

Supporting documents

Figure S1 | Phenotypic analysis of the flow sorted CD8⁺ T cell subsets. A,B) Summary of T cell subset relative frequencies at flow sorting. The error bars represent the median with interquartile range. C-D) Frequency of CD8⁺ T cells that express CD69 (C), CD127 (D) or PD-1 (E) in each subset. The error bars represent the median with interquartile range. F) Mean fluorescence intensity of PD-1 expression on CD8 T cells. A-F) Each graph includes the result of an one-way ANOVA test.

Figure S2 | T cell reactivity screening. IFN- γ and granzyme B release was measured by ELISA in the supernatant of the co-culture assay for each patient, performed in two independent assays. Each T cell product is visualized by a distinct color: DP in yellow, SP39 red, SP(103) in blue, DN in black and bulk TIL in green. Potential epitopes are marked by an asterisk *. Positive (SEB) and negative (EBV-LCL with DMSO) controls are included at the far right of the graphs.

Figure S3 | Validation of potential neoantigen-specific T cell responses. The validation measurements are visualized for each patient, including IFN- γ , granzyme B and flow cytometric measures CD137 and OX40. T cell responses derived from the bulk TIL (green) or DP (yellow) are depicted against the corresponding wild-type peptide (grey) or a DMSO control (grey). The respective neo-epitope is listed within each graph.

Figure S4 | Intracellular IFN- γ expression in TIL after stimulation with neoepitopes. A) Representative sample with increased IFN- γ expression specifically in the CD4⁺ T cells. B) Each graph depicts the percentage of IFN- γ ⁺ cells that were determined to be either CD4⁺ or CD8⁺ T cells per sample. NIC4 L29 was validated as a true CD8-mediated response, as it was also detected in the DP CD8⁺ T cell subset.

Figure S1

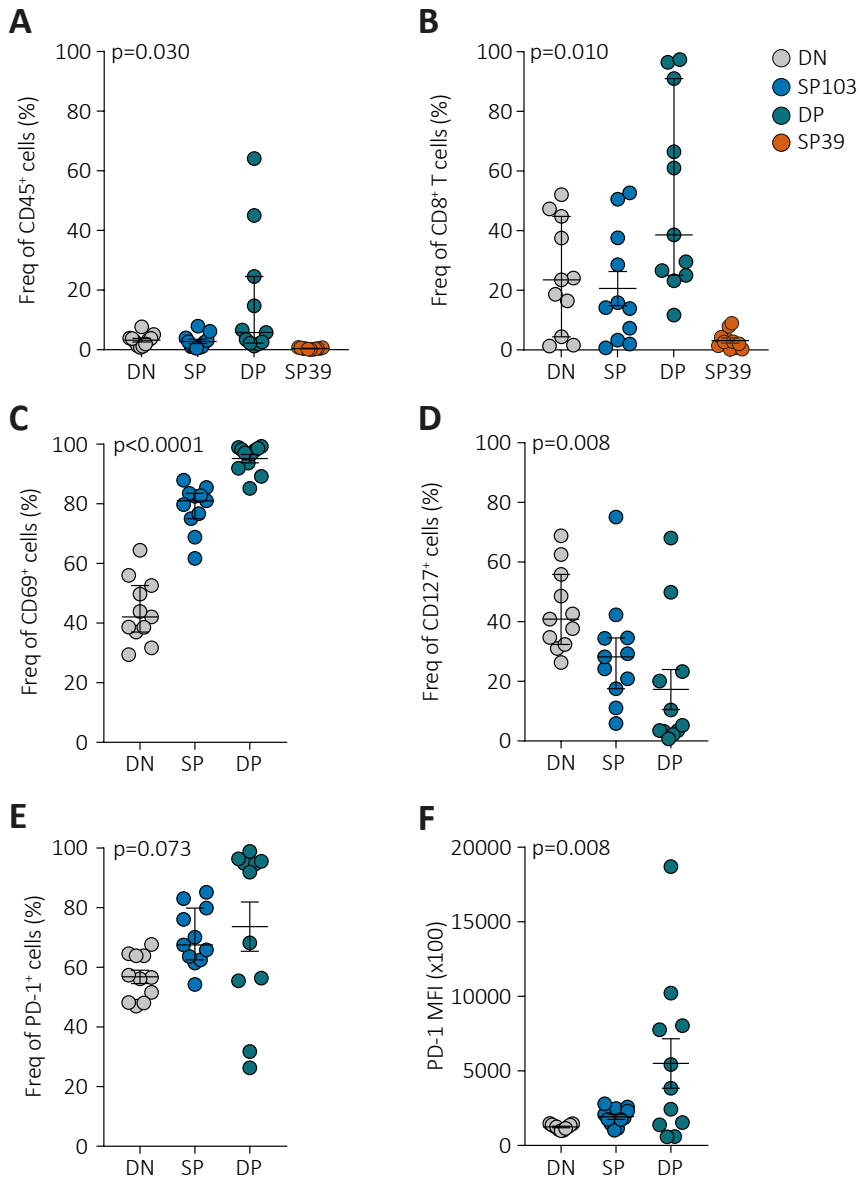
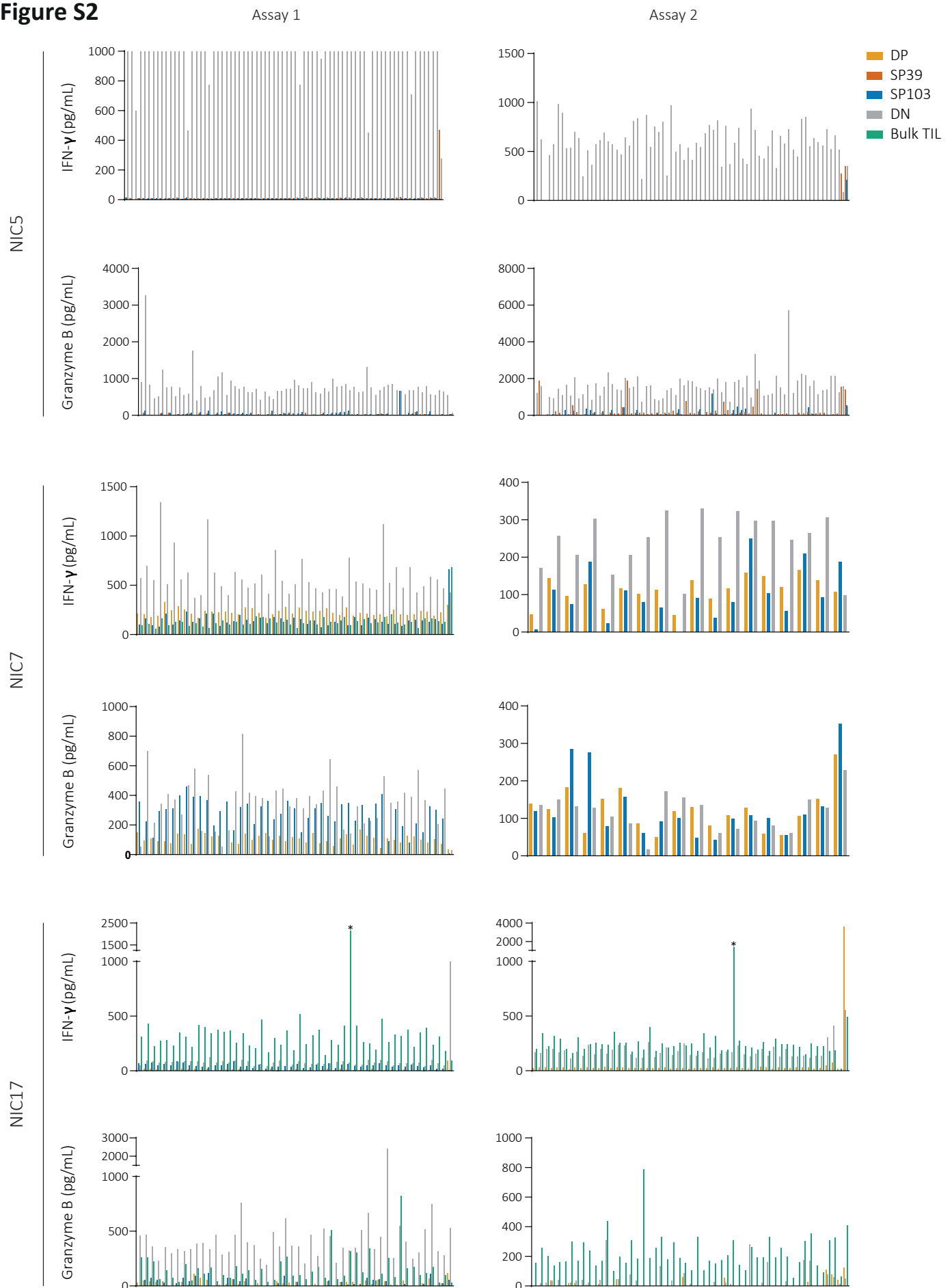
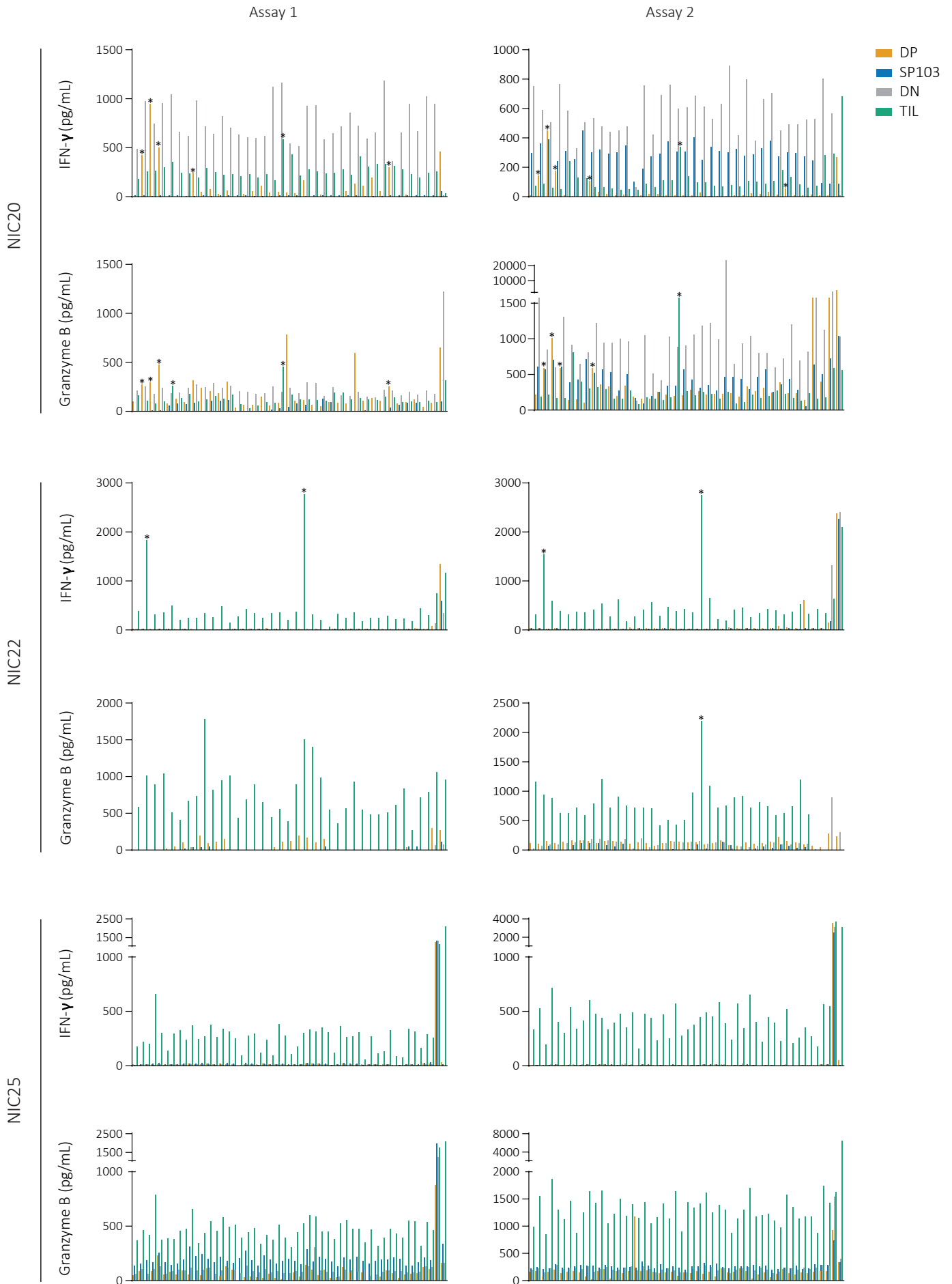


Figure S2





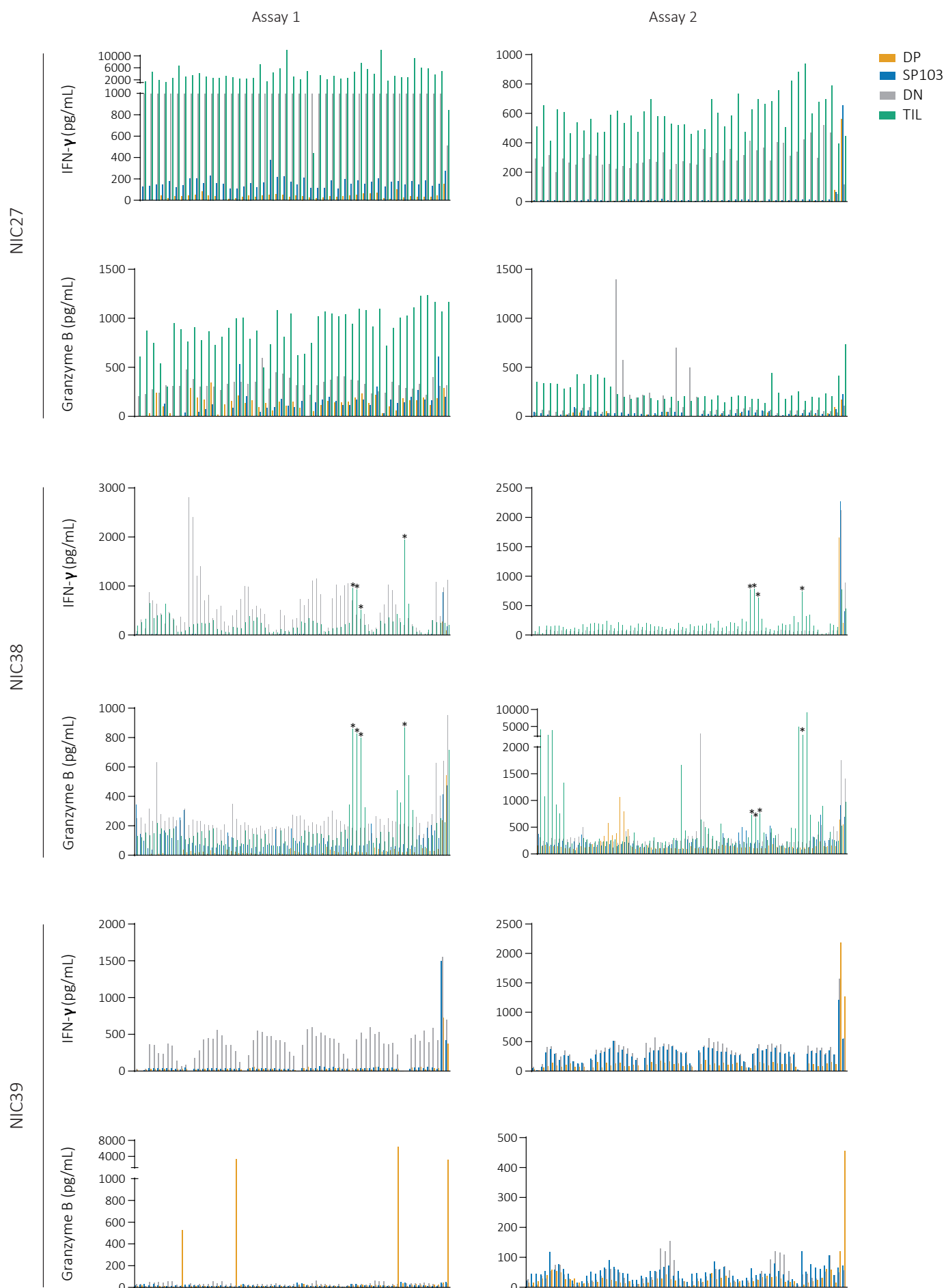


Figure S3

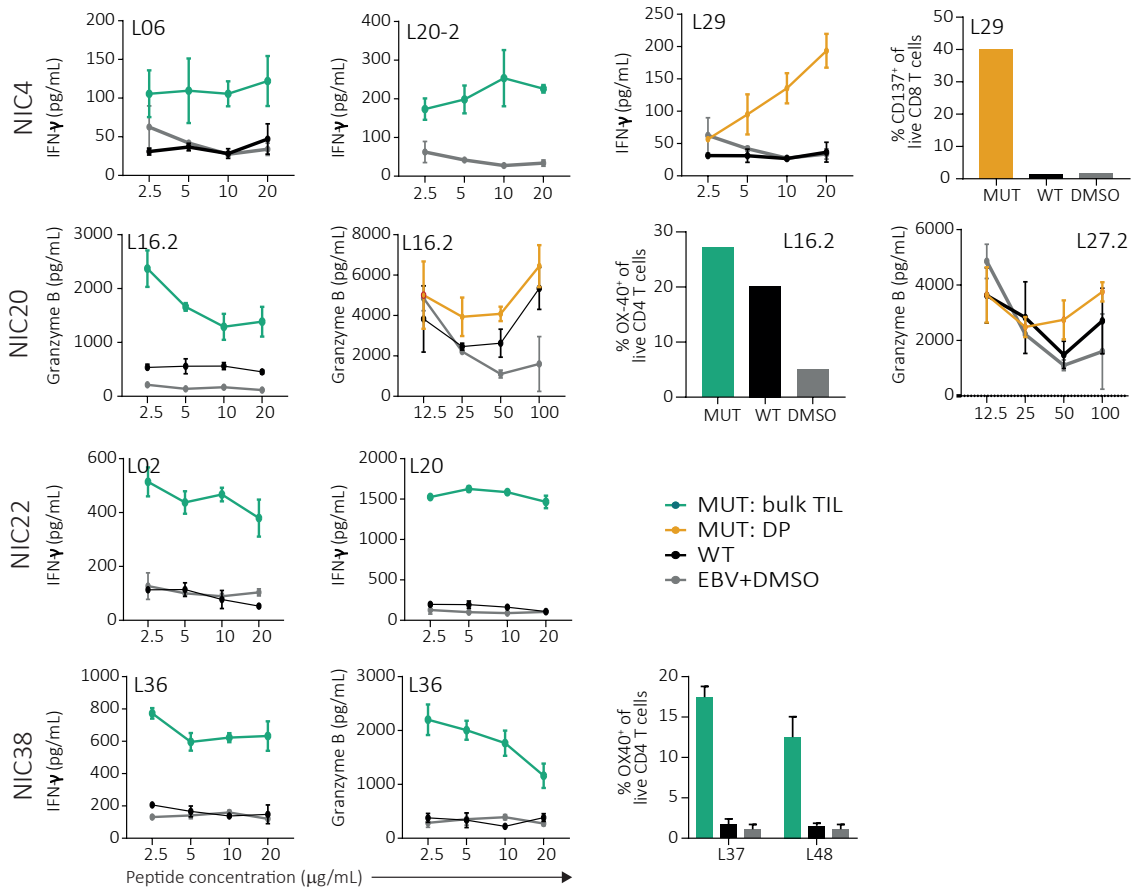


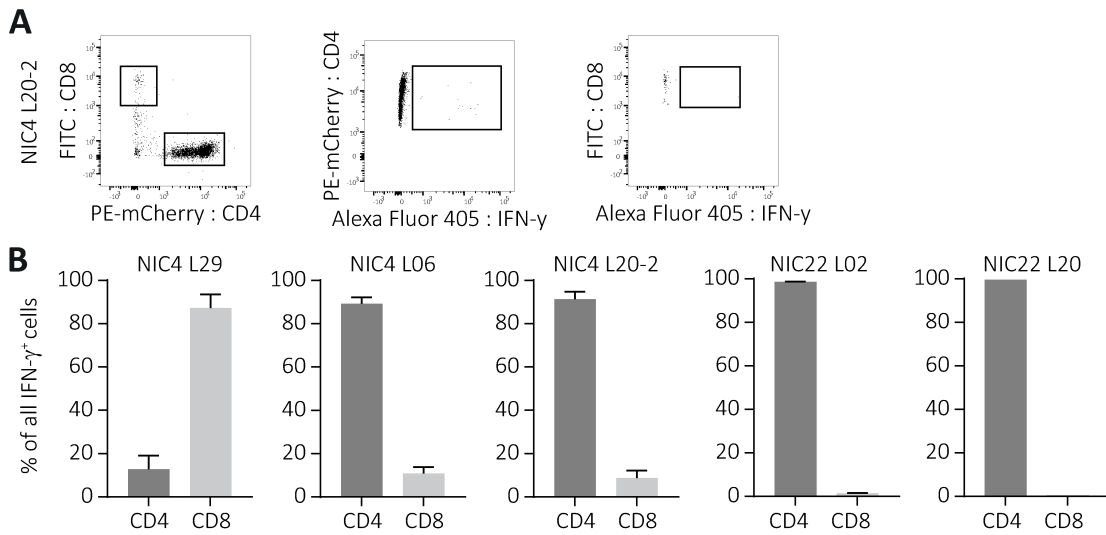
Figure S4

Table S1 | Percentage of CD4+ and CD8+ T cells in expanded bulk TIL cultures.

| Patient ID | CD4 (%) | CD8 (%) |
|------------|---------|---------|
| NIC4 | 81 | 19 |
| NIC5 | 93 | 7 |
| NIC7 | 92 | 8 |
| NIC16 | 61 | 39 |
| NIC17 | 34 | 66 |
| NIC20 | 96 | 4 |
| NIC22 | 50 | 50 |
| NIC25 | 95 | 5 |
| NIC27 | 60 | 40 |
| NIC38 | 28 | 72 |
| NIC39 | 99 | 1 |

Table S2 | All mutant peptide sequences that were investigated for T cell reactivity.

| Patient ID | Mutational position | Mutation type | Gene | SLP ID | Peptide sequence |
|------------|-----------------------|------------------|-----------------|--------|-----------------------------|
| NIC4 | chr1_11950386_G/A | Missense | <i>PLOD1</i> | L01 | ADSYDVLVFAFGPQELLLKFRQARSQ |
| NIC4 | chr11_14818305_G/A | Missense | <i>PDE3B</i> | L02 | FPDTADFLNKPSIILQRSLGNAPNT |
| NIC4 | chr11_74374521_C/T | Missense | <i>PGM2L1</i> | L03 | ENLLRNGMKNLEQLDRCCRMFTGTA |
| NIC4 | chr11_86446352_G/A | Missense | <i>ME3</i> | L04 | PGVALGVIAGGIWHPIDEFLLTAE |
| NIC4 | chr12_25245347_C/T | Missense | <i>KRAS</i> | L05 | YKLVVVGAGDVGKSAITLIQIQ |
| NIC4 | chr14_58223625_G/A | Missense | <i>ACTR10</i> | L06 | SVPEGVLEDIKAHTCFVSDLKRGLK |
| NIC4 | chr14_73276592_C/T | Missense | <i>NUMB</i> | L07 | PSPTNPFSSDLQKTFKIEL |
| NIC4 | chr14_73276674_C/G | Missense | <i>NUMB</i> | L08 | TGTCVPDPFEAQCAALENKSKQRTN |
| NIC4 | chr14_80792789_C/A | Missense | <i>CEP128</i> | L09 | KLERALEKQSETFDELTKNNQILK |
| NIC4 | chr16_28830704_G/C | Missense | <i>ATXN2L</i> | L10 | GVRCSRRGGRRPALSLPPRGPVHHL |
| NIC4 | chr17_42787309_A/G | Missense | <i>WNK4</i> | L11 | EMVALGLVCEADCQVAVRERVA |
| NIC4 | chr17_44190551_G/A | Missense | <i>TMUB2</i> | L12 | GQESQMKLIYQGHLLQDPARTLRSL |
| NIC4 | chr17_63420571_G/A | Missense | <i>TANC2</i> | L13 | PPPVGQGGKEYPNPPSPLRGPPQY |
| NIC4 | chr17_7674221_G/A | Missense | <i>TP53</i> | L14 | YMCNSSCMGGMNWRPILITITLEDSSG |
| NIC4 | chr19_10555328_CCTT/C | Inframe deletion | <i>KRI1</i> | L15 | FGLSTEEILAADELNRWCSLKKTCM |
| NIC4 | chr19_1093973_G/A | Missense | <i>POLR2E</i> | L16 | QFGDKPSEGRPRCTDLTVLVAHND |
| NIC4 | chr19_13074002_C/A | Missense | <i>NFIX</i> | L17 | YYNINQVTLGRRYITSPSTTTKR |
| NIC4 | chr2_219615172_C/T | Missense | <i>STK11IP</i> | L18 | TLFLLEDAAGSLAEFSPPAASGEA |
| NIC4 | chr2_74889415_G/A | Missense | <i>HK2</i> | L19 | AGMAAVVDRIENHGLDALKVTVGV |
| NIC4 | chr20_57378098_A/G | Stop loss | <i>RAE1</i> | L20-1 | NAAEELKPRNKVWLETLAQPELFL |
| | | | | L20-2 | WWLETLAQPELFLSTLPHLCTNLGP |
| | | | | L20-3 | LSTLPHLCTNLGSLVGLSAMDMDF |
| | | | | L20-4 | PSLVGLSAMDMDFNWRKRCHCSAA |
| | | | | L20-5 | FNPWRKRCHCSAAESPVVGRDPLSL |
| | | | | L20-6 | SAAESPVVGRDPLSLHSTACCRVFL |
| NIC4 | chr3_11259275_G/A | Missense | <i>HRH1</i> | L21 | SLSVADLIVGAVIMPNNILYLMMSK |
| NIC4 | chr3_192144025_T/G | Missense | <i>FGF12</i> | L22 | SGTPTMNGGKVVTDQST |
| NIC4 | chr3_37298887_G/A | Missense | <i>GOLGA4</i> | L23 | VKTLETLQQRVKHQNELLKRCKETI |
| NIC4 | chr4_143185536_C/T | Missense | <i>USP38</i> | L24 | LKRIVVRKVVESVHWLDEAQCEAM |
| NIC4 | chr5_103028911_T/A | Missense | <i>PAM</i> | L25 | GRFRGKGSGLNHGNFFASRKGYSR |
| NIC4 | chr5_112838150_GGA/G | Frameshift | <i>APC</i> | L26-1 | SSRSEKDRSLERTRNWSRQLPSSNR |
| | | | | L26-2 | TRNWSRQLPSSNRKSRNFFKARFAD |
| | | | | L26-3 | RKSRNFFKARFADLHHCSPDCQSHG |
| | | | | L26-4 | DLHHCSPDCQSHGRSVSHYLSGRQ |
| | | | | L26-5 | PDCQSHGRSVSHYLSGRQKFWVYH |
| NIC4 | chr7_94400200_C/T | Missense | <i>COL1A2</i> | L27 | PAGDRGPRGERGLPGPPGRDGEDGP |
| NIC4 | chr8_142613268_C/T | Missense | <i>ARC</i> | L28 | QYVVGTLQPKLKHFLRHLPLKTLQ |
| NIC4 | chr8_93923083_C/T | Missense | <i>PDP1</i> | L29 | PKSEAKSVVQDWLLGLLMPFRAFQ |
| NIC4 | chrX_1593799_C/T | Missense | <i>AKAP17A</i> | L30 | IKLSGFSDLKCAAEFKIDFPTRH |
| NIC5 | chr1_171584051_A/C | Missense | <i>PRRC2C</i> | L01 | TAIHNFTVHQALAKAQSGLAFQ |
| NIC5 | chr1_207767803_C/T | Missense | <i>CD46</i> | L02-1 | LSHSVSTSTTKFPASSASGPRPTY |
| | | | | L02-2 | KCLKVSTSTTKFPASSASGPRPTY |
| | | | | L02-3 | KCLKVSTSTTKFPASSASGYPKPE |
| NIC5 | chr1_209783196_G/C | Missense | <i>C1orf74</i> | L03 | LKALVAEIIITHLEGLQDLSLAVSY |
| NIC5 | chr1_46270754_C/T | Missense | <i>RAD54L</i> | L04 | AASEADRQLGEEWLRRELSIVNRCL |
| NIC5 | chr1_90027699_T/G | Stop lost | <i>ZNF326</i> | L05-1 | EELEETEAKEEPADFPVEQPEENEI |
| | | | | L05-2 | PADFPVEQPEENEI |
| NIC5 | chr10_114575476_T/A | Missense | <i>ABLIM1</i> | L06 | TRCHGCGEFVEGVVVTALGKTYHPN |
| NIC5 | chr10_73915266_C/T | Missense | <i>PLAU</i> | L07 | GFGKENSTDYLYLEQLKMTVVKLIS |
| NIC5 | chr11_66020856_T/A | Missense | <i>CATSPER1</i> | L08 | IFTTIFTLFTLLSLDDWSLIVYMSDR |
| NIC5 | chr11_67999580_C/T | Missense | <i>UNC93B1</i> | L09 | NYWERYTLPSTVALGMAIVPLWA |
| NIC5 | chr11_95783089_T/A | Missense | <i>FAM76B</i> | L10-1 | HPKHHHHHHHHHLRSHSSHKISNL |
| | | | | L10-2 | RKTSIIQNIITITITFTVAIT |
| NIC5 | chr13_45525021_A/G | Missense | <i>COG3</i> | L11-1 | LKTMASQGGPKYALSQQPWAQPAKV |
| | | | | L11-2 | VKNNGQSGRPQVCSLTAALGTTSKG |
| NIC5 | chr13_98809435_G/A | Missense | <i>DOCK9</i> | L12 | FERLAHYDLTHWYASKVTEVMHSG |
| NIC5 | chr14_103135969_G/A | Missense | <i>TNFAIP2</i> | L13 | VSTASIRRHQVAPQLQAGPAMGP |
| NIC5 | chr14_64065516_G/A | Missense | <i>SYNE2</i> | L14 | RQILRLRLRCKTNDGICLLKIVSA |
| NIC5 | chr15_41669457_A/T | Missense | <i>MGA</i> | L15 | FYKLLKTNNTLDLEGHILHSMHRY |
| NIC5 | chr16_346835_G/A | Missense | <i>AXIN1</i> | L16 | IKGETSTATPRRLDLDLGYEPGESA |
| NIC5 | chr16_88631239_G/T | Missense | <i>ZC3H18</i> | L17 | ASTLSRREELKHLKAVEDAIARRK |
| NIC5 | chr17_31233211_TG/T | Frameshift | <i>NF1</i> | L18 | MMGDQGLPIAMALANVVPSCQWMN |
| NIC5 | chr17_39725079_G/A | Missense | <i>ERBB2</i> | L19 | AKGMSYLEDRVLIHRDLAARNVLIK |
| NIC5 | chr17_48860426_T/C | Missense | <i>CALCOCO2</i> | L20 | TSDEGGARQNPGPAYGNPYSGIQES |
| NIC5 | chr17_58357951_G/A | Missense | <i>RNF43</i> | L21 | QVTRNSAAPSGLWSNPQCPRALPE |
| NIC5 | chr17_7673776_G/A | Missense | <i>TP53</i> | L22 | FEVRVCACPRDWRTEENLRKKGE |
| NIC5 | chr19_48441818_C/T | Missense | <i>GRIN2D</i> | L23 | FIYDAAVLNYMACKDEGCKLVITIGS |
| NIC5 | chr19_49447035_G/C | Missense | <i>PIH1D1</i> | L24-1 | LEAPDLLAEVDVPKLDGALGLSLE |
| | | | | L24-2 | LEAPDLLAEVDVPKLDGALGLSLE |

| | | | | | |
|------|------------------------|-------------------|---------------------|-------|----------------------------|
| | | | | L24-3 | HLNLWLEAPDLLLAEIDVPKLTLOI |
| | | | | L24-4 | LEAPDLLLAEIDVPKLNLSHESKAA |
| NIC5 | chr19_55401666_G/A | Missense | <i>UBE2S</i> | L25 | RLLLENYEEYAAWARLLTEIHGGAG |
| NIC5 | chr2_110144543_C/G | Missense | <i>NPHP1</i> | L26 | IPAKTYELFLNGATPYEKIEVDPS |
| NIC5 | chr2_127050828_C/A | Missense | <i>BIN1</i> | L27 | GTVEGSGAGRLYLPPGFMFVKVQAQ |
| NIC5 | chr2_127426153_G/A | Missense | <i>PROC</i> | L28 | MEKKRSHLKRDTKDQEDQVDPRLID |
| NIC5 | chr2_240462422_A/T | Missense | <i>GPC1</i> | L29 | LFKQLHPQLLPVDYLDCLGKQAEA |
| NIC5 | chr2_96298337_G/C | Missense | <i>SNRNP200</i> | L30 | ERIMGKMEADPEVSKFLYQLHETEK |
| NIC5 | chr20_18183172_C/T | Missense | <i>KAT14</i> | L31 | TKPPKQLLSQICSHLHRSDPHWTP |
| NIC5 | chr20_46374418_C/T | Missense | <i>ELMO2</i> | L32 | DTYIRIVLENSSQEDKHECPFRSA |
| NIC5 | chr3_197065340_G/A | Missense | <i>DLG1</i> | L33 | MEKDIQEHKFIEVGQYNNHLYGTSV |
| NIC5 | chr4_139370290_G/C | Missense | <i>NAA15</i> | L34 | QRRAQKKAQIEEDKNAEKEKQQRN |
| NIC5 | chr4_148120260_C/T | Missense | <i>NR3C2</i> | L35-1 | NLGERRCISLPCINYARGCTKSAFS |
| | | | | L35-2 | FNEEKMHQSAMYKLCQGMHQISLQF |
| NIC5 | chr5_112839398_AAT/A | Frameshift | <i>APC</i> | L36 | CKVSSINQETIQTYCEDTPMFFKM |
| NIC5 | chr5_112839906_AC/A | Frameshift | <i>APC</i> | L37-1 | SPGQTMPPSRSKNLHLHLKQKPE |
| | | | | L37-2 | KNLHLLKQLKPESEYKIKHLLK |
| | | | | L37-3 | KPSEKYLKIKHLLKREVRDLKSLQ |
| NIC5 | chr5_138924582_G/A | Missense | <i>CTNNA1</i> | L38 | IALQEKDVDGLDHTAGAIRGAARV |
| NIC5 | chr5_157809736_G/A | Missense | <i>CLINT1</i> | L39 | WDEEWDKNKSALFSDKLGELSDKI |
| NIC5 | chr6_105282511_C/G | Missense | <i>PREP</i> | L40 | DFQCAAELYKERYTSPKRLTINGG |
| NIC5 | chr6_135463154_G/T | Missense | <i>AH1</i> | L41 | TEDSMQDDTKPKQKTKKTKAVAD |
| NIC5 | chr6_136356706_T/A | Missense | <i>MAP7</i> | L42 | VGSPHVVTSHQSNVTVSTPDLEKQ |
| NIC5 | chr6_168078950_T/A | Missense | <i>FRMD1</i> | L43 | CSQEQPTLGMALASEHRDVLVLLP |
| NIC5 | chr6_26413488_G/T | Missense | <i>BTN3A1</i> | L44 | GLTDGNKYRTLDPRTNLKPKPPK |
| NIC5 | chr7_76625578_T/TTCTCC | Inframe insertion | <i>POMZP3</i> | L45 | TVLSALKEKKKKEKRTVEEDQIFL |
| NIC5 | chr7_99454126_C/G | Missense | <i>CPSF4</i> | L46-1 | AGNRGPRPLEQVSCYCKGEGHYAN |
| | | | | L46-2 | AGNRGPRPLEQVSCYCKCCCLSLFF |
| | | | | L46-3 | RATGDPGHWSRSRAVTSVARKDTPPT |
| NIC5 | chr8_100153299_G/A | Missense | <i>POLR2K</i> | L47 | IRCREGCRIMYKRTKRLVIFDAR |
| NIC5 | chr8_37899408_C/A | Missense | <i>RAB11FIP1</i> | L48 | MMLMVSAGRWLVAVWSPHVVQVTVL |
| NIC5 | chr8_73673126_G/C | Missense | <i>STAU2</i> | L49-1 | KPFPNYRANYNFGGMYNQRYHCPVP |
| | | | | L49-2 | KPFPNYRANYNFGGMYNQRWQLNG |
| | | | | L49-3 | YRPLDPKPFPNYRANYNFGGMYNQR |
| NIC5 | chr9_114169425_A/G | Missense | <i>COL27A1</i> | L50 | FHLAGSTPFLLVGGPPGPKDGLP |
| NIC5 | chr9_134050430_G/T | Missense | <i>BRD3</i> | L51 | VTSVPVPPAAATPPATPIVVPVPP |
| NIC5 | chr9_134690995_C/T | Missense | <i>COL5A1</i> | L52 | DGITKTTGFCATWRSSKGPDVAYRV |
| NIC5 | chr9_136946680_G/A | Missense | <i>C8G</i> | L53 | QIFYFPKYGFCEAADQFHILDEVRR |
| NIC5 | chr9_19378868_C/T | Missense | <i>RPS6</i> | L54 | RISGGNDKQGFPIKQVGLTHGRVRL |
| NIC5 | chrX_49065811_G/A | Missense | <i>CCDC120</i> | L55 | SSFEGRSVPATILTRGAGPQLCKP |
| NIC5 | chr4_141222377_TA/T | Frameshift | <i>ZNF330</i> | L56 | MPKKRLVRGRRRLTAENVKNN |
| NIC7 | chr1_166858202_C/A | Missense | <i>TADA1</i> | L01 | SHPPPDDAEQQASLLLACSGDTPA |
| NIC7 | chr1_173984497_A/T | Splice | <i>RC3H1</i> | L02-1 | LALYKPLSSARGKFVFSYLKSKT |
| | | | | L02-2 | RGKFVFSYLKSKTAFKYSVHNPI |
| NIC7 | chr1_206195806_A/C | Missense | <i>FAM72A</i> | L03 | CSSCLLSCNNGHVWMFHSQAVYDIN |
| NIC7 | chr1_224294313_C/T | Missense | <i>NVL</i> | L04 | SLDPALRRAGRFNREICLGPDEAS |
| NIC7 | chr1_32091892_C/T | Missense | <i>TMEM39B</i> | L05-1 | AMPTHACCLSPSFIRSEVFLKMDF |
| | | | | L05-2 | AHKTAVWPGRHAHPCLLPVTLHPQ |
| NIC7 | chr1_51302546_G/A | Missense | <i>TTC39A</i> | L06 | FVLGTGNVNIEVEKLLKPYLNRYP |
| NIC7 | chr1_7778152_T/TCAG | Inframe insertion | <i>VAMP3</i> | L07 | KMWAIGITVLVIFSIHIIIIVWVSS |
| NIC7 | chr10_112425377_T/G | Missense | <i>ACSL5</i> | L08 | GTLKIIRKKNIVKLAQGEYIAPEK |
| NIC7 | chr10_472477_C/A | Missense | <i>DIP2C</i> | L09 | PVTPSSASRYHRLRSRSGRDERYRS |
| NIC7 | chr10_47922844_G/T | Missense | <i>CH17-360D5.1</i> | L10 | FAVLVLPVLFVNFLEDDWHHEAIPC |
| NIC7 | chr10_50814032_G/A | Missense | <i>A1CF</i> | L11-1 | RAIIRAPSVRGAVGVRGLGGGRGYLA |
| | | | | L11-2 | VREIYMNVVPGAVGVRGLGGGRGYLA |
| NIC7 | chr11_59152054_G/A | Missense | <i>FAM111A</i> | L12 | EIETHQQQEMLVHGTEGIEKYNLNG |
| NIC7 | chr12_16363960_T/G | Missense | <i>MGST1</i> | L13 | HTIAYLTPLPQPKRALSFVGVYGT |
| NIC7 | chr12_1754359_GAA/G | Frameshift | <i>ADIPOR2</i> | L14-1 | MNEPTAPIGVQQDSRARYKAQKRAP |
| | | | | L14-2 | IGVQQDSRARYKAQKRAPTGWYTKR |
| NIC7 | chr12_56257327_G/A | Missense | <i>ANKRD52</i> | L15 | LDQERRTPLHAAYVVDVPIQLLLL |
| NIC7 | chr13_109783442_C/T | Missense | <i>IRS2</i> | L16 | TQPPHPVVPSPVQPSGGRPEFLGQ |
| NIC7 | chr13_113766192_G/A | Missense | <i>TMEM255B</i> | L17 | GSLLLVSLIVTIGLAATTRTENVT |
| NIC7 | chr16_72950933_C/T | Missense | <i>ZFHX3</i> | L18-1 | LVGGEIPLDMRLRGGQLVSEELMNL |
| | | | | L18-2 | MRLRGGQLVSEELMNLGESFIQTND |
| NIC7 | chr17_7676002_TCA/T | Frameshift | <i>TP53</i> | L19-1 | RLGFLHSGTAKSDLHVLPCPQQDVL |
| | | | | L19-2 | SDLHVLPCPQQDVLPTGQDLPCAAY |
| | | | | L19-3 | DLHVLPCPQQDVLPTGQDLPCAAYG |
| | | | | L19-4 | YQGSYGFRLGFLHSGTAKSDLHVL |
| | | | | L19-5 | RLGFLHSGTAKSDLHVLPTGQDL |
| | | | | L19-6 | HSGTAKSDLHVLPTGQDLPCAAYG |
| NIC7 | chr19_39879805_G/A | Missense | <i>FCGBP</i> | L20 | GGQGVCLPNYAMCWLWDGPHYHSF |

| | | | | | |
|-------|-------------------------------------|------------|-----------------|-------|-----------------------------|
| NIC7 | chr19_55093057_C/T | Missense | <i>PPP1R12C</i> | L21 | KPAQSLDPSRRPHVPGVENS DSPAQ |
| NIC7 | chr2_240464953_C/A | Missense | <i>GPC1</i> | L22 | RRRGKLAPRRPHSGTLEKLVSEAK |
| NIC7 | chr20_34776325_C/T | Missense | <i>NCOA6</i> | L23 | LRILAQSNQQLQDLGILSVQIEGE |
| NIC7 | chr20_35044541_A/C | Missense | <i>TRPC4AP</i> | L24 | TLLAKNAQKKKSVSLGSPAAEINQA |
| NIC7 | chr22_17108607_C/T | Missense | <i>IL17RA</i> | L25 | TRAKWQALLGRGVPVRLRCDH GKPV |
| NIC7 | chr3_101857345_G/T | Missense | <i>NFKB1Z</i> | L26 | TALHVAASLQYRFQTLDVAVLLMRK |
| NIC7 | chr4_13602515_C/T | Missense | <i>BOD1L1</i> | L27 | KYAETVKLKHKRNPGKVKDISIDVE |
| NIC7 | chr7_129413686_G/A | Missense | <i>AHCYL2</i> | L28 | VCNMGHSNTEIDMASLRTPELTWER |
| NIC7 | chr8_66429486_C/A | Missense | <i>RRS1</i> | L29 | RPRPLTRWQQFAILKGRIPKKTNL |
| NIC7 | chrM_15617_G/A | Missense | <i>MT-CYB</i> | L30 | TILRSVPNKLGGILALLLSLILAM |
| NIC7 | chrX_54541327_C/T | Missense | <i>GNL3L</i> | L31 | KQQAAREQERQKCRITIESYCDVLR |
| NIC7 | chr19_48195980_G/A | Missense | <i>C19orf68</i> | L32 | WRGAQLHDERAGELRTAEWKGPQSE |
| NIC7 | chr1_18910469_C/T | Missense | <i>IFFO2</i> | L33-1 | CNPTIDLQGELKLATAKSDMNRHLH |
| | | | | L33-2 | KEYQETIGQIELKLATAKSDMNRHL |
| NIC16 | chr10_102366504_A/T | Missense | <i>GBF1</i> | L01 | IQRLLAEFTERWLNLCNGSPFANSDA |
| NIC16 | chr1_114713909_G/T | Missense | <i>NRAS</i> | L02 | ETCLLDLDTAGKEEYSAMRDQYMR |
| NIC16 | chr11_2270166_TTGC GCCGCTACGGCCGC/T | Frameshift | <i>ASCL2</i> | L03 | RRPATAETGGGAMSASATA |
| NIC16 | chr1_156956504_C/G | Missense | <i>ARHGEF11</i> | L04 | NTYMSHAGIRLRDARPSNTEAKAQS |
| NIC16 | chr11_65635326_C/A | Missense | <i>PCNX3</i> | L05 | RLVISHEGDPAWSSAINTSPSLLA |
| NIC16 | chr12_123627113_A/G | Missense | <i>EIF2B1</i> | L06 | LTHAYSRVLRVPEAAVAAKKRFVS |
| NIC16 | chr12_57769824_C/T | Missense | <i>METTL1</i> | L07 | RAAPAGGFQNIAYLRSNAMKHLPNF |
| NIC16 | chr12_65169982_C/A | Missense | <i>LEMD3</i> | L08 | SLLGGPGGASAAHAAGSKVLLGFSS |
| NIC16 | chr16_15724685_G/T | Missense | <i>MYH11</i> | L09 | LQDQLDEEMEAKNLERHISTLNIQ |
| NIC16 | chr17_29583013_C/A | Missense | <i>GIT1</i> | L10.1 | TLLQMVHTLASNWANSIWEHSLDLP |
| | | | | L10.2 | MVHTLASNWANSIWEHSLDPAQVQ |
| NIC16 | chr17_75836605_G/A | Missense | <i>UNC13D</i> | L11 | IRFRSVFPLSVLDSPARLQSLLRV |
| NIC16 | chr17_79077832_T/G | Missense | <i>ENGASE</i> | L12.1 | PPLSSQRPTLLWHDDMMGGYLDRF |
| | | | | L12.2 | PPLSSQRPTLLWHDDMMGGYLLDRD |
| NIC16 | chr19_57873985_A/T | Missense | <i>ZNF814</i> | L13 | VHAGERPFKCGESVSKFSHKRSLVH |
| NIC16 | chr2_106843518_C/T | Missense | <i>ST6GAL2</i> | L14 | SHTQGTGFPSPREPGPREGAFPA |
| NIC16 | chr2_130172479_C/A | Missense | <i>SMPD4</i> | L15 | LITQKPLPVSLHFRSDCAYFILVD |
| NIC16 | chr2_238140762_G/A | Missense | <i>KLHL30</i> | L16 | MVQNVDDLDFHLPSPAQDMLDGLQR |
| NIC16 | chr22_38699959_TTGT | Frameshift | <i>JOSD1</i> | L17 | MSCVVPWKGEQI |
| NIC16 | chr2_70088042_T/A | Missense | <i>PCBP1</i> | L18 | TNSTAASRPVPTQRLVVPATQCGSL |
| NIC16 | chr5_112827969_TG/T | Missense | <i>APC</i> | L19 | LCSMKGCMRALVPN |
| NIC16 | chr5_37726991_G/A | Missense | <i>WDR70</i> | L20 | KTDDSNPREAILHAKAAEDSPYVW |
| NIC16 | chr6_33687091_G/A | Missense | <i>ITPR3</i> | L21 | DSENAERILISLQPLVDVVIKAY |
| NIC17 | chr10_133370734_C/T | Missense | <i>ECHS1</i> | L01 | PFASGANFEYIIEKRGKNNVTGLI |
| NIC17 | chr10_72935651_C/A | Missense | <i>PLA2G12B</i> | L02 | TLGCRPFMNSQRAAFICAEKEEEL |
| NIC17 | chr1_116589057_C/T | Missense | <i>IGSF3</i> | L03 | QVSKSKRTLTLVKNKIQIPLNCSVKS |
| NIC17 | chr11_17169117_G/C | Missense | <i>PIK3C2A</i> | L04 | SYLPTPATPFHPGEGSLPIRVPVST |
| NIC17 | chr11_2570678_G/C | Missense | <i>KCNQ1</i> | L05 | VVFFGTYYVRLCSAGCRSKYVGLW |
| NIC17 | chr11_6683217_T/C | Missense | <i>MIRPL17</i> | L06 | FRRMGLGPESRILRLNLLTGLVRH |
| NIC17 | chr1_26122123_T/C | Missense | <i>PDIK1L</i> | L07.1 | TSLEPTLKVADSGLSKVCASGQN |
| | | | | L07.2 | PDNILISQTRLDTSDLEPTLKVADS |
| NIC17 | chr12_6750194_G/A | Missense | <i>MLF2</i> | L08.1 | GAPKVYQETSEMCSAPGGIRETRRT |
| | | | | L08.2 | GAPKVYQETSEMCSAPGGVSWGALL |
| NIC17 | chr13_102821834_A/G | Missense | <i>BIVM</i> | L09 | FEDIRFGPFTGNATLMRWRFRQINDH |
| NIC17 | chr13_30657546_C/T | Missense | <i>USPL1</i> | L10 | CSEHKKFEVPALEIHIVWERKIS |
| NIC17 | chr14_21230984_T/A | Missense | <i>HNRNPC</i> | L11.1 | KRSAAEMYGSVTDHPSPLSSSF |
| | | | | L11.2 | KRSAAEMYGSVTDHPSPLSVYQ |
| NIC17 | chr1_44802975_G/A | Missense | <i>PLK3</i> | L12 | SLGCVMYTLCCGNPFETADLKETY |
| NIC17 | chr15_44651635_G/C | Missense | <i>SPG11</i> | L13 | ELKCVSVTGFTAVFTWEVERMGYTI |
| NIC17 | chr15_68086601_C/T | Missense | <i>PIAS1</i> | L14 | PQLTYDGH PASLPPVSLGPKHE |
| NIC17 | chr16_19699568_C/T | Missense | <i>C16orf62</i> | L15 | FFNSILAHGDLNKNLQSLVNLW |
| NIC17 | chr16_2175867_G/T | Missense | <i>TRAF7</i> | L16 | KIWDIRTLDCIHFLQTSGGSVYSIA |
| NIC17 | chr1_6469615_G/A | Missense | <i>PLEKHG5</i> | L17 | TDLLLVTKAVKVERTRVIRPPLL |
| NIC17 | chr16_67167533_C/T | Missense | <i>HSF4</i> | L18 | GLSPHRARGPIIFDIPEDSPSPEGT |
| NIC17 | chr1_68137792_C/A | Missense | <i>WLS</i> | L19.1 | FLYAPSHKNYGEYQNGDLGVHSGE |
| | | | | L19.2 | FLYAPSHKNYGEYQNGMQLPCKSR |
| NIC17 | chr17_82054677_G/A | Missense | <i>GPS1</i> | L20 | NYKGSIKESIRHGHDDLGDHYLDC |
| NIC17 | chr18_58919969_C/T | Missense | <i>ZNF532</i> | L21 | QKIQAIINAALQPPKKS RVQV |
| NIC17 | chr19_11021837_C/T | Missense | <i>SMARCA4</i> | L22 | NTHYVAPRRLMLMGTPQLNKLPELW |
| NIC17 | chr19_3478879_C/T | Missense | <i>SMIM24</i> | L23 | LKPWLVLGLAAVVSFLFIVYLLLAN |
| NIC17 | chr19_47680387_G/T | Missense | <i>GLTSCR1</i> | L24 | PQNLTFMAAGKAVQNVVLSGFPAPA |
| NIC17 | chr19_55092787_G/A | Missense | <i>PPP1R12C</i> | L25 | EHRKVGKEWRGPVVEEGEAEPADRSQ |
| NIC17 | chr19_55482650_A/C | Missense | <i>ZNF628</i> | L26 | RDHTGERPYQCGACGKAFKRSSLLA |
| NIC17 | chr20_63882783_G/C | Missense | <i>TPD52L2</i> | L27 | QAGQKTSAAALSTLGS AISRKLGDMR |
| NIC17 | chr3_136152028_C/A | Missense | <i>MSL2</i> | L28 | VLRSLTVSNTEFCPNLQPNLEAT |
| NIC17 | chr3_45500451_C/A | Missense | <i>LARS2</i> | L29 | RYTDPHNPSPFKTAVADYWMVPVDL |
| NIC17 | chr4_143538936_A/C | Missense | <i>SMARCA5</i> | L30 | DSDWNPQVDLQALDRAHRIGQTKTV |

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| NIC17 | chr4_76740029_C/A | Missense | <i>SHROOM3</i> | L31 | QAQAWQAGEDKRYSLSEPWEGDFQ |
| NIC17 | chr6_31888379_C/T | Missense | <i>EHMT2</i> | L32 | ARMVKHHCCPGCDYFCTAGTFLECH |
| NIC17 | chr7_117791275_C/A | Missense | <i>CTTNBP2</i> | L33 | SALATSQVGAWPSATPGGLNQPACSD |
| NIC17 | chr7_135209655_C/T | Missense | <i>WDR91</i> | L34 | DYWSYLERRFLSHLEDIYRPTIHKL |
| NIC17 | chr7_143291622_T/A | Missense | <i>CASP2</i> | L35 | KKNRVVLAKQLLMSLELLEHLEKDI |
| NIC17 | chr7_4788195_C/A | Missense | <i>AP5Z1</i> | L36 | APAASERPLWDTYLRAPSCLEAFRD |
| NIC17 | chr7_5715168_C/T | Missense | <i>RNF216</i> | L37 | EQYKQDGLIEHCCEYGEFFPELFT |
| NIC17 | chr7_756863_A/T | Missense | <i>DNAAF5</i> | L38 | VFLKLLSTLKKSPSASGLLVLSA |
| NIC17 | chr7_99035681_G/C | Missense | <i>SMURF1</i> | L39 | ELIIGLDKIDLKDWSNTRLKHCV |
| NIC17 | chr9_131475787_G/A | Missense | <i>PRRC2B</i> | L40 | RLSNCGYGRRTFISKESPHWQSKSP |
| NIC17 | chr9_72916962_G/C | Missense | <i>ALDH1A1</i> | L41 | FVRRSVERAKKYMGNPLTPGVQTG |
| NIC17 | chr9_87706564_G/A | Missense | <i>DAPK1</i> | L42 | CRWIHQSTEGDTRDLRWVNGKLA |
| NIC17 | chrX_64921864_TC/T | Frameshift | <i>ZC4H2</i> | L43 | YKQEMDLLLQEKWPMWRNSD |
| NIC20 | chr1_220157870_C/T | Missense | <i>RAB3GAP2</i> | L1 | KSPKDLRDRDVRMSDTAMTSFLGS |
| NIC20 | chr12_25245351_C/G | Missense | <i>KRAS</i> | L2 | MTEYKLVVVGARGVGKSALTILQIL |
| NIC20 | chr12_56324171_G/A | Missense | <i>PAN2</i> | L3 | QAYRGAGGSFCSLGDVSVIGQLFSCE |
| NIC20 | chr12_6529892_G/T | Missense | <i>NCAPD2</i> | L4 | DNFDCFGDKLSDSIFSAFLSVVGK |
| NIC20 | chr12_6536969_G/A | Missense | <i>GAPDH</i> | L5 | KIKWGDAGAEYVMESTGVFTTMEKA |
| NIC20 | chr13_32339480_G/T | Missense | <i>BRCA2</i> | L6 | IFDGGPERINTAYVGNLYENNSN |
| NIC20 | chr17_58511460_G/A | Missense | <i>MTMR4</i> | L7.1 | IDSVESRDMFQLYISCKDSKVVRCH |
| | | | | L7.2 | SVINVPLRMIDSVESRDMFQLYISCK |
| | | | | L7.3 | RMIDSVESRDMFQLYISCKDSKVVR |
| | | | | L8 | LEEKQRLEKIKLGGKIGKGTSTN |
| NIC20 | chr17_67911137_G/A | Missense | <i>BPTF</i> | L9 | GGLSLWIFTWACFPCTRQLRSS |
| NIC20 | chr17_75960324_G/A | Missense | <i>ACOX1</i> | L10 | VCACPRDRRTEKENLRKKGEPHHE |
| NIC20 | chr17_7673764_C/T | Missense | <i>TP53</i> | L11 | FEVRVCACPRDRWTEENLRKKGGE |
| NIC20 | chr17_7673776_G/A | Missense | <i>TP53</i> | L12 | IDQELVIPCPNCFASQPKVVRGRHF |
| NIC20 | chr18_80135747_G/A | Missense | <i>ADNP2</i> | L13 | ERSLRARKLTLRELALYKRRRTP |
| NIC20 | chr19_46015404_C/A | Missense | <i>CCDC61</i> | L14 | TDVGRPFTSGQTPVNIQELLGKNF |
| NIC20 | chr19_57254563_T/C | Missense | <i>ZNF805</i> | L15 | GAGLALSTAPALGETWSDVALPELD |
| NIC20 | chr21_46389211_A/G | Missense | <i>PCNT</i> | L16.2 | RNAMQIVGFMDHDAESVLAVVAAVL |
| NIC20 | chr2_191363763_A/C | Missense | <i>MYO1B</i> | L17.1 | LLLDKIQDESLNNEKNALQTPHL |
| NIC20 | chr2_196995406_A/T | Missense | <i>ANKRD44</i> | L17.2 | KCALLLDKIQDESLNNEKNALQTPH |
| | | | | L18 | TEGDEEDATEAWCLHQKHVFLVSEA |
| NIC20 | chr3_49911685_G/A | Missense | <i>MON1A</i> | L19 | KTEANWVNVISDFKIEDLIQSMHI |
| NIC20 | chr4_141721984_G/T | Missense | <i>IL15</i> | L20 | ANSSDPTSGVSKHKSMSSTYEELD |
| NIC20 | chr4_89113177_G/A | Missense | <i>TIGD2</i> | L21 | DEIKQSEQRQSRNQSTTYPFILCLY |
| NIC20 | chr5_112838822_T/TGTTTACTG | Frameshift | <i>APC</i> | L22 | AQTKREVPKNKAPTAEKRVDSLKLQ |
| NIC20 | chr5_112839978_AAGAG/A | Frameshift | <i>APC</i> | L23 | GSASVQLVLRVSTLVYERQTAMAV |
| NIC20 | chr5_176577513_G/A | Missense | <i>CDHR2</i> | L24 | DVIQTHLDKCMKLYKTLKSNLKWKL |
| NIC20 | chr6_144493316_TTGAG/T | Frameshift | <i>UTRN</i> | L25 | MYGATQSQDMCGDQDCIQSTKFLV |
| NIC20 | chr6_157672728_A/G | Missense | <i>ZDHHC14</i> | L26 | GPEEAGSVRRYTHLFTSTPAEGAS |
| NIC20 | chr7_102637557_C/T | Missense | <i>UPK3BL1</i> | L27.1 | NVTVSRVNHVFFSGCAGKPRASHR |
| NIC20 | chr7_152176502_G/GA | Frameshift | <i>KMT2C</i> | L27.2 | VSRVNHVFFSGCAGKPRASRSINS |
| | | | | L28 | LQPIGLTYQFSELYFLASLFWPEN |
| NIC20 | chr9_93101806_G/A | Missense | <i>SAMD9</i> | L29 | KHEKRMSKDEERTVKDELLSEKPEI |
| NIC20 | chr9_14307385_C/T | Missense | <i>NFIB</i> | L30 | LATLHGSNMKWSTAVLWALGFILF |
| NIC20 | chrM_6909_G/A | Missense | <i>MT-CO1</i> | L01 | PVQMPDTPSDLVCHTTTLPSSHEI |
| NIC22 | chr1_1917159613_G/A | Missense | <i>ZBTB41</i> | L02 | SEKDFHYSDDDAVEADSEGADEPCD |
| NIC22 | chr1_218302341_A/G | Missense | <i>RRP15</i> | L03 | FKSGSLAVDNADTLKIPFASLARS |
| NIC22 | chr1_99884678_C/A | Missense | <i>AGL</i> | L04 | FEDKQRRKTEWFTLESKQKRIKNR |
| NIC22 | chr10_118040557_C/G | Missense | <i>RAB11FIP2</i> | L05 | RELKPEEPENKPTAAATARRSKR |
| NIC22 | chr10_132405164_G/A | Missense | <i>PWWP2B</i> | L06 | GSGAGSGSAREDWLFKWTNYIKGY |
| NIC22 | chr11_59615387_C/T | Missense | <i>OSBP</i> | L07 | YTEGLHENGVCSDPGLSLGVSNGGG |
| NIC22 | chr11_68157926_GAA/G | Frameshift | <i>KMT5B</i> | L08 | SCGHGGVNVNISKLSVQLNWRGFSY |
| NIC22 | chr13_53050008_C/T | Missense | <i>OLFM4</i> | L09 | DGARLEGDLSLAEKDVATAKDSKFKM |
| NIC22 | chr14_104945557_G/T | Missense | <i>AHNAK2</i> | L10 | KEEDIEVPKAMGVIFESLAGAIYMD |
| NIC22 | chr14_95091301_T/A | Missense | <i>DICER1</i> | L11 | SAAPGSLGYQLWLDGSGVFEIAEAS |
| NIC22 | chr16_3677504_G/A | Missense | <i>TRAP1</i> | L12 | TLGAFGHEEEVICNPLSPRVIQNI |
| NIC22 | chr16_47669255_C/G | Missense | <i>PHKB</i> | L13 | IRFYGEKPCHEMCDLDRILLSGIYV |
| NIC22 | chr16_71690689_G/A | Missense | <i>PHLPP2</i> | L14 | QQQQKQLPQTPLSCLKTEIMSPLY |
| NIC22 | chr17_63821516_G/A | Missense | <i>FTSJ3</i> | L15 | SQWNSNDLVEQIKTMGLKDEHQFEGG |
| NIC22 | chr17_6525386_C/T | Missense | <i>PITPNM3</i> | L16.1 | YMCNSSCMGGMNWRPILITITLEDSD |
| NIC22 | chr17_7674221_G/A | Missense | <i>TP53</i> | L16.2 | EVGSDCTIHYNYMCNSSCMGGMNWR |
| | | | | L17 | SPPLSTTTTARPMPLTSTASPAATT |
| NIC22 | chr19_14161578_G/A | Missense | <i>ADGRL1</i> | L18 | NISWDYIHYTDNQPTLDLALKPMS |
| NIC22 | chr2_127584256_G/A | Missense | <i>MYO7B</i> | L19 | RVLFPKGTTEVQDLALCYGGMANRT |
| NIC22 | chr2_31377127_C/A | Missense | <i>XDH</i> | L20 | DLVKKLLVDPKGRFTTEEARLHPW |
| NIC22 | chr22_28694075_G/C | Missense | <i>CHEK2</i> | L21 | GSFIRLIDAFKGMVMTHTFGGYANSA |
| NIC22 | chr3_52259737_C/T | Missense | <i>WDR82</i> | L22.1 | LNKGLPLGVRPPMMNGPLHPRPLVA |
| NIC22 | chr4_1238321_G/C | Missense | <i>CTBP1</i> | L22.2 | MSGVRPPMMNGPLHPRPLVALLDGR |

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| NIC22 | chr5_112839525_A/AG | Frameshift | <i>APC</i> | L22.3 | MCRRLSDGVRPPMMNGPLHPRPLVA |
| NIC22 | chr5_57249510_G/T | Missense | <i>GPBP1</i> | L23 | EADSANTLQIAIEIKESSIGLQKIL |
| NIC22 | chr6_118829150_C/T | Missense | <i>MCM9</i> | L24 | LTRMRTDKKSEFFKALKRDRVEEHEH |
| NIC22 | chr7_45104146_C/T | Missense | <i>TBRG4</i> | L25 | DPQESVSVNIALSSPLSRFDLILV |
| NIC22 | chr9_23701494_C/T | Missense | <i>ELAVL2</i> | L26 | TSGEVAHCAKSFTLLKWLSLPLFEA |
| NIC22 | chrM_11031_G/GA | Frameshift | <i>MT-ND4</i> | L27 | GQKPPGATEPITIKFANNPSQKTNQ |
| | | | | L28.1 | RHLSSEPLSRKKTLPYTNLPTNLL |
| | | | | L28.2 | LSRKKTLPLYTNLPTNLLNLYNIHSH |
| NIC22 | chrM_15731_G/A | Missense | <i>MT-CYB</i> | L29 | FRPLSQSLYWLTLADLLIITWIGGQ |
| NIC22 | chrM_9715_G/A | Missense | <i>MT-CO3</i> | L30 | QMIQALLITILLDLYFTLLQASEYF |
| NIC25 | chr10_132777741_C/T | Missense | <i>INPP5A</i> | L01 | QYMNTRCPAWCDCILMSPSAKELVL |
| NIC25 | chr10_34470134_C/G | Missense | <i>PARD3</i> | L02 | SRKNPTRWSTTAALFKNCQTAGSPKT |
| NIC25 | chr11_107433697_T/A | Missense | <i>CWF19L2</i> | L03 | DGGLSWLRKSYLSMKEQAEKQSRNF |
| NIC25 | chr11_72014750_C/T | Missense | <i>NUMA1</i> | L04 | QEKMAATSKEVAHLETLVKAGEQQ |
| NIC25 | chr12_131913767_C/T | Missense | <i>ULK1</i> | L05 | SLMCSGSSLVASVGLSHGRTPSPS |
| NIC25 | chr1_21847754_C/T | Missense | <i>HSPG2</i> | L06 | VEGQTLDLNLCVTRQQAIIHWYKR |
| NIC25 | chr12_25245350_C/A | Missense | <i>KRAS</i> | L07 | MTEYKLVVVGAVGVGKSALTIQLIQ |
| NIC25 | chr1_243191320_C/G | Missense | <i>CEP170</i> | L08 | STIHEIPTKDTPTSHITGAGHASF |
| NIC25 | chr12_56088072_C/T | Missense | <i>ERBB3</i> | L09 | NDSGACVPRCQSLVYNKLTFLQEP |
| NIC25 | chr13_75286844_C/T | Missense | <i>TBC1D4</i> | L10 | PADALVNCDLLKDLNCNPNNKAKI |
| NIC25 | chr14_24338294_A/C | Missense | <i>RIPK3</i> | L11 | NRKASTASDVSVGLMWAVLAGRE |
| NIC25 | chr16_75656305_GGAA/G | Inframe deletion | <i>TERF2IP</i> | L12.1 | ETQPDEEEEEEEKVSQPEVGAAIKI |
| NIC25 | | | | L12.2 | ETQPDEEEEEEEKVSQPEVSISSQS |
| NIC25 | chr17_20205400_G/GT | Frameshift | <i>SPECC1</i> | L13 | HRERAELQSQENEKLMNLLQERVKE |
| NIC25 | chr17_7673607_TGCTA/T | Splice | <i>TP53</i> | L14.1 | PHHELPPGSTKRGKQAGQEAVEETK |
| NIC25 | | | | L14.2 | KQAGQEAVEETKGAVMPIHFYHLS |
| NIC25 | | | | L14.3 | AVMPQIHFYHLSPLFTAQQHQLLS |
| NIC25 | | | | L14.4 | QHQLLSPAKEETGWRIFHPSDPWA |
| NIC25 | | | | L14.5 | PLFTAQQHQLLSPAKEETGWRIFH |
| NIC25 | chr19_35738445_G/A | Missense | <i>IGFLR1</i> | L15 | EGQKHIVIFALRHILRGEELTYDYK |
| NIC25 | chr19_4524976_C/T | Missense | <i>PLIN5</i> | L16 | LWGEWGWQRPESHRRSQALETLLV |
| NIC25 | chr19_46778729_C/T | Missense | <i>SLC1A5</i> | L17 | LIYFLTRKNPYHFLWGVITPLATA |
| NIC25 | chr20_38156089_C/T | Missense | <i>TGM2</i> | L18 | ASVDSLTSVVDTPAPSQEAGTKAR |
| NIC25 | chr20_41484523_C/T | Missense | <i>CHD6</i> | L19 | KDDVEKNLAPKQKTIIEVELTNIQK |
| NIC25 | chr20_50891831_A/C | Missense | <i>ADNP</i> | L20 | MHNASDSEVDQDEVVWKGDSGPSE |
| NIC25 | chr20_63930879_C/T | Missense | <i>DNAJC5</i> | L21 | WAKALFVFCGLLMCCYCCCLCCFC |
| NIC25 | chr2_230467207_G/T | Missense | <i>SP100</i> | L22 | AEASSGALRSKHVEKAPMSTRSTST |
| NIC25 | chr22_35334417_C/T | Missense | <i>TOM1</i> | L23 | RLEDEFDMFALTWVGSSLADQRKEVK |
| NIC25 | chr22_40266865_T/TC | Frameshift | <i>TNRC6B</i> | L24 | SSGPQPATPKDEEPSGWEEPSPTVN |
| NIC25 | chr2_86478667_A/G | Missense | <i>KDM3A</i> | L25 | VHSVRAKWGKADCPNSRQFKLFS |
| NIC25 | chr3_24146684_C/T | Missense | <i>THRB</i> | L26.1 | ECRFKKCIYVGMTTDLVLDSKRLA |
| NIC25 | | | | L26.2 | QECRFKKCIYVGMTTDCHTFIKKWP |
| NIC25 | chr4_147654416_C/T | Missense | <i>PRMT9</i> | L27 | KSFTQNKDLLSENAELCSALANL |
| NIC25 | chr4_733979_G/T | Missense | <i>PCGF3</i> | L28.1 | SEKSFHAKGPVGVVRAEASLRRAK |
| NIC25 | | | | L28.2 | QKSHFTLKVLLVLSSEQMRPLRGERN |
| NIC25 | chr4_8607369_G/A | Missense | <i>CPZ</i> | L29 | LHGGDLVSVYPFNFSKHPQEKMF5 |
| NIC25 | chr5_112840204_CAG/C | Frameshift | <i>APC</i> | L30 | QKDVELRIMPPVQENDNGNETIRAA |
| NIC25 | chr5_136063199_A/G | Missense | <i>TGFB1</i> | L31 | ELADSALEIFKQASAFSRPLSIRSY |
| NIC25 | chr5_141384779_G/A | Missense | <i>PCDHGA2</i> | L32 | GLFAVGLYTGCVHTARALLDRDALK |
| NIC25 | chr5_180948367_C/T | Missense | <i>BTNL8</i> | L33 | KIFFSKFQWKIQVELDWRKKGQAE |
| NIC25 | chr6_139166833_C/CCACGGGCTA | Inframe insertion | <i>HECA</i> | L34.1 | GGSPGQSPPTGYTGYLSILPAHFSG |
| NIC25 | | | | L34.2 | GSPGQSPPTGYTGYLSILPAHFSGP |
| NIC25 | | | | L34.3 | SPGQSPPTGYTGYLSILPAHFSGPR |
| NIC25 | chr7_158167215_C/T | Missense | <i>PTPRN2</i> | L35 | AHTSALTYPPGQSTQLREDLLPRTL |
| NIC25 | chr8_126556693_G/T | Missense | <i>FAM84B</i> | L36 | LRIGKQPYRLQIKLSAQRSHLTFEQ |
| NIC25 | chr9_83970226_G/A | Missense | <i>HNRNPK</i> | L37 | IKIDEPLEGSEDIITITGTQDQIQ |
| NIC25 | chrX_71250094_G/A | Missense | <i>ZMYM3</i> | L38 | SVCLSLYEAQQCPQPQSGDPADAT |
| NIC27 | chr10_87170897_A/T | Missense | <i>SHLD2</i> | L1 | GQKQKVMMLTVELAQDQHYALVLWG |
| NIC27 | chr1_114716126_C/T | Missense | <i>CSDE1</i> | L2 | MTEYKLVVVGADGVGKSALTIQLIQ |
| NIC27 | chr11_46778488_C/T | Missense | <i>CKAP5</i> | L3 | DGDEPDGSDNDVILLPRTEISDKI |
| NIC27 | chr1_202012640_A/AC | Frameshift | <i>ELF3</i> | L4.1 | AFQEALDPGPFDPGQPLCPGAAGR |
| | | | | L4.2 | PGQPLCPGAAGRASQPLPRQLW |
| | | | | L4.3 | AGRRASQPLPRQLWRRSPLPWQL |
| NIC27 | chr1_237658004_C/A | Missense | <i>RYR2</i> | L5 | EYFINKYAEHSHEKWSMDKLANGWI |
| NIC27 | chr14_45006152_G/A | Missense | <i>KLHL28</i> | L6 | RGISLLPKADLNTVGHKKKEPDDI |
| NIC27 | chr16_12069072_G/T | Missense | <i>SNX29</i> | L7 | VGSYSPADAPLIGLENGTGPEDHVL |
| NIC27 | chr16_3138989_G/T | Missense | <i>ZNF213</i> | L8.1 | TCFVSGVHGPFVAFGDIPFYFSREEW |
| NIC27 | chr16_3138989_G/T | Missense | <i>ZNF213</i> | L8.2 | QEQSHSGTGTGIWRHPILFLPGRMG |
| NIC27 | chr19_3738627_G/A | Missense | <i>TJP3</i> | L9 | EAVQFLGLLPPGKEMELVYTRKQDI |
| NIC27 | chr19_49867076_G/T | Missense | <i>PNKP</i> | L10.1 | LVLGRGPLTQVTERKCSRTQVELVA |
| | | | | L10.2 | DGQALVLRGRLTQVTERKCSRTQA |

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| NIC27 | chr20_63590574_C/T | Missense | <i>GMEB2</i> | L11 | RPRLARATSGPATMASQVLTQSAQL |
| NIC27 | chr2_170846011_G/T | Missense | <i>GAD1</i> | L12 | TDNVILIKCNERVKIIPADFEAKIL |
| NIC27 | chr3_15074555_G/A | Missense | <i>RBSN</i> | L13 | DLQREQLQMLREWELELEREQFRVA |
| NIC27 | chr3_151199322_T/TA | Frameshift | <i>MED12L</i> | L14.1 | VYKDLEPFTYFFLFSFPCWNYWKL |
| | | | | L14.2 | FSFPCWNYWKLFCNLGFYTEYESQ |
| | | | | L14.3 | YWKLFCLNGFYTEEYESQVCEHLLN |
| NIC27 | chr3_97877501_G/A | Missense | <i>CRYBG3</i> | L15 | DDSSQEDILSSEISPGHHGPRKSRD |
| NIC27 | chr4_17501822_GCT/G | Frameshift | <i>QDPR</i> | L16.1 | SLFKNCDLMWQHMIDHDLQKGCPCG |
| | | | | L16.2 | MDIDHLQKGCPCGWDSWYDRVRHGQG |
| | | | | L16.3 | WDSWYDRVRHGQGCCSPALPEPGWE |
| | | | | L16.4 | GCCSPALPEPGWEEQRHAARGSRHR |
| | | | | L16.5 | EQRHAARGSRHRCAPGYPGPDEQE |
| | | | | L16.6 | HAARGSRHRCAPGYPGPDEQEINA |
| | | | | L16.7 | SLFKNCDLMWQHMIDHDLQPSGYQ |
| | | | | L16.8 | MDIDHLQPSGYQASQGRPPDLGWR |
| | | | | L16.9 | ASQGRPPDLGWRKGCPCGWDSWVTL |
| | | | | L16.10 | RPPDLGWRKGCPCGWDSWVTLDTMP |
| NIC27 | chr4_17813010_G/A | Missense | <i>NCAPG</i> | L17 | LLGSMPENAQIDNDVDFKINKAMLI |
| NIC27 | chr4_8235554_G/A | Missense | <i>SH3TC1</i> | L18 | GAWEREKAVSFYQDRALPLAVTTGN |
| NIC27 | chr4_9890687_G/A | Missense | <i>SLC2A9</i> | L19 | AVFSGLVIEHLGWRPLLIGGFLMG |
| NIC27 | chr5_150204571_G/A | Missense | <i>SLC6A7</i> | L20 | GMYWLVLLDDYSTSFLGLMVVVITC |
| NIC27 | chr6_33711605_C/A | Missense | <i>UQCC2</i> | L21 | WPVDETKRGRDLCAYLRRQVAQAFR |
| NIC27 | chr7_98984093_C/T | Missense | <i>TRRAP</i> | L22.1 | SSFWMWRQHYYQVIVTAYENSSQHD |
| | | | | L22.2 | QGKPTWSGMHSSLIVTAYENSSQHD |
| NIC27 | chr8_144057495_G/T | Missense | <i>OPLAH</i> | L23 | PLSLEEVAMGFVSVANEAMCRPIRA |
| NIC27 | chr8_144360298_A/G | Missense | <i>FBXL6</i> | L24 | AAGTTPGDPKACQLLSARSACLLG |
| NIC27 | chr8_28160331_C/T | Missense | <i>ELP3</i> | L25 | PDQDILIGLLRLCKCSEETFRFELG |
| NIC27 | chr8_39918906_C/A | Missense | <i>IDO1</i> | L26.1 | LPILVYADCLENWKKKDPNKYVN |
| | | | | L26.2 | LPILVYADCLENWKKKDPNKPLT |
| NIC38 | chr1_114713909_G/T | Missense | <i>NRAS</i> | L01 | ETCLLDILDTAGKEEYSAMRDQYMR |
| NIC38 | chr1_155187338_G/C | Missense | <i>MUC1</i> | L02.1 | AVCQCRRNKYGQVDFIPARDTYHPM |
| | | | | L02.2 | GCLSVPPKELRAGHLLSSPGYLPY |
| | | | | L02.3 | WLSVSAAEERTTGRWTSFQGPITIL |
| NIC38 | chr1_204968350_G/A | Missense | <i>NFASC</i> | L03 | VLRGMDLLELCITSGVPTPIAWYK |
| NIC38 | chr1_52359809_G/A | Missense | <i>CC2D1B</i> | L04 | SAQPVSDLDPDPWALLSSRQREYKV |
| NIC38 | chr10_127439193_C/A | Missense | <i>DOCK1</i> | L05 | FEKEFKPTDISLKQSEAVILSETIS |
| NIC38 | chr10_87790413_T/C | Missense | <i>ATAD1</i> | L06 | VDPLNMHVWSDMAGLDDVITDLKD |
| NIC38 | chr11_114407658_C/T | Missense | <i>RBM7</i> | L07 | PYLADRHYSRECYCTDHGSDHHYRG |
| NIC38 | chr11_68934473_G/A | Missense | <i>IGHMBP2</i> | L08 | EDEQSKGNPGEVHLVSLHIQALVDA |
| NIC38 | chr11_75796404_G/A | Missense | <i>DGAT2</i> | L09 | IFGYHPHGMGLDAFCNFSTEATEV |
| NIC38 | chr12_100623662_C/T | Missense | <i>GAS2L3</i> | L10 | LLKYDPCRILQFVTLQKILAFKQK |
| NIC38 | chr12_25245347_C/T | Missense | <i>KRAS</i> | L11 | MTEYKLVVVGAGDVGKSAITLIQLQ |
| NIC38 | chr12_50474099_C/T | Missense | <i>LARP4</i> | L12.1 | TTIPVSPSTTKSSRASTASPCNNN |
| NIC38 | chr12_50474099_C/T | Missense | <i>LARP4</i> | L12.2 | TTIPVSPSTTKSSREPRKLSYAEV |
| NIC38 | chr12_57268355_C/T | Missense | <i>R3HDM2</i> | L13 | VSQSVQGGLPAAARVYVYMSIPPAQ |
| NIC38 | chr12_6974548_TCA/T | Splice | <i>EMG1</i> | L14.1 | NGRDPGEARPDITHQTPGTVLTL |
| | | | | L14.2 | DPGEARPDITHQVYIHTQKNVLEIV |
| | | | | L14.3 | YIHTQKNVLEIVNPQTRIPRTDFR |
| | | | | L14.4 | PQTRIPRTDFRFGCLMVQLLHKLVS |
| | | | | L14.5 | GLMVQLLHKLVSRAADGPQKLLKVI |
| | | | | L14.6 | ILLKNGRDPGEARPDITHQFADADG |
| NIC38 | chr13_24883229_C/T | Missense | <i>CENPJ</i> | L15 | ANGHQETKYRSGQIRVKDKEGNVLM |
| NIC38 | chr14_64948446_G/A | Missense | <i>RAB15</i> | L16 | QAHRKELEGRMCASNELALAELEE |
| NIC38 | chr16_2117882_G/T | Missense | <i>PKD1</i> | L17 | ALELVCPSSVQSEESLDLSIQKQK |
| NIC38 | chr17_42670596_C/T | Missense | <i>PLEKHH3</i> | L18 | PLHPEGLSPDGHKLPFLFEQAHAL |
| NIC38 | chr17_47292436_G/A | Missense | <i>ITGB3</i> | L19 | QQDECSPREGQPICSRQGECLCGQC |
| NIC38 | chr17_72124031_TC/T | Frameshift | <i>SOX9</i> | L20 | PQAHTLTLTSSPEPQSSERTSRSS |
| NIC38 | chr17_7674229_C/A | Missense | <i>TP53</i> | L21.1 | HNYNYMCNSSCMGMNRRPILTIITL |
| | | | | L21.2 | EVGSDCTTIHNYNYMCNSSCMGMNRR |
| NIC38 | chr17_81811574_G/A | Missense | <i>GCGR</i> | L22 | VSTWLSDGVSPQRPQAGGWVGSQA |
| NIC38 | chr18_25226861_A/T | Missense | <i>ZNF521</i> | L23 | SNPSPLVTVGYTTVSTTPDSNLSV |
| NIC38 | chr18_50275897_C/T | Missense | <i>MBD1</i> | L24 | GACSTLLQLPHNVASGLFCKCERR |
| NIC38 | chr19_3981442_G/A | Missense | <i>EEF2</i> | L25 | QLILDPIFKVDFVIMNFKKEETAKL |
| NIC38 | chr19_44288724_G/T | Missense | <i>ZNF235</i> | L26 | DDNIVHKRDKVHRNSDCGKDTLKVS |
| NIC38 | chr19_49168357_G/GGT | Frameshift | <i>TRPM4</i> | L27.1 | RDHQMASTGGTKWWWVWVWPPGVWS |
| | | | | L27.2 | WWWVWVWVWVWVWVWVWVWVWVW |
| | | | | L27.3 | IETPSSTPRARSLRGTGGAVTRRTG |
| | | | | L27.4 | RGTGGAVTRRTGSSFPWTTTTRPSS |
| | | | | L27.5 | SFPWTTTTRPSSWTTAHTAAWGAR |
| | | | | L27.6 | WTTAHTAAWGARTASACAWSPTS |
| | | | | L27.7 | ASACAWSPTS |

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| | | | | L27.8 | AWSPTSHSRRRAWEGLELTSLSCSS |
| | | | | L27.9 | GPSDGGHWHGQGVVAMGVAPWGVVR |
| | | | | L27.10 | PSDGGHWHGQGVVAMGVAPWGVVRN |
| | | | | L27.11 | GTIRWPALGAPRCGGHGGCPLGCGP |
| | | | | L27.12 | TIRWPALGAPRCGGHGGCPLGCGPE |
| NIC38 | chr19_49909636_C/T | Missense | <i>NUP62</i> | L28 | APFQPATSTPSTLFLSATQTPTAQ |
| NIC38 | chr19_54192199_A/G | Missense | <i>TSEN34</i> | L29 | PRSALLQLATAGPRPVKARPLDWR |
| NIC38 | chr2_132785077_C/A | Missense | <i>NCKAP5</i> | L30 | QGQGHGRMALNLHSDTDDNETFDE |
| NIC38 | chr2_218740117_T/C | Missense | <i>TLL4</i> | L31 | DQAETEDTEELADGLEDCSARDEN |
| NIC38 | chr2_25243924_A/T | Missense | <i>DNMT3A</i> | L32 | PVPAEKRPKIRVQSLFDGIATGLLV |
| NIC38 | chr2_54850185_G/A | Missense | <i>EML6</i> | L33 | WSLDSKYLQTNDSAGERLFYRMPG |
| NIC38 | chr2_70088042_T/G | Missense | <i>PCBP1</i> | L34 | TNSTAASRPPVTRRLVVPATQCGSL |
| NIC38 | chr20_25207212_G/A | Missense | <i>ENTPD6</i> | L35 | GVFIYVAYIKWHQATATQAFFSITR |
| NIC38 | chr20_38558332_C/T | Missense | <i>RALGAPB</i> | L36 | EPANSRLPPHLLVDSTIPGFFDDI |
| NIC38 | chr20_58909366_G/A | Missense | <i>GNAS</i> | L37 | DYVPSDQDLRCHVLTSGIFETKFKQ |
| NIC38 | chr22_41176347_G/A | Missense | <i>EP300</i> | L38 | PDPLIPCDLMDGGDFLTLARDKHL |
| NIC38 | chr22_41604044_C/T | Missense | <i>DESI1</i> | L39 | LEYLSSLGESLFQGEAYNLFEHNCN |
| NIC38 | chr3_50276335_C/T | Missense | <i>SEMA3B</i> | L40 | QVLAERTERTAWGLLRLRRRDS |
| NIC38 | chr3_77577541_A/G | Missense | <i>ROBO2</i> | L41 | PQSVTVLTVGSSYSSTISVSWDPPP |
| NIC38 | chr4_75969346_C/T | Missense | <i>SDAD1</i> | L42 | LKQLECKERFEMKMMMLNLSRLV |
| NIC38 | chr5_112839514_TAAAAG/T | Frameshift | <i>APC</i> | L43 | IGCNQTTQEASANTLQIAEIKDWN |
| NIC38 | chr5_140835112_C/A | Missense | <i>PCDHA7</i> | L44 | TVLDNNDNAPVFERTLYTVKLPENV |
| NIC38 | chr5_14610204_T/A | Missense | <i>OTULINL</i> | L45 | LEVKIKVFRFKINSRDFEVCYPEE |
| NIC38 | chr7_100684319_G/A | Missense | <i>GIGYF1</i> | L46 | SPPPLLGNMDQEWLKKQQLAAAL |
| NIC38 | chr7_1496228_C/T | Missense | <i>INTS1</i> | L47 | ERFVVHITDVLAMSMMLGITAQVKE |
| NIC38 | chr7_155803327_C/T | Missense | <i>SHH</i> | L48 | VRPGQRVVVAEHGDRLRLLPAVH |
| NIC38 | chr7_5388319_G/A | Missense | <i>TNRC18</i> | L49 | AAKLFGLPEGRPLPTGPEHKWKPF |
| NIC38 | chr7_98229051_C/T | Missense | <i>TECPR1</i> | L50 | HTAWVYTGYYGSGCFQGLASSTNI |
| NIC38 | chr8_121617152_C/G | Missense | <i>HAS2</i> | L51 | MLDPASSVEMVKLLEEDPMVGGVGG |
| NIC38 | chr9_106925857_C/T | Missense | <i>ZNF462</i> | L52 | SSLPLENETDSHSSSNTVKKSQTS |
| NIC38 | chr9_93289156_G/A | Missense | <i>WNK2</i> | L53 | CTPAPEAASRTDTSAPREPLPPAP |
| NIC38 | chr1_203347520_T/TGTACAGCTG | Inframe insertion | <i>FMOD</i> | L54.1 | PDGLPSALEQLYSCTMEHNNVYTP |
| NIC39 | chr10_118039249_C/T | Missense | <i>RAB11FIP2</i> | L01 | LPRKKNPFEESSKTWDSMNLFSKP |
| NIC39 | chr11_19933968_A/G | Missense | <i>NAV2</i> | L02 | GIPKPGMKSMGRSPAPAPSKEGE |
| NIC39 | chr1_144424696_C/T | Missense | <i>NBPF15</i> | L03 | ALEEKHVGFSLDMGEIEKKGKGGKR |
| NIC39 | chr1_19186599_G/A | Missense | <i>UBR4</i> | L04 | RKGSMSDASASIDSNITYEDDFS |
| NIC39 | chr11_93700058_C/A | Missense | <i>CEP295</i> | L05 | QQDNLGLQKLDIQREVLHYSQKAQ |
| NIC39 | chr1_202013255_CAA/C | Frameshift | <i>ELF3</i> | L06.1 | GKRKRGRPKRSLRVGLSRGQEEQA |
| | | | | L06.2 | VLGLSRGQEEQARAQRHPPVGVHPG |
| | | | | L06.3 | AQRHPPVGVHPGHPHPGAQRGPHE |
| | | | | L06.4 | PVGVHPGHPHPGAQRGPHEVGESA |
| NIC39 | chr12_121453254_G/A | Missense | <i>KDM2B</i> | L07 | LAANRTTAGARRCRTCRCACEALR |
| NIC39 | chr12_25245350_C/A | Missense | <i>KRAS</i> | L08 | MTEYKLVVVGAVGVGKSALTQLIQ |
| NIC39 | chr12_58879049_C/T | Missense | <i>LRIG3</i> | L09 | TPMDLIRAGAMTRLECAAVGHPAP |
| NIC39 | chr13_19659265_T/A | Missense | <i>MPHOSPH8</i> | L10 | GDYITVKVALNSKEEYNLDQEDSSG |
| NIC39 | chr14_104171738_C/T | Missense | <i>KIF26A</i> | L11 | NPGSIGVKVMLWVPAQGAQRSAE |
| NIC39 | chr14_22902052_C/CGGT | Inframe insertion | <i>RBM23</i> | L12 | QLPSTAAAAAAPAAQAAALQNGA |
| NIC39 | chr1_46272733_G/A | Missense | <i>RAD54L</i> | L13 | YKRFRLQAKPAEKLEGGKMSVSSLS |
| NIC39 | chr14_88792343_T/C | Missense | <i>EML5</i> | L14 | GVGVVYSPREHRRKRYRSHSDDIIS |
| NIC39 | chr15_34982598_C/A | Missense | <i>ZNF770</i> | L15 | QGGFENGEIGESDENLPLDQVSIYI |
| NIC39 | chr16_22534398_C/T | Missense | <i>NPIP5</i> | L16 | PLPPSADDNLKTLSEKQLTLPPLPSA |
| NIC39 | chr16_549404_C/T | Missense | <i>CAPN15</i> | L17 | EGAYQVRLCKDGMWTTVLVDDMLPC |
| NIC39 | chr16_58267555_A/G | Missense | <i>CCDC113</i> | L18 | DKEILLRKEELLERIEKETLQVEEDR |
| NIC39 | chr16_90006391_G/A | Missense | <i>DBNDD1</i> | L19 | QSHKQPLGDPWQATVLDLFTLVE |
| NIC39 | chr17_47292436_G/A | Missense | <i>ITGB3</i> | L20 | QQDECSPREGQPCSRGECLECGQC |
| NIC39 | chr17_51041572_C/T | Missense | <i>SPAG9</i> | L21 | GDGLLTPDAQGRETPGSEQWKFQE |
| NIC39 | chr17_7675088_C/T | Missense | <i>TP53</i> | L22 | YKQSQHMTVEVVRHCPHERCSDSDG |
| NIC39 | chr19_19202339_AGTT/A | Inframe deletion | <i>RFXANK</i> | L23.1 | LHKIVDFYPEDNSLQTFPIAAEVD |
| | | | | L23.2 | LHKIVDFYPEDNSLQISPCFVGGW |
| NIC39 | chr19_3193350_G/C | Missense | <i>NCLN</i> | L24 | AMETAVPVYFAVQDEALLSIYKQTQ |
| NIC39 | chr19_41116275_G/T | Missense | <i>CYP2F1</i> | L25 | CLLLTSSRDKGNLPPGPRPLSILG |
| NIC39 | chr19_6534932_C/T | Missense | <i>TNFSF9</i> | L26 | QGRLLHLSAGQCLGVHLHTEARAR |
| NIC39 | chr19_9980686_C/G | Missense | <i>COL5A3</i> | L27 | PGATGQPGPKGDLGQDGAPGIPGEK |
| NIC39 | chr20_5922477_C/A | Missense | <i>CHGB</i> | L28 | SSRGEAGAPGEEIIGQPTKADTEKW |
| NIC39 | chr2_131052950_G/A | Missense | <i>FAM168B</i> | L29 | PVAPHPVTPTYWAPGTPPTYSVPPP |
| NIC39 | chr21_46389270_G/C | Missense | <i>PCNT</i> | L30 | LPDLRTLSECAQMSVAEISSHMR |
| NIC39 | chr2_24024246_G/A | Missense | <i>MFS2B</i> | L31.1 | MVGSTPKTPSRDTSRSLRRLRSTY |
| | | | | L31.2 | LCILMVGSTPKTPSRDTSRSLRRLR |
| | | | | L31.3 | MVGSTPKTPSRDTSRSLRRLRVLHH |
| NIC39 | chr22_41177044_G/C | Missense | <i>EP300</i> | L32 | QHTKGCRRKTNAGCICKQLIALCC |
| NIC39 | chr3_129250763_C/T | Missense | <i>COPG1</i> | L33 | SAVLQEASDICSPLAFIINIHHQCN |

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| NIC39 | chr3_133838231_G/A | Missense | <i>RAB6B</i> | L34 | DKRQITIEEGEQCAKELSVMIETS |
| NIC39 | chr3_64615973_G/A | Missense | <i>ADAMTS9</i> | L35 | CSGECNTGGWRYFAWTECKSCDGG |
| NIC39 | chr4_883459_C/T | Missense | <i>GAK</i> | L36 | LDISYITSRIAVISFPAEGVESALK |
| NIC39 | chr4_989975_C/T | Missense | <i>IDUA</i> | L37 | QLHKRFGSSVAGNIPTGFMPQVPE |
| NIC39 | chr5_112839783_GA/G | Frameshift | <i>APC</i> | L38.1 | SRCTSVSSLDSFGVVRLPAPFRVNH |
| | | | | L38.2 | SVSSLDSFGVVRLPAPFRVNHAVEW |
| NIC39 | chr5_1338974_G/GCACT | Frameshift | <i>CLPTM1L</i> | L39 | INLLTGESDTQQIEAEKPTSECPG |
| NIC39 | chr5_141955118_G/A | Missense | <i>RNF14</i> | L40 | PQRPPASSATLRWQRHLNGKVSPEK |
| NIC39 | chr6_106511835_G/A | Missense | <i>CRYBG1</i> | L41 | HENDSPQLEPLETEGEPFDATTTA |
| NIC39 | chr6_119348513_G/A | Missense | <i>MAN1A1</i> | L42 | PVDFVPIGVESWEPADAAIREKRA |
| NIC39 | chr6_1312718_T/C | Missense | <i>FOXQ1</i> | L43 | MKLEAFVPRAAHGDKQGSDELGAGG |
| NIC39 | chr6_149378140_G/C | Missense | <i>TAB2</i> | L44 | SDDSGISGLRNHITLNLDLQSQNI |
| NIC39 | chr6_38703045_G/A | Missense | <i>GLO1</i> | L45 | MAESQPPSGGLTDEAALSCCSDADP |
| NIC39 | chr6_4130838_TG/T | Frameshift | <i>C6orf201</i> | L46 | KLKLYALYKQATEGPCNMPNQVYLT |
| NIC39 | chr7_134661775_C/T | Missense | <i>BPGM</i> | L47 | WVPVSSWRNLNECHYALIGLNREQ |
| NIC39 | chr7_144363086_T/G | Missense | <i>ARHGEF5</i> | L48 | CPIQSEHLDMAPLSSDLGSEEEVE |
| NIC39 | chr7_43624714_G/C | Missense | <i>COA1</i> | L49 | TKESIVTEELIVLTSYTLGQCQSE |
| NIC39 | chr8_39922577_C/T | Missense | <i>IDO1</i> | L50 | LTYENMDVLFSCDGDCKGFFLVS |
| NIC39 | chr8_52657517_G/A | Missense | <i>RB1CC1</i> | L51 | MMVESLYSSVINVIDSRMQDTNVC |
| NIC39 | chr9_106927814_G/T | Missense | <i>ZNF462</i> | L52 | PALKATVTSIMRLAFLDLGIEAGYH |
| NIC39 | chr9_127482955_G/C | Missense | <i>LRSAM1</i> | L53 | SEILKSLNERITMEQLMSITQEET |
| NIC39 | chr9_136854652_G/T | Missense | <i>PHPT1</i> | L54 | AGGPERPSWPRRYHSRNSAQGSFLV |
| NIC39 | chrM_5227_G/A | Missense | <i>MT-CO2</i> | L55 | TPLIPSTLLSLGDLPLTGFPLKWA |
| NIC39 | chrX_53580849_G/C | Missense | <i>HUWE1</i> | L56 | VANCCIRIALPAARGSGTASDDEFE |
| NIC39 | chrX_70287275_C/A | Splice | <i>KIF4A</i> | L57.1 | NDVDFQDIEHSKIIIKRGRLCTRK |
| | | | | L57.2 | IIIKRGRLCTRKLQPTALHVDVSM |
| | | | | L57.3 | IAKKRGLCTRKLQPTALHVDVSMTC |

SLP - synthetic long peptide

Table S3 | 40-marker imaging mass cytometry panel

| Target | Clone | Metal | Incubation Time | Temp | Dilution |
|-----------------|-----------------|--------|-----------------|------|----------|
| B catenin | D10A8 | 89Y | Overnight | 4C | 100 |
| TGFbeta | TB21 | 115In | 5h | RT | 100 |
| HLA-DR | TAL 1B5 | 141 Pr | 5h | RT | 100 |
| CD20 | H1 | 142 Nd | Overnight | 4C | 100 |
| CD68 | D4B9C | 143 Nd | Overnight | 4C | 100 |
| CD11b | D6X1N | 144 Nd | 5h | RT | 100 |
| CD4 +2nd Ab | EPR6855 | 145 Nd | Indirect ON | RT | 100 |
| CD8a | D8A8Y | 146 Nd | 5h | RT | 50 |
| CD31 | 89C2 | 147 Sm | Overnight | 4C | 100 |
| TCRgd + 2nd Ab | H41 | 148 Nd | Indirect ON | 4C | 50 |
| CD45 | D9M8I | 149 Sm | Overnight | 4C | 50 |
| Granzyme B | D6E9W | 150 Nd | 5h | RT | 100 |
| CD57 | HNK-1 / Leu-7 | 151 Eu | Overnight | 4C | 100 |
| Ki-67 | 8D5 | 152 Sm | Overnight | 4C | 100 |
| CD3 | EP449E | 153 Eu | Overnight | 4C | 50 |
| TIM3 | D5D5R | 154 Sm | 5h | RT | 100 |
| LAG-3 | D2G40 | 155 Gd | 5h | RT | 50 |
| PD-L1 | E1L3N | 156 Gd | Overnight | 4C | 50 |
| CD39 | EPR20627 | 157 Gd | 5h | RT | 100 |
| VISTA | D1L2G | 158 Gd | 5h | RT | 100 |
| FOXP3 | D608R | 159 Tb | Overnight | 4C | 50 |
| PD-1 | D4W2J | 160 Gd | 5h | RT | 50 |
| ICOS | D1K2T | 161 Dy | 5h | RT | 50 |
| IDO | D5J4E | 162 Dy | Overnight | 4C | 100 |
| CD14 | D7A2T | 163 Dy | 5h | RT | 100 |
| CD204 | J5HTR3 | 164 Dy | 5h | RT | 50 |
| CD45RO | UCHL1 | 165 Ho | Overnight | 4C | 100 |
| PDPN | D2-40 | 166 Er | Overnight | 4C | 100 |
| CD56 | E7X9M | 167 Er | 5h | RT | 100 |
| CD103 | EPR4166(2) | 168 Er | 5h | RT | 50 |
| CD38 | EPR4106 | 169 Tm | Overnight | 4C | 100 |
| Tbet | 4B10 | 170 Er | 5h | RT | 50 |
| CD15 | MC480 | 171 Yb | Overnight | 4C | 100 |
| Cleaved-caspase | 5A1E | 172 Yb | 5h | RT | 100 |
| CD163 | D6U1J | 173 Yb | 5h | RT | 50 |
| CD7 | EPR4242 | 174 Yb | 5h | RT | 100 |
| p16ink4a | D3W8G | 175 Lu | Overnight | 4C | 100 |
| CD11c | EP1347Y | 176 Yb | 5h | RT | 100 |
| Vimentin | D21H3 | 194 Pt | Overnight | 4C | 50 |
| Keratin | C11 and AE1/AE3 | 198 Pt | Overnight | 4C | 50 |

Table S4 | Number of T cells at sorting and after expansion.

| Patient | #Cells | | | | % | | | | Primary expansion rate | | | | Restimulation expansion rate | | | |
|---------|--------|------|------|------|------|------|------|------|------------------------|--------|--------|------|------------------------------|--------|------|--------|
| | DP | SP | DN | SP39 | DP | SP | DN | SP39 | DP | SP | DN | SP39 | DP | SP | DN | SP39 |
| NIC4 | 610 | 1447 | 1792 | 353 | 11,7 | 37,6 | 47,3 | 3,42 | 157377 | 32480 | 42410 | | | | | |
| NIC5 | 595 | 51 | 185 | 94 | 61 | 7,32 | 24,1 | 7,89 | | 882352 | 145945 | | | | | 797872 |
| NIC7 | 1110 | 738 | 3549 | 246 | 25,0 | 13,9 | 52,1 | 9,0 | 2703 | | 10989 | | | 207317 | | |
| NIC16 | 8342 | 301 | 445 | 84 | 91,0 | 3,3 | 4,4 | 1,4 | 4075 | | | | | 5980 | 4270 | |
| NIC17 | 2095 | 727 | 2677 | 24 | 38,6 | 15,9 | 44,8 | 0,7 | | | 16809 | | 4296 | 7703 | | |
| NIC20 | 287 | 418 | 650 | 29 | 29,6 | 28,6 | 37,5 | 4,3 | 142857 | 74163 | 63077 | | | | | |
| NIC22 | 31000 | 649 | 484 | 51 | 96,5 | 2,0 | 1,3 | 0,2 | 7419 | 37750 | 32231 | | | | | |
| NIC25 | 224 | 895 | 478 | 18 | 23,2 | 50,6 | 23,5 | 2,7 | | 2123 | 17364 | | 232143 | | | |
| NIC27 | 6574 | 1602 | 2070 | 95 | 66,5 | 14,2 | 16,5 | 2,8 | 11409 | 8115 | 26962 | | | | | |
| NIC38 | 29768 | 157 | 409 | NA | 97,4 | 0,7 | 1,6 | 0,3 | 2284 | 40764 | 18582 | | | | | |
| NIC39 | 1400 | 5337 | 1821 | 136 | 26,6 | 52,7 | 18,7 | 2,1 | | 2248 | 4723 | | | | | |

SP - CD103+CD39-