 437 (55.8%)      | 5945 (50.8%)     | 268 (48.7%)      |
| Bone                     | 17 (1.35%)       | 11 (1.40%)       | 176 (1.50%)      | 6 (1.09%)        |
| Missing                  | 6142 (46.3%)     | 335 (42.8%)      | 5585 (47.7%)     | 276 (50.2%)      |
| **Brain metastasis. n (%)** |                  |                  |                  |                  |
| No                       | 7048 (53.1%)     | 444 (56.7%)      | 6060 (51.8%)     | 269 (48.9%)      |
| Brain                    | 65 (0.49%)       | 3 (0.38%)        | 49 (0.42%)       | 3 (0.55%)        |
| Missing                  | 6149 (46.4%)     | 336 (42.9%)      | 5597 (47.8%)     | 278 (50.5%)      |
| **Liver metastasis. n (%)** |                  |                  |                  |                  |
| No                       | 2175 (16.4%)     | 164 (20.9%)      | 1559 (13.3%)     | 144 (26.2%)      |
| Liver                    | 5009 (37.8%)     | 287 (36.7%)      | 4626 (39.5%)     | 133 (24.2%)      |
| Missing                  | 6078 (45.8%)     | 332 (42.4%)      | 5521 (47.2%)     | 273 (49.6%)      |
| **Lung metastasis. n (%)** |                  |                  |                  |                  |
| No                       | 6061 (45.7%)     | 388 (49.6%)      | 5094 (43.5%)     | 234 (42.5%)      |
| Lung                     | 1051 (7.92%)     | 58 (7.41%)       | 1027 (8.77%)     | 40 (7.27%)       |
| Missing                  | 6150 (46.4%)     | 337 (43.0%)      | 5585 (47.7%)     | 276 (50.2%)      |
| **Metastasis Site. n (%)** |                  |                  |                  |                  |
| Liver                    | 4266 (32.2%)     | 245 (31.3%)      | 3892 (32.2%)     | 108 (19.6%)      |
| Liver + lung             | 617 (4.65%)      | 33 (4.21%)       | 597 (5.10%)      | 19 (3.45%)       |
| Lung                     | 364 (2.74%)      | 22 (2.81%)       | 342 (2.92%)      | 18 (3.27%)       |
| Bone/brain only or combine with other | 235 (1.77%) | 13 (1.66%) | 219 (1.87%) | 9 (1.64%) |
| Other                    | 1685 (12.7%)     | 138 (17.6%)      | 1120 (9.57%)     | 122 (22.2%)      |
| Missing                  | 6695 (46.0%)     | 332 (42.4%)      | 5536 (47.3%)     | 274 (49.8%)      |
| **The number of metastasis. n (%)** |                  |                  |                  |                  |
| 1                        | 4708 (35.5%)     | 271 (34.6%)      | 4285 (36.6%)     | 128 (23.3%)      |
|                     | Median [IQR]       | P-value    | P-value    |
|---------------------|--------------------|------------|------------|
| No                  | 2.00 [1.00;5.00]   | 0.012      | 0.07       |
| Yes                 | 2.00 [1.00;6.00]   | 0.003      | 0.001      |
| Missing             | 2.00 [1.75;5.00]   | 0.693      | 0.628      |
|                     | 2.00 [1.00;5.00]   |            |            |
| ≤ 2                 | 674 (5.00%)        | 0.012      | 0.001      |
| > 2                 | 647 (4.68%)        |            |            |
| No                  | 4042 (30.5%)       | 20 (3.64%) |            |
| Yes                 | 37 (4.73%)         | 28 (5.09%) |            |
| NA                  | 7899 (59.6%)       | 371 (67.5%)|            |
| Regional lymphnodes examined. n (%) | 17.0 [12.0;23.0] | <0.001   | <0.001   |
| Regional lymphnodes were examined. n (%) | 18.0 [13.0;27.0] | <0.001   | <0.001   |
| Regional lymphnodes positive. n (%) | 4.00 [2.00;8.00] | <0.001   | <0.001   |
| Rate of regional lymphnodes positive. n (%) | 0.29 [0.14;0.57]  | <0.001    | <0.001   |
| Rate of regional lymphnodes positive. n (%) | 0.24 [0.11;0.48]  | <0.001    | <0.001   |
| Rate of regional lymphnodes positive. n (%) | 0.33 [0.15;0.62]  | <0.001    | <0.001   |
| Surgery for distant metastasis organ and lymphnode site. n (%) | 0.734    | <0.001    | <0.001   |
| No                  | 9629 (72.6%)       | 369 (67.1%)|            |
| Yes                 | 3616 (27.3%)       | 180 (32.7%)|            |
| Missing             | 17 (0.13%)         | 1 (0.18%)  |            |
| Radiation therapy. n (%) | 12874 (97.1%)   | 0.193      | 0.05       |
| No/Missing          | 763 (97.4%)        |            |            |
| Yes                 | 392 (3.35%)        | 19 (3.45%) |            |
| Chemotherapy therapy. n (%) | 5111 (38.5%)    | <0.001     | <0.001     |
| No/Missing          | 299 (38.2%)        |            |            |
| Yes                 | 7736 (66.1%)       | 185 (33.6%)|            |

IQR: Interquartile range; CEA: Carcino-embryonic antigen