**Supplemental table 1*.* MRI data of Patient 1 with *TRIM63* HCM.**

|  |  |
| --- | --- |
| Septum, mm | 56 |
| Posterior wall of LV, mm | 30 |
| LV end-diastolic diameter, mm | 37 |
| LV end-systolic diameter, mm | 22 |
| LV end-diastolic volume, ml | 199 |
| LV end-systolic volume, ml | 70 |
| Ejection fraction, % | 64 |
| Stroke volume of LV, ml | 128 |
| Cardiac index of LV, l/min | 8 |
| RV dimension, mm | 85\*32  |
| RV wall thickness, mm | 13 |
| Right atrium, mm | 46\*42 |
| Left atrium, mm | 56\*42 |
| Mitral regurgitation  | + |
| SAM of mitral valve | + |
| LGE localization | Circularly intramurally at all LV walls |

***Abbreviation*:** LV – left ventricle, RV – right ventricle, SAM – systolic anterior movement, LGE – late gadolinium enhancement.

**Supplemental table 2*.* List of studied genes for Patient 1.**

108 Target IDs resolved to 108 targets comprising 2159 regions.

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **TargetID** | **Interval** | **Coverage** |
|  | ABCC9 | chr12:21953968-22089618 | 100.00 |
|  | ACTC1 | chr15:35082603-35087019 | 100.00 |
|  | ACTN2 | chr1:236849964-236925929 | 99.82 |
|  | AKAP9 | chr7:91570404-91739483 | 99.93 |
|  | ANK2 | chr4:113825640-114309894 | 100.00 |
|  | ANKRD1 | chr10:92672613-92680794 | 100.00 |
|  | BAG3 | chr10:121411178-121436804 | 100.00 |
|  | BRAF | chr7:140426284-140624513 | 100.00 |
|  | CACNA1C | chr12:2162719-2800375 | 99.95 |
|  | CACNA2D1 | chr7:81579698-82072785 | 100.00 |
|  | CACNB2 | chr10:18429656-18828663 | 99.78 |
|  | CALM1 | chr14:90863565-90871071 | 100.00 |
|  | CALR3 | chr19:16589932-16606950 | 100.00 |
|  | CASQ2 | chr1:116243852-116311172 | 100.00 |
|  | CAV3 | chr3:8775553-8787563 | 100.00 |
|  | CBL | chr11:119077118-119170501 | 100.00 |
|  | CRYAB | chr11:111779478-111782458 | 100.00 |
|  | CSRP3 | chr11:19204207-19214005 | 99.85 |
|  | DES | chr2:220283175-220290722 | 100.00 |
|  | DMD | chrX:31132798-33357392 | 99.92 |
|  | DMPK | chr19:46273729-46285639 | 100.00 |
|  | DSC2 | chr18:28647971-28681944 | 100.00 |
|  | DSG2 | chr18:29078205-29126716 | 100.00 |
|  | DSP | chr6:7542139-7586121 | 100.00 |
|  | DTNA | chr18:32335931-32470414 | 100.00 |
|  | EMD | chrX:153607835-153609567 | 100.00 |
|  | EYA4 | chr6:133595909-133852374 | 100.00 |
|  | FHL1 | chrX:135251952-135292194 | 100.00 |
|  | FHL2 | chr2:105977730-106015563 | 100.00 |
|  | FKTN | chr9:108337304-108402414 | 99.68 |
|  | FXN | chr9:71650689-71714860 | 100.00 |
|  | GAA | chr17:78078376-78093140 | 100.00 |
|  | GLA | chrX:100652787-100662901 | 100.00 |
|  | GPD1L | chr3:32148194-32207412 | 100.00 |
|  | HCN4 | chr15:73614812-73660621 | 100.00 |
|  | HRAS | chr11:532626-534332 | 100.00 |
|  | ILK | chr11:6625492-6631852 | 100.00 |
|  | JPH2 | chr20:42743426-42815355 | 100.00 |
|  | JUP | chr17:39775836-39928116 | 100.00 |
|  | KCND3 | chr1:112318689-112525358 | 100.00 |
|  | KCNE1 | chr21:35821533-35821942 | 100.00 |
|  | KCNE1L | chrX:108867811-108868259 | 100.00 |
|  | KCNE2 | chr21:35742768-35743159 | 100.00 |
|  | KCNE3 | chr11:74168287-74168618 | 100.00 |
|  | KCNH2 | chr7:150642443-150675011 | 100.00 |
|  | KCNJ2 | chr17:68171171-68172474 | 100.00 |
|  | KCNJ5 | chr11:128781159-128786636 | 100.00 |
|  | KCNJ8 | chr12:21918647-21926560 | 100.00 |
|  | KCNQ1 | chr11:2466319-2869243 | 100.00 |
|  | KRAS | chr12:25362719-25398328 | 100.00 |
|  | LAMA4 | chr6:112430630-112575362 | 100.00 |
|  | LAMP2 | chrX:119562329-119603034 | 100.00 |
|  | LDB3 | chr10:88428439-88492743 | 100.00 |
|  | LMNA | chr1:156084700-156109640 | 99.71 |
|  | MAP2K1 | chr15:66679676-66782963 | 100.00 |
|  | MAP2K2 | chr19:4090586-4123882 | 100.00 |
|  | MRPL3 | chr3:131181557-131221837 | 100.00 |
|  | MYBPC3 | chr11:47353412-47374208 | 100.00 |
|  | MYH6 | chr14:23851239-23876442 | 99.44 |
|  | MYH7 | chr14:23882053-23902951 | 99.55 |
|  | MYL2 | chr12:111348871-111358343 | 88.61 |
|  | MYL3 | chr3:46899724-46904890 | 100.00 |
|  | MYLK2 | chr20:30407374-30421610 | 100.00 |
|  | MYOM1 | chr18:3067250-3215231 | 100.00 |
|  | MYOZ2 | chr4:120057671-120107365 | 100.00 |
|  | MYPN | chr10:69866472-69970222 | 100.00 |
|  | NEBL | chr10:21074666-21462772 | 100.00 |
|  | NEXN | chr1:78381782-78408608 | 100.00 |
|  | NF1 | chr17:29422318-29705959 | 99.63 |
|  | NOS1AP | chr1:162039958-162353331 | 100.00 |
|  | NRAS | chr1:115251146-115258791 | 100.00 |
|  | PDLIM3 | chr4:186423438-186456598 | 99.45 |
|  | PKP2 | chr12:32945348-33049675 | 100.00 |
|  | PLN | chr6:118880075-118880253 | 100.00 |
|  | PRKAG2 | chr7:151254277-151573715 | 99.87 |
|  | PSEN1 | chr14:73614718-73686007 | 100.00 |
|  | PSEN2 | chr1:227068337-227083290 | 100.00 |
|  | PTPN11 | chr12:112856906-112942578 | 100.00 |
|  | RAF1 | chr3:12626003-12660230 | 99.57 |
|  | RANGRF | chr17:8192097-8193264 | 100.00 |
|  | RBM20 | chr10:112404203-112595746 | 100.00 |
|  | RYR2 | chr1:237205812-237995957 | 99.70 |
|  | SCN1B | chr19:35521715-35530615 | 99.64 |
|  | SCN3B | chr11:123504841-123524519 | 100.00 |
|  | SCN4B | chr11:118007732-118023398 | 100.00 |
|  | SCN5A | chr3:38591802-38674808 | 99.73 |
|  | SCO2 | chr22:50962030-50962850 | 100.00 |
|  | SDHA | chr5:218461-256545 | 97.59 |
|  | SGCD | chr5:155756577-156186411 | 100.00 |
|  | SHOC2 | chr10:112724107-112771586 | 100.00 |
|  | SLC25A3 | chr12:98987747-98995316 | 100.00 |
|  | SLMAP | chr3:57743369-57913125 | 100.00 |
|  | SNTA1 | chr20:31996303-32031436 | 100.00 |
|  | SOS1 | chr2:39212955-39347573 | 99.65 |
|  | SPRED1 | chr15:38545377-38643875 | 100.00 |
|  | TAZ | chrX:153640171-153649353 | 100.00 |
|  | TCAP | chr17:37821603-37822372 | 100.00 |
|  | TGFB3 | chr14:76425520-76447246 | 100.00 |
|  | TMEM43 | chr3:14166684-14183305 | 100.00 |
|  | TMPO | chr12:98909537-98941646 | 100.00 |
|  | TNNC1 | chr3:52485281-52488041 | 100.00 |
|  | TNNI3 | chr19:55663192-55668967 | 100.00 |
|  | TNNT2 | chr1:201328328-201342392 | 100.00 |
|  | TPM1 | chr15:63335019-63363381 | 100.00 |
|  | TRDN | chr6:123539736-123957930 | 98.85 |
|  | TRPM4 | chr19:49661114-49714765 | 100.00 |
|  | TTN | chr2:179391729-179682294 | 98.80 |
|  | VCL | chr10:75757956-75877977 | 100.00 |

**Supplemental table 3. List of studied genes for Patient 2.**

176 Target IDs resolved to 176 targets comprising 3271 regions.

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **TargetID** | **Interval** | **Coverage** |
|  | ABCC9 | chr12:21801034-21936684 | 100.0 |
|  | ACADVL | chr17:7217136-7225107 | 100.0 |
|  | ACTA1 | chr1:229431489-229433125 | 100.0 |
|  | ACTC1 | chr15:34790402-34794818 | 100.0 |
|  | ACTN2 | chr1:236686664-236762629 | 100.0 |
|  | ACVR2B | chr3:38454313-38483342 | 100.0 |
|  | AGK | chr7:141555457-141652934 | 100.0 |
|  | AKAP9 | chr7:91941090-92110169 | 100.0 |
|  | ALPK3 | chr15:84816837-84868466 | 100.0 |
|  | ANK2 | chr4:112904484-113381650 | 100.0 |
|  | ANKRD1 | chr10:90912856-90921037 | 100.0 |
|  | ANO5 | chr11:22193483-22279775 | 100.0 |
|  | BAG3 | chr10:119651666-119677292 | 100.0 |
|  | BRAF | chr7:140726484-140924713 | 100.0 |
|  | CACNA1C | chr12:1971053-2691209 | 100.0 |
|  | CACNA2D1 | chr7:81950382-82443469 | 100.0 |
|  | CACNB2 | chr10:18140727-18539734 | 100.0 |
|  | CALM1 | chr14:90397221-90404727 | 100.0 |
|  | CALM2 | chr2:47160766-47176551 | 100.0 |
|  | CALM3 | chr19:46601425-46609163 | 100.0 |
|  | CALR3 | chr19:16479121-16496139 | 100.0 |
|  | CASQ2 | chr1:115701231-115768551 | 100.0 |
|  | CAV3 | chr3:8733867-8745877 | 100.0 |
|  | CBL | chr11:119206408-119308087 | 100.0 |
|  | CDH2 | chr18:27952143-28177032 | 100.0 |
|  | CMYA5 | chr5:79689898-79799626 | 100.0 |
|  | CRELD1 | chr3:9934429-9944589 | 100.0 |
|  | CRYAB | chr11:111908754-111911734 | 100.0 |
|  | CSRP3 | chr11:19182660-19192458 | 100.0 |
|  | CTNNA3 | chr10:65920320-67648780 | 100.0 |
|  | DES | chr2:219418453-219426000 | 100.0 |
|  | DMD | chrX:31121823-33339275 | 100.0 |
|  | DMPK | chr19:45770471-45782381 | 100.0 |
|  | DNAAF1 | chr16:84145431-84178416 | 100.0 |
|  | DNAAF3 | chr19:55159052-55166658 | 100.0 |
|  | DPP6 | chr7:153887674-154892490 | 100.0 |
|  | DSC2 | chr18:31068005-31101981 | 100.0 |
|  | DSG2 | chr18:31498242-31546753 | 100.0 |
|  | DSP | chr6:7541906-7585888 | 100.0 |
|  | DTNA | chr18:34755967-34890450 | 100.0 |
|  | DYSF | chr2:71453989-71686502 | 100.0 |
|  | EMD | chrX:154379475-154381207 | 100.0 |
|  | EYA4 | chr6:133274771-133531236 | 100.0 |
|  | FHL1 | chrX:136196793-136210035 | 100.0 |
|  | FHL2 | chr2:105361273-105399555 | 100.0 |
|  | FHOD3 | chr18:36297826-36779540 | 100.0 |
|  | FKRP | chr19:46755441-46756948 | 100.0 |
|  | FKTN | chr9:105575023-105640133 | 100.0 |
|  | FLNA | chrX:154348839-154371255 | 100.0 |
|  | FLNC | chr7:128830628-128858533 | 100.0 |
|  | FXN | chr9:69035773-69099944 | 100.0 |
|  | GAA | chr17:80104577-80119341 | 100.0 |
|  | GATA4 | chr8:11708303-11758485 | 100.0 |
|  | GATA5 | chr20:62464826-62475531 | 100.0 |
|  | GATA6 | chr18:22171135-22200833 | 100.0 |
|  | GATAD1 | chr7:92447720-92456572 | 100.0 |
|  | GDF1 | chr19:18868587-18870317 | 100.0 |
|  | GJA5 | chr1:147758152-147759248 | 100.0 |
|  | GLA | chrX:101397799-101407913 | 100.0 |
|  | GPD1L | chr3:32106702-32165920 | 100.0 |
|  | HAND1 | chr5:154475796-154478018 | 100.0 |
|  | HCN4 | chr15:73322471-73368280 | 100.0 |
|  | HFE | chr6:26087431-26094421 | 100.0 |
|  | HRAS | chr11:532626-534332 | 100.0 |
|  | ILK | chr11:6604262-6610621 | 100.0 |
|  | ISPD | chr7:16091685-16421332 | 100.0 |
|  | JPH2 | chr20:44114786-44186715 | 100.0 |
|  | JUP | chr17:41755734-41771864 | 100.0 |
|  | KCNA5 | chr12:5044138-5045999 | 100.0 |
|  | KCND3 | chr1:111776067-111982736 | 100.0 |
|  | KCNE1 | chr21:34449235-34449644 | 100.0 |
|  | KCNE2 | chr21:34370469-34370860 | 100.0 |
|  | KCNE3 | chr11:74457242-74457573 | 100.0 |
|  | KCNE5 | chrX:109624582-109625030 | 100.0 |
|  | KCNH2 | chr7:150945355-150977923 | 100.0 |
|  | KCNJ2 | chr17:70175030-70176333 | 100.0 |
|  | KCNJ5 | chr11:128911264-128916741 | 100.0 |
|  | KCNJ8 | chr12:21765713-21773626 | 100.0 |
|  | KCNQ1 | chr11:2444676-2848013 | 100.0 |
|  | KRAS | chr12:25209785-25245394 | 100.0 |
|  | LAMA4 | chr6:112109427-112254160 | 100.0 |
|  | LAMP2 | chrX:120428474-120469179 | 100.0 |
|  | LDB3 | chr10:86668682-86732986 | 100.0 |
|  | LEFTY2 | chr1:225937411-225941150 | 100.0 |
|  | LMNA | chr1:156114909-156139849 | 100.0 |
|  | LMOD3 | chr3:69109085-69122396 | 100.0 |
|  | LRRC10 | chr12:69609995-69610848 | 100.0 |
|  | LZTR1 | chr22:20982362-20997358 | 100.0 |
|  | MAP2K1 | chr15:66387338-66490625 | 100.0 |
|  | MAP2K2 | chr19:4090588-4123885 | 100.0 |
|  | MIB1 | chr18:21741574-21864676 | 100.0 |
|  | MMP21 | chr10:125766652-125775831 | 100.0 |
|  | MRAS | chr3:138372874-138402279 | 100.0 |
|  | MYBPC3 | chr11:47331861-47352657 | 100.0 |
|  | MYBPHL | chr1:109294229-109307001 | 100.0 |
|  | MYH6 | chr14:23382030-23407233 | 100.0 |
|  | MYH7 | chr14:23412844-23433742 | 100.0 |
|  | MYL2 | chr12:110911067-110920539 | 100.0 |
|  | MYL3 | chr3:46858234-46863400 | 100.0 |
|  | MYL4 | chr17:47209413-47223052 | 100.0 |
|  | MYLK2 | chr20:31819571-31833807 | 100.0 |
|  | MYOF | chr10:93306953-93482204 | 100.0 |
|  | MYOM1 | chr18:3067252-3215233 | 100.0 |
|  | MYOT | chr5:137870642-137887395 | 100.0 |
|  | MYOZ2 | chr4:119136516-119186210 | 100.0 |
|  | MYPN | chr10:68106715-68210465 | 100.0 |
|  | NEBL | chr10:20785737-21173843 | 100.0 |
|  | NEXN | chr1:77916097-77942923 | 100.0 |
|  | NF1 | chr17:31095198-31378941 | 100.0 |
|  | NKX2-5 | chr5:173232559-173235093 | 100.0 |
|  | NKX2-6 | chr8:23702441-23706608 | 100.0 |
|  | NPPA | chr1:11845993-11847694 | 100.0 |
|  | NRAS | chr1:114708525-114716170 | 100.0 |
|  | NUP155 | chr5:37291890-37370987 | 100.0 |
|  | PDLIM3 | chr4:185502284-185535444 | 100.0 |
|  | PKD1L1 | chr7:47775133-47948450 | 100.0 |
|  | PKP2 | chr12:32792414-32896741 | 100.0 |
|  | PLEC | chr8:143916167-143975379 | 100.0 |
|  | PLEKHM2 | chr1:15684549-15733944 | 100.0 |
|  | PLN | chr6:118558912-118559090 | 100.0 |
|  | PPA2 | chr4:105369715-105474060 | 100.0 |
|  | PPP1CB | chr2:28752115-28799313 | 100.0 |
|  | PRDM16 | chr1:3069250-3433821 | 100.0 |
|  | PRKAG2 | chr7:151557191-151876630 | 100.0 |
|  | PSEN1 | chr14:73148010-73219299 | 100.0 |
|  | PSEN2 | chr1:226880636-226895589 | 100.0 |
|  | PTPN11 | chr12:112419102-112504774 | 100.0 |
|  | RAF1 | chr3:12584504-12618731 | 100.0 |
|  | RANGRF | chr17:8288779-8289946 | 100.0 |
|  | RBM20 | chr10:110644445-110835988 | 100.0 |
|  | RIT1 | chr1:155900378-155910895 | 100.0 |
|  | RRAS | chr19:49635566-49640108 | 100.0 |
|  | RYR2 | chr1:237042512-237832657 | 100.0 |
|  | SALL4 | chr20:51784255-51802418 | 100.0 |
|  | SCN10A | chr3:38697339-38794020 | 100.0 |
|  | SCN1B | chr19:35030811-35039711 | 100.0 |
|  | SCN2B | chr11:118166877-118176441 | 100.0 |
|  | SCN3B | chr11:123634133-123653811 | 100.0 |
|  | SCN4B | chr11:118137017-118152683 | 100.0 |
|  | SCN5A | chr3:38550311-38633317 | 100.0 |
|  | SCNN1G | chr16:23186262-23215479 | 100.0 |
|  | SDHA | chr5:218346-256430 | 100.0 |
|  | SGCD | chr5:156329567-156759400 | 100.0 |
|  | SHOC2 | chr10:110964349-111011828 | 100.0 |
|  | SLMAP | chr3:57757642-57927398 | 100.0 |
|  | SNTA1 | chr20:33408497-33443630 | 100.0 |
|  | SOS1 | chr2:38985814-39120432 | 100.0 |
|  | SOS2 | chr14:50118334-50231293 | 100.0 |
|  | SPEG | chr2:219434968-219498199 | 100.0 |
|  | SPRED1 | chr15:38253176-38351674 | 100.0 |
|  | SYNE1 | chr6:152122426-152628341 | 100.0 |
|  | SYNM | chr15:99105190-99133068 | 100.0 |
|  | SYNPO2L | chr10:73646708-73655932 | 100.0 |
|  | TAZ | chrX:154411834-154421014 | 100.0 |
|  | TBX20 | chr7:35202420-35253630 | 100.0 |
|  | TBX5 | chr12:114355522-114403908 | 100.0 |
|  | TCAP | chr17:39665350-39666119 | 100.0 |
|  | TECRL | chr4:64277025-64409361 | 100.0 |
|  | TGFB3 | chr14:75959177-75980903 | 100.0 |
|  | TMEM43 | chr3:14125184-14141805 | 100.0 |
|  | TMPO | chr12:98515858-98547868 | 100.0 |
|  | TNNC1 | chr3:52451265-52454025 | 100.0 |
|  | TNNI3 | chr19:55151824-55157599 | 100.0 |
|  | TNNI3K | chr1:74235442-74543992 | 100.0 |
|  | TNNT2 | chr1:201359200-201373264 | 100.0 |
|  | TPM1 | chr15:63042820-63071182 | 100.0 |
|  | TRDN | chr6:123218591-123636785 | 100.0 |
|  | TRPM4 | chr19:49157857-49211508 | 100.0 |
|  | TTN | chr2:178527002-178804652 | 100.0 |
|  | TTR | chr18:31591893-31598685 | 100.0 |
|  | VCL | chr10:73998198-74118179 | 100.0 |
|  | ZIC3 | chrX:137566682-137577281 | 100.0 |