**Supplementary Table 1** – Mutation information for 10 patients with urethral tumors (5 melanomas, 3 adenocarcinomas, 1 urothelial carcinoma and 1 squamous cell carcinoma) who underwent MSK-IMPACT sequencing of their primary tumors

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Patient # | Tumor Histology | Gene | Chromosome | Start Position | End Position | Mutation Classification | Reference Allele | Alternative Allele | Protein Change |
| 1 | Melanoma | TP53 | 17 | 7577114 | 7577114 | Missense\_Mutation | C | T | p.Cys275Tyr |
| 1 | Melanoma | NRAS | 1 | 1.15E+08 | 1.15E+08 | Missense\_Mutation | C | T | p.Gly12Asp |
| 1 | Melanoma | CHEK2 | 22 | 29107902 | 29107902 | Missense\_Mutation | C | G | p.Glu263Gln |
| 1 | Melanoma | REL | 2 | 61121601 | 61121601 | Missense\_Mutation | C | T | p.His75Tyr |
| 1 | Melanoma | IRS2 | 13 | 1.1E+08 | 1.1E+08 | Missense\_Mutation | G | A | p.Ala940Val |
| 1 | Melanoma | AXL | 19 | 41743895 | 41743895 | Frame\_Shift\_Del | A | - | p.Asp277AlafsTer20 |
| 1 | Melanoma | EPHA3 | 3 | 89499434 | 89499434 | Missense\_Mutation | A | C | p.Arg868Ser |
| 1 | Melanoma | KDR | 4 | 55979613 | 55979613 | Missense\_Mutation | T | A | p.Lys278Asn |
| 1 | Melanoma | FAM175A | 4 | 84388689 | 84388689 | Missense\_Mutation | G | T | p.Ser200Tyr |
| 1 | Melanoma | FAT1 | 4 | 1.88E+08 | 1.88E+08 | Missense\_Mutation | C | A | p.Gly2130Val |
| 1 | Melanoma | PLK2 | 5 | 57752357 | 57752357 | Missense\_Mutation | A | C | p.Ser406Ala |
| 2 | Melanoma | TP53 | 17 | 7578406 | 7578406 | Missense\_Mutation | C | A | p.Arg175Leu |
| 2 | Melanoma | TP53 | 17 | 7574030 | 7574030 | Frame\_Shift\_Del | G | - | p.Arg333ValfsTer12 |
| 2 | Melanoma | MTOR | 1 | 11300570 | 11300570 | Missense\_Mutation | G | A | p.Arg526Cys |
| 2 | Melanoma | ATRX | X | 76937383 | 76937383 | Frame\_Shift\_Del | C | - | p.Cys1122LeufsTer8 |
| 3 | Melanoma | TP53 | 17 | 7579310 | 7579310 | Splice\_Site | A | C |  |
| 3 | Melanoma | NTRK3 | 15 | 88423650 | 88423650 | Missense\_Mutation | G | A | p.His729Tyr |
| 3 | Melanoma | ATRX | X | 76874369 | 76874369 | Nonsense\_Mutation | G | A | p.Gln1785Ter |
| 3 | Melanoma | NF1 | 17 | 29587454 | 29587455 | Frame\_Shift\_Ins | - | GTGACGGCAATGT | p.Leu1505Ter |
| 4 | Melanoma | TP53 | 17 | 7577094 | 7577094 | Missense\_Mutation | G | A | p.Arg282Trp |
| 4 | Melanoma | SMARCA4 | 19 | 11097617 | 11097617 | Missense\_Mutation | C | T | p.Ser266Leu |
| 5 | Melanoma | TERT | 5 | 1295228 | 1295228 | 5'Flank | G | A |  |
| 5 | Melanoma | ERBB2 | 17 | 37868208 | 37868208 | Missense\_Mutation | C | A | p.Ser310Tyr |
| 5 | Melanoma | KIT | 4 | 55599340 | 55599340 | Missense\_Mutation | T | G | p.Asn822Lys |
| 5 | Melanoma | ALOX12B | 17 | 7989402 | 7989402 | Missense\_Mutation | C | T | p.Arg95His |
| 5 | Melanoma | APC | 5 | 1.12E+08 | 1.12E+08 | Missense\_Mutation | G | C | p.Glu258Asp |
| 5 | Melanoma | PIK3CG | 7 | 1.07E+08 | 1.07E+08 | Missense\_Mutation | G | T | p.Leu695Phe |
| 6 | Adenocarcinoma | TP53 | 17 | 7574003 | 7574003 | Nonsense\_Mutation | G | A | p.Arg342Ter |
| 6 | Adenocarcinoma | KDR | 4 | 55955053 | 55955053 | Missense\_Mutation | C | A | p.Leu1164Phe |
| 6 | Adenocarcinoma | ARID5B | 10 | 63845501 | 63845501 | Missense\_Mutation | G | T | p.Asp414Tyr |
| 6 | Adenocarcinoma | ERBB3 | 12 | 56477640 | 56477640 | Missense\_Mutation | T | C | p.Leu63Pro |
| 6 | Adenocarcinoma | ZFHX3 | 16 | 72827932 | 72827932 | Missense\_Mutation | C | A | p.Met2883Ile |
| 6 | Adenocarcinoma | SMARCB1 | 22 | 24134033 | 24134033 | Missense\_Mutation | A | C | p.Lys62Gln |
| 7 | Adenocarcinoma | FBXW7 | 4 | 1.53E+08 | 1.53E+08 | Nonsense\_Mutation | G | A | p.Arg222Ter |
| 7 | Adenocarcinoma | EGFR | 7 | 55259451 | 55259451 | Missense\_Mutation | G | A | p.Asp837Asn |
| 7 | Adenocarcinoma | FLT1 | 13 | 29001340 | 29001340 | Missense\_Mutation | G | C | p.Ile464Met |
| 7 | Adenocarcinoma | RNF43 | 17 | 56440713 | 56440713 | Missense\_Mutation | C | T | p.Ala169Thr |
| 7 | Adenocarcinoma | TP53 | 17 | 7578452 | 7578453 | In\_Frame\_Ins | - | GGCGCG | p.Arg158\_Ala159dup |
| 8 | Adenocarcinoma | KRAS | 12 | 25398284 | 25398284 | Missense\_Mutation | C | A | p.Gly12Val |
| 8 | Adenocarcinoma | HIST1H3C | 6 | 26045875 | 26045875 | Missense\_Mutation | C | G | p.Phe79Leu |
| 8 | Adenocarcinoma | ARID1A | 1 | 27101091 | 27101095 | Frame\_Shift\_Del | AGTTT | - | p.Gln1458ArgfsTer31 |
| 9 | Urothelial Carcinoma | TERT | 5 | 1295250 | 1295250 | 5'Flank | G | A |  |
| 9 | Urothelial Carcinoma | FGFR3 | 4 | 1803568 | 1803568 | Missense\_Mutation | C | G | p.Ser249Cys |
| 9 | Urothelial Carcinoma | TP53 | 17 | 7578463 | 7578463 | Missense\_Mutation | C | T | p.Arg156His |
| 9 | Urothelial Carcinoma | FGFR3 | 4 | 1806564 | 1806564 | Missense\_Mutation | C | G | p.Ser427Cys |
| 9 | Urothelial Carcinoma | ARID2 | 12 | 46245720 | 46245720 | Nonsense\_Mutation | C | T | p.Arg1272Ter |
| 9 | Urothelial Carcinoma | CDKN1A | 6 | 36651921 | 36651924 | Frame\_Shift\_Del | AGCA | - | p.Ser15ArgfsTer15 |
| 10 | Squamous Cell Carcinoma | MAP3K13 | 3 | 1.85E+08 | 1.85E+08 | Missense\_Mutation | G | A | p.Asp756Asn |
| 10 | Squamous Cell Carcinoma | MLL3 | 7 | 1.52E+08 | 1.52E+08 | Splice\_Site | A | G |  |
| 10 | Squamous Cell Carcinoma | PIK3C2G | 12 | 18719930 | 18719930 | Missense\_Mutation | G | T | p.Arg1276Ile |
| 10 | Squamous Cell Carcinoma | BLM | 15 | 91303439 | 91303439 | Missense\_Mutation | G | T | p.Asp384Tyr |
| 10 | Squamous Cell Carcinoma | PALB2 | 16 | 23646903 | 23646903 | Missense\_Mutation | C | G | p.Glu322Gln |
| 10 | Squamous Cell Carcinoma | CTCF | 16 | 67663398 | 67663398 | Missense\_Mutation | G | C | p.Arg600Thr |
| 10 | Squamous Cell Carcinoma | NF1 | 17 | 29683503 | 29683503 | Missense\_Mutation | G | C | p.Leu2547Phe |
| 10 | Squamous Cell Carcinoma | BRCA1 | 17 | 41243698 | 41243698 | Missense\_Mutation | G | A | p.His1284Tyr |