

**Supplementary Table 1. PCR primer sequences for selected genes.**

| <b>Gene</b>          | <b>Forward primer</b>  | <b>Reverse primer</b>    | <b>Application</b> |
|----------------------|------------------------|--------------------------|--------------------|
| <i>TERT</i>          | CGTCCTGCCCTTCACCTT     | AGCGCTGCCTGAAACTCG       | Sanger             |
| <i>FGFR3 exon6</i>   | AACAAGTTTGGCAGCATCCG   | TTGAGCACGGTAACGTAGGG     | Sanger             |
| <i>FGFR3 exon9</i>   | CAACGCCCATGTCTTTGCAG   | TGAGCAGAGACGAGGAGAGG     | Sanger             |
| <i>FGFR3 exon13</i>  | GAGAGGTGGAGAGGCTTCAG   | CTACTGGCATGACCCCCAC      | Sanger             |
| <i>TP53</i>          | AGGACCTGATTTCTTACTGCC  | CTGAGGCATAACTGCACCCT     | Sanger             |
| <i>PIK3CA exon9</i>  | GAATCCAGAGGGGAAAAATATG | TCCATTTTAGCACTTACCTGTGAC | Sanger             |
| <i>PIK3CA exon20</i> | TTCAGGAGATGTGTTACAAGGC | TCCAGAGTGAGCTTTCATTTTC   | Sanger             |
| <i>ERBB2 exon19</i>  | CCCACGCTCTTCTCACTCAT   | TCCTTCTGTCCTCCTAGCA      | Sanger             |
| <i>ERBB2 exon20</i>  | TGGTCTCCCATACCTCTCA    | CAAAGAGCCCAGGTGCATA      | Sanger             |
| <i>TSC1 exon13-a</i> | GAATACCGACTGCCATTTCT   | AGGGCTTTCATCAGCACTG      | Sanger             |
| <i>TSC1 exon13-b</i> | GCAAGCCTTTACTCCCATAG   | GGCACACCATCTTCCTCTG      | Sanger             |
| <i>TSC1 exon13-c</i> | CAGCCCATCATTTTGTATC    | AGGTGGGAGTGTGAAGAATG     | Sanger             |

**Supplementary Table 2. Detailed clinical characteristics of the bladder carcinoma patients.**

| No. | OS | pT  | pN | pCIS1 | LV1 | TSC1  | FGFR3                 | TP53                 | PIK3CA                 | HER2                         | TERT  | EGFR | RRM1 | PD-L1 | BRCA1 | TUBB3 | ERCC1 | BCMab1 | CK5/6 | Sex | Age | Follow-up/month | Survival Status |
|-----|----|-----|----|-------|-----|---|-----------------------|----------------------|------------------------|------------------------------|-------|------|------|-------|-------|-------|-------|--------|-------|-----|-----|-----------------|-----------------|
| R1  | 1  | 1   | 0  | 0     | 0   | c.1484A>G<br>c.1658C>T<br>c.1596C>T<br>c.1729G>A  | c.746C>G              | c.839G>A             | c.146G>A               | -                            | -     | 3    | 3    | 3     | 2     | 3     | 2     | 2      | 0     | M   | 75  | 25              | DEAD            |
| R2  | 1  | 0   | 0  | 0     | 0   | c.1499G>A   | -                     | -                    | -                      | -                            | -     | 3    | 1    | 2     | 2     | 3     | 2     | 2      | 0     | F   | 45  | 6               | DEAD            |
| R3  | 0  | 1   | 0  | 0     | 0   | -   | -                     | -                    | c.152G>A               | -                            | -     | 2    | 2    | 1     | 2     | 3     | 2     | 1      | 0     | M   | 67  | 61              | ALIVE           |
| R4  | 1  | 1   | 0  | 0     | 0   | c.1726T>C   | -                     | c.839G>A             | -                      | -                            | -     | 2    | 2    | 2     | 3     | 3     | 3     | 1      | 0     | M   | 75  | 25              | DEAD            |
| R5  | 0  | cis | 0  | 1     | 0   | c.1983C>A   | -                     | c.856_863delGAAGAGAA | -                      | -                            | -     | 2    | 3    | 2     | 3     | 3     | 3     | 1      | 0     | M   | 61  | 50              | ALIVE           |
| R6  | 0  | 1   | 0  | 0     | 0   | -   | -                     | -                    | -                      | -                            | -     | 2    | 3    | 1     | 2     | 2     | 2     | 2      | 0     | M   | 53  | 51              | ALIVE           |
| R7  | 0  | cis | 0  | 1     | 0   | c.1499G>A   | c.895G>A              | -                    | -                      | -                            | -     | 2    | 2    | 1     | 2     | 3     | 3     | 1      | 0     | M   | 71  | 49              | ALIVE           |
| R8  | 0  | 0   | 0  | 0     | 0   | c.1499G>A   | -                     | -                    | -                      | -                            | C228T | 3    | 2    | 2     | 1     | 3     | 2     | 2      | 0     | M   | 67  | 55              | ALIVE           |
| R9  | 0  | cis | 0  | 1     | 0   | c.1463A>T<br>c.1513T>C<br>c.1538C>T<br>c.1571C>T<br>c.1624A>G<br>c.1643C>T<br>c.1646A>G<br>c.1952G>A<br>c.1977G>A | c.1114G>T             | -                    | c.1629G>A<br>c.3059G>A | -                            | -     | 2    | 3    | 2     | 3     | 3     | 2     | 2      | 0     | M   | 68  | 28              | ALIVE           |
| R10 | 0  | 1   | 0  | 1     | 0   | -   | -                     | -                    | -                      | c.2301C>G                    | C228T | 2    | 2    | 2     | 3     | 3     | 2     | 1      | 0     | F   | 62  | 15              | DEAD            |
| R11 | 0  | 1   | 0  | 0     | 0   | c.1982G>A   | c.746C>G              | -                    | c.1633G>C              | -                            | -     | 2    | 2    | -     | 3     | 3     | 2     | 2      | 0     | F   | 64  | 13              | DEAD            |
| R12 | 0  | a   | 0  | 0     | 0   | c.1982G>A   | -                     | c.839G>C             | c.1633G>A              | -                            | -     | 2    | 3    | 1     | 3     | 3     | 2     | 2      | 0     | M   | 64  | 45              | ALIVE           |
| R13 | 0  | 1   | 0  | 0     | 1   | c.1982G>A   | -                     | -                    | -                      | c.2585_2586 insAACGTGATGGCC  | -     | 2    | 3    | 2     | 3     | 2     | 3     | 1      | 0     | M   | 50  | 42              | ALIVE           |
| R14 | 0  | 1   | 0  | 0     | 0   | -   | c.1114G>T             | -                    | -                      | -                            | -     | 2    | 3    | -     | 2     | 3     | 3     | 1      | 0     | F   | 74  | 31              | ALIVE           |
| R15 | 0  | 1   | 0  | 0     | 1   | c.1982G>A   | -                     | -                    | -                      | c.2583_2584 insGCAACITTTGATG | -     | 2    | 2    | 3     | 2     | 3     | 2     | 2      | 0     | M   | 50  | 42              | ALIVE           |
| R16 | 0  | cis | 0  | 1     | 0   | c.1763G>A<br>c.1982G>A  | -                     | -                    | -                      | -                            | C228T | 3    | 2    | 2     | 3     | 3     | 3     | 1      | 1     | M   | 71  | 38              | ALIVE           |
| R17 | 0  | cis | 0  | 1     | 0   | -   | c.1224G>A<br>c.121C>T | -                    | -                      | -                            | C250T | 2    | 3    | 2     | 3     | 3     | 2     | 2      | 0     | M   | 58  | 39              | ALIVE           |
| R18 | 0  | 0   | 0  | 0     | 0   | c.1982G>A   | -                     | -                    | -                      | -                            | C228T | 2    | 0    | 3     | 2     | 2     | 2     | 2      | 1     | F   | 61  | 38              | ALIVE           |
| R19 | 0  | 1   | 0  | 0     | 0   | c.1982G>A   | c.746C>G              | -                    | c.1633G>C              | -                            | -     | 2    | 2    | -     | 3     | 3     | 2     | 2      | 0     | F   | 64  | 13              | DEAD            |
| R20 | 0  | 1   | 0  | 1     | 0   | c.1960C>G<br>c.1982G>A  | -                     | -                    | -                      | -                            | -     | 2    | 2    | 3     | 3     | 2     | 3     | 2      | 0     | M   | 61  | 37              | ALIVE           |
| R21 | 0  | cis | 0  | 1     | 0   | c.1982G>A   | -                     | -                    | -                      | -                            | C250T | 2    | 2    | 2     | 3     | 2     | 2     | 2      | 0     | M   | 58  | 36              | ALIVE           |
| R22 | 0  | 1   | 0  | 1     | 0   | c.1983C>A   | -                     | -                    | -                      | -                            | -     | 2    | 2    | 2     | 3     | 3     | 3     | 1      | 0     | M   | 58  | 16              | ALIVE           |
| R23 | 0  | 0   | 0  | 0     | 0   | c.1499G>A<br>c.1982G>A  | -                     | -                    | -                      | -                            | C228T | 2    | 3    | 2     | 3     | 2     | 3     | 1      | 0     | M   | 63  | 28              | ALIVE           |
| R24 | 0  | cis | 0  | 1     | 0   | -   | -                     | -                    | -                      | -                            | -     | 2    | 2    | 3     | 2     | 3     | 3     | 2      | 0     | M   | 71  | 31              | ALIVE           |
| R25 | 0  | 1   | 0  | 0     | 0   | c.1517C>T   | -                     | -                    | -                      | -                            | 失败    | 2    | 2    | 2     | 2     | 3     | 3     | 2      | 1     | M   | 67  | 5               | ALIVE           |
| R26 | 0  | 1   | 0  | 1     | 0   | c.1982G>A   | -                     | -                    | -                      | -                            | -     | 3    | 3    | 2     | 2     | 3     | 3     | 1      | 0     | M   | 58  | 16              | ALIVE           |
| R27 | 0  | 1   | 0  | 0     | 0   | c.1982G>A   | c.1114G>T             | -                    | -                      | -                            | -     | 2    | 2    | 2     | 2     | 3     | 3     | 2      | 0     | F   | 74  | 31              | ALIVE           |
| R28 | 0  | 1   | 0  | 1     | 0   | c.1499G>A   | c.895G>A              | -                    | -                      | -                            | -     | 3    | 2    | 2     | 2     | 3     | 2     | 1      | 0     | M   | 61  | 37              | ALIVE           |
| R29 | 0  | 1   | 0  | 1     | 0   | c.1515G>A   | -                     | -                    | -                      | -                            | -     | 2    | 3    | 3     | 2     | 2     | 3     | 2      | 0     | M   | 57  | 29              | ALIVE           |
| R30 | 0  | 1   | 0  | 0     | 0   | c.1982G>A   | -                     | -                    | -                      | -                            | -     | 2    | 2    | 2     | 2     | 3     | 2     | 2      | 0     | F   | 66  | 8               | ALIVE           |
| R31 | 0  | 1   | 0  | 0     | 0   | c.1982G>A   | -                     | -                    | -                      | -                            | -     | 3    | 2    | 2     | 2     | 3     | 3     | 2      | 0     | M   | 45  | 27              | ALIVE           |
| R32 | 0  | 1   | 0  | 0     | 0   | c.1763G>A   | c.895G>A              | -                    | -                      | -                            | C228T | 2    | 3    | 3     | 2     | 2     | 2     | 1      | 1     | M   | 67  | 5               | ALIVE           |
| R33 | 0  | cis | 0  | 1     | 0   | c.1982G>A   | c.895G>A              | -                    | -                      | -                            | -     | 2    | 3    | 3     | 2     | 3     | 3     | 1      | 0     | M   | 42  | 21              | DEAD            |
| R34 | 0  | 0   | 0  | 0     | 0   | c.1499G>A<br>c.1982G>A  | -                     | -                    | -                      | -                            | C228T | 3    | 2    | 2     | 2     | 3     | 3     | 2      | 1     | M   | 56  | 26              | ALIVE           |
| R35 | 0  | 1   | 0  | 0     | 0   | c.1982G>A   | c.746C>G              | -                    | -                      | -                            | -     | 2    | 2    | 2     | 3     | 2     | 3     | 2      | 0     | M   | 72  | 25              | ALIVE           |

|      |   |   |   |   |   |                        |                      |          |   |   |   |       |    |    |    |    |    |    |   |   |    |    |       |       |
|------|---|---|---|---|---|------------------------|----------------------|----------|---|---|---|-------|----|----|----|----|----|----|---|---|----|----|-------|-------|
| R36  | 0 | 1 | 0 | 0 | 0 | c.1982G>A<br>c.1499G>A | -                    | -        | - | - | - | 3     | 2  | 3  | 3  | 2  | 3  | 2  | 1 | M | 66 | 13 | ALIVE |       |
| R37  | 0 | 1 | 0 | 0 | 0 | c.1982G>A              | -                    | -        | - | - | - | 3     | 2  | 3  | 2  | 3  | 3  | 2  | 1 | M | 62 | 23 | ALIVE |       |
| R38  | 0 | 0 | 0 | 0 | 0 | c.1982G>A              | c.1231G>A            | -        | - | - | - | 1     | 1  | 3  | 2  | 3  | 2  | 2  | 1 | F | 61 | 22 | ALIVE |       |
| R39  | 0 | 1 | 0 | 0 | 0 | c.1763G>A              | c.746C>G<br>c.864C>G | c.853G>A | - | - | - | 3     | 3  | 3  | 2  | 2  | 2  | 2  | 0 | M | 72 | 25 | ALIVE |       |
| NR1  | 1 | 3 | 0 | 0 | 0 | -                      | -                    | -        | - | - | - | NA    | NA | NA | NA | NA | NA | NA | 1 | M | 63 | 1  | DEAD  |       |
| NR2  | 0 | 3 | 0 | 0 | 0 | c.1982G>A              | -                    | -        | - | - | - | 2     | 3  | 3  | 1  | 3  | 1  | 2  | 1 | M | 65 | 57 | ALIVE |       |
| NR3  | 0 | 2 | 0 | 1 | 0 | c.1616C>T              | -                    | -        | - | - | - | 3     | 1  | 3  | 1  | 3  | 0  | 1  | 1 | M | 62 | 31 | ALIVE |       |
| NR4  | 0 | 1 | 0 | 0 | 0 | -                      | -                    | c.853G>A | - | - | - | 3     | 0  | 2  | 2  | 3  | 1  | 2  | 0 | M | 64 | 22 | ALIVE |       |
| NR5  | 0 | 3 | 2 | 0 | 0 | c.1499G>A<br>c.1982G>A | -                    | c.853G>A | - | - | - | C228T | 2  | 2  | 3  | 3  | 2  | 3  | 1 | 1 | M  | 66 | 26    | ALIVE |
| NR6  | 0 | 1 | 0 | 0 | 0 | c.1763G>A              | -                    | -        | - | - | - | 2     | 3  | 3  | 3  | 2  | 2  | 1  | 0 | M | 64 | 22 | ALIVE |       |
| NR7  | 0 | 3 | 0 | 0 | 0 | c.1982G>A              | -                    | -        | - | - | - | 2     | 2  | 3  | 3  | 2  | 2  | 2  | 0 | M | 60 | 25 | ALIVE |       |
| NR8  | 0 | 3 | 2 | 0 | 0 | c.1982G>A              | -                    | c.853G>A | - | - | - | C228T | 3  | 3  | 3  | 2  | 3  | 3  | 1 | 1 | M  | 66 | 26    | ALIVE |
| NR9  | 0 | 3 | 2 | 0 | 1 | -                      | -                    | -        | - | - | - | 3     | 3  | 2  | 3  | 3  | 3  | 2  | 0 | M | 67 | 9  | DEAD  |       |
| NR10 | 0 | 3 | 0 | 0 | 0 | -                      | -                    | -        | - | - | - | 2     | 3  | 2  | 3  | 3  | 2  | 1  | 0 | M | 60 | 25 | ALIVE |       |
| NR11 | 0 | 2 | 0 | 0 | 1 | c.1982G>A              | -                    | -        | - | - | - | C228T | 2  | 2  | 3  | 2  | 3  | 3  | 1 | 1 | M  | 57 | 2     | ALIVE |
| NR12 | 0 | 3 | 2 | 0 | 1 | c.1498C>T              | -                    | -        | - | - | - | 3     | 3  | 3  | 3  | 2  | 2  | 1  | 0 | M | 67 | 9  | DEAD  |       |
| NR13 | 0 | 2 | 0 | 0 | 1 | -                      | -                    | -        | - | - | - | C228T | 2  | 2  | 3  | 2  | 3  | 2  | 1 | M | 57 | 2  | ALIVE |       |