**Inventory of Supplementary Information**

**Table S1.** Mouse tissue samples used for RNA-Seq, related to Figure 6, embedded in the Supplementary Materials document file.

**Table S2.** Differentially expressed genes identified by RNA-Seq in adult skeletal muscle, related to Figure 6, supplied as a separate spreadsheet file.

**Table S3.** Rbm24-regulated splicing events identified by RNA-Seq in adult skeletal muscle, related to Figure 6, supplied as a separate spreadsheet file.

**Table S4.** Rbm24-regulated alternative splicing events in skeletal muscle of mice which also occur during C2C12 differentiation, related to Figure 7, supplied as a separate spreadsheet file.

**Table S5.** Alternative splicing events in response to both Rbm24 and Rbfox2, embedded in the Supplementary Materials document file.

**Table S6.** Primer sequences for the alternative splicing assay, plasmid construction and various PCRs, supplied as a separate spreadsheet file.

**Table S7.** Annotation of the alternative exon loci in each gel image in Figures.

**Supplementary Information**

**Supplemental Methods**

**Generation of the Rbm24 conditional knockout mice**

The construction of conditional allele of Rbm24 has been described in detail in our previous study [1]. In brief, exon 2 and exon 3 of Rbm24 were flanked by loxP sites, which allowed for Cre recombinase-mediated knockout. We bred $Rbm24^{loxP/loxP}$ mice to the UBC-CreERT2 mice which contained a tamoxifen-inducible Cre recombinase-estrogen receptor fusion protein cassette driven by the UBC promoter for systemic Rbm24 knockout. Additionally, we bred Pax7-CreER mice with $Rbm24^{loxP/loxP}$ mice to generate satellite cell-specific Rbm24 knockout mice. The following genotype mice were used: UBC-CreERT2, $Rbm24^{loxP/loxP}$ (UKO) or Pax7-CreER, $Rbm24^{loxP/loxP}$ (PKO) and $Rbm24^{loxP/loxP}$ (WT). The sequences of genotyping primers are shown in Table S6. For inducible knockout of Rbm24, tamoxifen was administrated in 8-week-old male mice by intraperitoneal injection for 5 consecutive days. The knockout efficiency was validated both at the RNA and protein levels.

**Cage Flip**

Mice were placed on a grid for 60 s and allowed to acclimate to the environment, and then the cage was inverted for up to 3 min at a height of 50 cm. The time until the mice let go of the grid was recorded. Each mouse was tested three times with 5 min resting period between each test. The maximum hanging time of each mice was used for further analysis. Muscle strength is expressed in terms of physical impulse which is calculated as time (s) ∗ body mass (g) ∗ 0.00980665 N/g. A total of 9 mice per group were tested in triplicate. Data were analyzed using a Student's t-test.

**RNA-Seq and data analysis**

RNA samples were extracted from hind limb TA muscle of 2-month-old WT or UKO male mice (n = 2) 3 days after tamoxifen administration using TRIzol reagent (Invitrogen). RNA quality was assessed by agarose gel electrophoresis and by evaluating the A260/A280 ratio. Reliable RNAs were pooled and sequenced using the

Illumina HiSeq system (Illumina). For each group, two biological replicates were used. Reads were aligned to mouse transcriptome (GRCm38/mm10) using Tophat [2]. Assembly of transcription was performed using Cufflinks. Gene expression was determined based on calculated fragments per kilobase of transcripts per million mapped reads (FPKM) and differentially expressed genes were identified by DESeq [3] with a false discovery rate (FDR) <5% and | log2 fold change | ≥1. Alternative splicing (AS) events were identified by Astalavista and rMATS with a FDR <5% and ΔIncLevelDifference ≥20% [4-6]. Gene ontology analysis was performed using DAVID.

**RT-PCR and qRT-PCR**

Total RNAs were prepared using TRIzol (Invitrogen) and cDNAs were synthesized using TransScript® One-Step gDNA Removal and cDNA Synthesis SuperMix (TransGen Biotech) according to the manufacturer's protocol. cDNA products were subjected to RT-PCR analysis. PCR products were separated on 1-3% agarose gel. qPCR was performed on an ABI 7500 (Applied Biosystems) using qPCR SYBR Green mix (Vazyme Biotech) according to manufacturer's protocol. Primers for various PCR are listed in Table S6.

**Immunofluorescence staining**

Muscle sections or cell slides were fixed in 4% paraformaldehyde at room temperature for 20 min and permeabilized for 20 min in 0.25% Triton X-100 in PBS. Then samples were blocked in 3.5% goat serum for 1 h at room temperature. Primary antibodies were incubated in blocking buffer at 4 ˚C overnight. The following day, the samples were washed by PBS and stained with the corresponding fluorescently labeled secondary antibodies (Alexa Fluor 488 or 555) for 1 h at room temperature. After washing with PBS, Hoechst (Sigma-Aldrich; 1:1,000) was used to stain the nuclei for 5 min. The primary antibodies used were: mouse anti-MyHC (DSHB; 1:250), rabbit anti-laminin (Sigma-Aldrich; 1:400), mouse anti-Pax7 (DSHB; 1:50), mouse anti-Myog (BD Biosciences; 1:200) and rabbit anti-Rbm24 (Abcam; 1:200).

**Western blotting**

TA muscles or cell pellets were washed with PBS and lysed in RIPA lysis buffer. Proteins were separated by SDS-PAGE gels and electrotransferred to a PVDF membrane (Pall Corporation). The PVDF membrane was blocked in 5% milk dissolved in TBST for 1 h at room temperature. Membranes were incubated with the primary antibodies at 4 ˚C overnight. Subsequently, the membrane was washed with TBST and incubated with the HRP-labeled secondary antibodies (goat anti-rabbit or anti-mouse) for 1 h at room temperature. After washing with TBST, signals were visualized by chemiluminescence. The following primary antibodies were used: Rabbit anti-Rbm24 (Abcam; 1:3,000), mouse anti-MyHC (DSHB; 1:500), mouse anti-Myogenin (BD Biosciences; 1:500), mouse anti-Pax7 (DSHB; 1:200), mouse anti-GAPDH (Transgene; 1:5,000) or mouse anti-Flag (Origene; 1:3,000).

**Lentivirus production**

We constructed the plasmid expressing shRNA directed against Rbm24 by inserting the custom oligos with *Xba*I and *Hpa*I restriction enzymes sites into the pLL3.7 vector that conferred G418 resistance. Two distinct Mef2d expression plasmids (Mef2dα1 and Mef2dα2) were constructed by inserting the amplified Mef2d fragments into the *Xba*I and *Mlu*I sites in the PLVCS-N-Flag vector that conferred puromycin resistance. These two plasmids were used for the rescue experiments. Lentivirus was produced by simultaneously transfecting the expression plasmid with the three package plasmids pVSVG, pMDL and pREV (2:1:1:1) into 293T cells using Lipofectamine® 3000 according to the manufacturer's protocol. After 48 h, the viral supernatant was collected and centrifuged at 500 ∗ g for 5 min. The supernatant was further filtered using a 0.45 μm filter and then stored at -20 ˚C until use.

**Supplementary Results**

**Progressive loss of muscle mass and strength in UKO mice**

UKO exhibited smaller body sizes and body weight was significantly reduced 1 month after tamoxifen treatment (Figure S1A and B). Consistent with the decreased body weight, TA muscle weight was also significantly reduced in the UKO mice (Figure S1C). Furthermore, we determined whether muscle strength was also decreased as a result of the loss of muscle mass using an inverted cage flip test. The inverted cage flip test measured limb and pectoral strength by quantifying the time a mouse held on to the bottom of a cage [7]. In this experiment, 6 months old UKO mice were tested 3-4 months after tamoxifen administration. Based on the results of the cage flip test (Figure S1D), there was a significant loss of muscle strength observed in the UKO mice compared with the WT group.

**Analysis of Rbm24 expression in mdx mice and satellite cells**

We analyzed the expression of Rbm24 during mdx mice development. It has been demonstrated that mdx mice undergo pathological degeneration and regeneration waves after birth. In particular, the TA muscle of mdx mice show no signs of regeneration during the first two weeks after birth, whereas there is extensive regeneration seen in 4-week-old mdx mice, and the regenerative activity decreases thereafter [8, 9]. Interestingly, we found that Rbm24 expression was increased in TA muscle of 4-week-old mdx mice compared with the WT mice, but not in the 2-week-old mdx mice (Figures 2A-B and S2A-B). The increased expression levels of Rbm24 decreased as the mdx mice developed. Thus, Rbm24 expression mimics the regenerative activity in mdx mice, indicating the potential role of Rbm24 in regulation of muscle regeneration of mdx mice.

We further analyzed Rbm24 expression during satellite cell activation and differentiation according to the published RNA-Seq data [10]. As indicated in Figure S2C, Rbm24 expression was very low in quiescent satellite cells (WT freshly isolated satellite cells) and activated satellite cells (WT cultured satellite cells). Rbm24 was highly expressed in the differentiated Myog positive satellite cells (Figure S2D). The results of immunostaining also confirmed the results of RNA-Seq (Figure 2D).

**Analysis of the RNA-Seq results**

Based on our RNA-Seq data, we validated the differentially expressed genes in response to loss of Rbm24 (Figure S3A). In this part, Col12a1 and Pkg1 were assessed to determine differential expression. Consistent with the RNA-Seq results, both the expression levels of Col12a1 and Pkg1 were increased in the UKO mice. Interestingly, both the RNA-Seq results and qRT-PCR analyses showed that loss of Rbm24 did not alter Pax7 or Myod expression (Figure S3A), indicating that disruption of Rbm24 does not activate the satellite cells directly. We also examined the AS events identified in our RNA-Seq results. Both AS of Usp28 and Usp25 were analyzed as they have been reported to be alternatively spliced by Rbm24 in skeletal muscle [11]. The unknown AS events, such as AS of Cog1, Ubr3 and Tmem65 were also assessed (Figure S3B). All of the AS events tested showed notable transition in response to loss of Rbm24. These results suggest the RNA-Seq data are reliable and repeatable. Besides, GO analysis of alternatively spliced genes identified significant enrichment of genes relevant to muscle cell development (Figure 6C), muscle cell components (Figure S3C) and muscle cell functions (Figure S3D). We analyzed the expression of the genes enriched in cell differentiation or muscle cell development, including Ppp3ca, Prkca, Rock2, Pdlim5 and Itgb1. Consistent with the RNA-Seq results, their mRNA expression levels were not affected due to loss of Rbm24 (Figure S3E). In contrast, their abnormal splicing were identified following Rbm24 knockdown (Figure 6E).

We also compared our RNA-Seq results with the transcriptome data from other articles including the data from E11.5 heart [11] and Day 5 heart of Rbm24 knockout mice [1] (Figure S3F). We found only 20 genes were aberrantly spliced both in E11.5 heart and adult TA muscle of Rbm24 knockout mice. Besides, we identified 50 genes abnormally spliced both in Day 5 heart and adult TA muscle of Rbm24 knockout mice. Only 15 genes were abnormally spliced in E11.5 heart, Day 5 heart and TA muscle of Rbm24 knockout mice, including coro6, Naca, Fxr1, and Usp28 which have been well-studied in previous studies. Therefore, Rbm24 regulates AS in a context-dependent manner, and regulates different AS events at different developmental stages and in different tissues.

**Rbm24 regulates a series of AS events involved in myogenic differentiation.**

In order to identify additional Rbm24-regulated AS events which may play a role in myogenic differentiation, we compared the AS events in our RNA-Seq with the AS events occurring during C2C12 differentiation [12]. Excitingly, we found 62 Rbm24-regulated genes that were alternatively spliced during C2C12 differentiation, including Rock2, Naca, Lrrfip1 and Mef2d (Figure S4A and Table S4). Further analysis identified 47 Rbm24-regulated exons among the 62 genes were alternatively spliced during C2C12 differentiation, indicating their potential function in regulating myogenic differentiation. The genes identified are listed in Table S4.

**Rbm24 and Rbfox2 regulate a common set of AS events**

We noted that both Rbm24 and Rbfox2 regulated the AS of Mef2d and Rock2. Rbfox2 was also shown to regulate myogenesis by coordination of AS [12]. This prompts a potential cooperative mechanism in AS regulation between Rbm24 and Rbfox2 during the myogenic process. Thus, whether there were more AS events regulated by both Rbm24 and Rbfox2 was assessed. We compared genes which were alternatively spiced by Rbfox2 during myoblast differentiation with those alternatively spiced by Rbm24 in skeletal muscle. Interestingly, Rbm24 and Rbfox2 regulated AS of 28 common genes that are involved in myoblast differentiation (Figure S4A). Further analysis identified that 23 of the 28 genes were spliced at the same exon by both Rbm24 and Rbfox2 (Table S5). This further indicates the potential cooperative mechanism in AS regulation during the myogenic process between Rbm24 and Rbfox2.

Additionally, we assessed Rbfox2 expression in Rbm24 knockout mice. Rbm24 knockout in skeletal muscle did not alter the expression of Rbfox2 but notably decreased the muscle-specific exon of Mef2d, suggesting that Rbfox2 cannot maintain sufficient generation of muscle-specific isoform of Mef2d without Rbm24 (Figure S4B). These results hint that sufficient generation of AS transition *in vivo* may be dependent on the collaborative work of Rbfox2 and Rbm24.

## References


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**Table S1. Mouse tissue samples used for RNA-Seq, related to Figure 6.**

| Sample | Age | Sex | Total Reads | %Uniquely Mapped |
|---|---|---|---|---|
| WT TA1 | 8 weeks | Male | 39086524 | 84.02 |
| WT TA2 | 8 weeks | Male | 41945060 | 83.20 |
| UKO TA1 | 8 weeks | Male | 41432030 | 82.99 |
| UKO TA2 | 8 weeks | Male | 53925520 | 83.91 |

**Legend**: The 8-week-old male Rbm24$^{loxP/loxP}$ mice were used as the control and littermate UBC-CreERT2，Rbm24$^{loxP/loxP}$ mice as the KO mice. Each group had two biological replicates. Three days after tamoxifen treatment, TA muscle was dissected for RNA extraction and subjected to paired-end RNA-sequencing. The reads were mapped to the reference mouse genome (GRCm38/mm10) using Tophat.

**Table S2. Differential expression genes identified by RNA-Seq in adult skeletal muscle.**

| gene symbol | baseMean | baseMeanA | baseMeanB | FoldChange | log2FoldChange | P-value | P-adj |
|---|---|---|---|---|---|---|---|
| Mmp13 | 486.2756308 | 73.60116451 | 898.9500972 | 12.21380264 | 3.610440533 | 1.5E-14 | 2.55E-10 |
| Spp1 | 173.3708227 | 25.88663444 | 320.855011 | 12.39462054 | 3.631642199 | 2.29E-10 | 0.00000194 |
| Col11a1 | 176.8542129 | 28.92102166 | 324.7874042 | 11.23014975 | 3.489305261 | 9.98E-10 | 0.00000472 |
| Col12a1 | 575.4435126 | 157.0718388 | 993.8151864 | 6.327137915 | 2.661553043 | 1.21E-09 | 0.00000472 |
| Ibsp | 163.5583729 | 22.96452856 | 304.1522172 | 13.2444355 | 3.727314449 | 1.39E-09 | 0.00000472 |
| Klk1b22 | 28.77655142 | 0 | 57.55310283 | Inf | Inf | 5.15E-09 | 0.0000146 |
| Tnn | 203.9218239 | 45.08816493 | 362.7554829 | 8.045470103 | 3.008176721 | 6.63E-08 | 0.000160648 |
| Postn | 703.9582696 | 244.4760813 | 1163.440458 | 4.758913231 | 2.25063215 | 9.55E-08 | 0.000202554 |
| Adamts8 | 252.9407933 | 90.50980782 | 415.3717788 | 4.589246059 | 2.198257161 | 0.000000201 | 0.000378203 |
| Cilp | 228.6951037 | 93.36932843 | 364.020879 | 3.898720116 | 1.963000589 | 0.00000172 | 0.002649448 |
| Col1a1 | 5545.507088 | 2022.154136 | 9068.86004 | 4.484752115 | 2.165028245 | 0.00000282 | 0.003713998 |
| Ogdhl | 50.58238592 | 13.50733729 | 87.65743454 | 6.489616173 | 2.698133153 | 0.00000392 | 0.004751785 |
| Fmod | 269.5813667 | 111.5799482 | 427.5827853 | 3.832075497 | 1.938125985 | 0.000009 | 0.010175296 |
| Tnc | 131.9264133 | 37.54161713 | 226.3112095 | 6.028275465 | 2.591745343 | 0.0000131 | 0.013095311 |
| AI662270 | 41.39613253 | 6.16050414 | 76.63176091 | 12.43920289 | 3.636822135 | 0.0000249 | 0.021081004 |
| Col16a1 | 232.6844103 | 90.52606307 | 374.8427575 | 4.140716439 | 2.049880409 | 0.0000333 | 0.025648597 |
| Krt14 | 230.2056824 | 363.3326149 | 97.07874985 | 0.267189748 | -1.904063441 | 1.14E-06 | 0.00193064 |
| Avil | 169.9068181 | 280.2236327 | 59.59000344 | 0.212651599 | -2.233436395 | 2.85E-06 | 0.003713998 |
| Mt2 | 174.93366 | 282.6288012 | 67.23851872 | 0.237903987 | -2.071548643 | 1.13E-05 | 0.01196442 |
| BC037156 | 110.4264159 | 177.6474541 | 43.20537768 | 0.243208539 | -2.039734215 | 1.47E-05 | 0.013892262 |
| Erdr1 | 711.5305107 | 1083.66491 | 339.3961117 | 0.313192859 | -1.674876774 | 2.06E-05 | 0.018411982 |
| Krt5 | 233.6689696 | 351.5901989 | 115.7477402 | 0.329212079 | -1.602910826 | 2.69E-05 | 0.021691378 |
| Myh8 | 773.5396146 | 345.9829724 | 1201.096257 | 3.471547309 | 1.795578832 | 2.02E-06 | 0.017450566 |

| | |
|---|---|
| baseMean | normalized counts, averaged over all samples |
| baseMeanA | normalized counts from WT mice |
| baseMeanB | normalized counts from Rbm24 knockout mice |
| P-adj | adjusted P-value |

**Table S3. Rbm24-regulated alternative splicing events identified by RNA-Seq in adult skeletal muscle.**

**SE**

| gene symbol | chr | exonStart | exonEnd | upstreamES | upstreamEE | downstreamES | downstreamEE | P-value | IncLevelDiffer |
|---|---|---|---|---|---|---|---|---|---|
| Lrrfip1 | chr1(+) | 91082140 | 91082179 | 91079030 | 91079081 | 91084945 | 91085005 | 0 | 0.817 |
| Ppfibp2 | chr7(+) | 107705283 | 107705466 | 107697566 | 107697698 | 107708779 | 107708872 | 1.04E-13 | 0.73 |
| Atp11a | chr8(+) | 12863761 | 12863862 | 12861639 | 12861724 | 12864919 | 12868728 | 1.17E-09 | 0.704 |
| Clasp2 | chr9(+) | 113860119 | 113860137 | 113854172 | 113854346 | 113862185 | 113862287 | 3.85E-10 | 0.635 |
| Ppfibp1 | chr6(+) | 146996808 | 146996901 | 146996389 | 146996482 | 146998166 | 146998281 | 0 | 0.629 |
| Pex11a | chr7(-) | 79740594 | 79740640 | 79735956 | 79737910 | 79742909 | 79743080 | 5.78E-08 | 0.608 |
| R3hdm1 | chr1(+) | 128162768 | 128162858 | 128153188 | 128153399 | 128167892 | 128168007 | 8.76E-11 | 0.586 |
| Slc8a3 | chr12(-) | 81216808 | 81216827 | 81214065 | 81214169 | 81314259 | 81316104 | 5.31E-05 | 0.574 |
| Cad | chr5(+) | 31075470 | 31075521 | 31075088 | 31075185 | 31075808 | 31075853 | 1.11E-06 | 0.573 |
| Coro6 | chr11(+) | 77466765 | 77466975 | 77466505 | 77466599 | 77468265 | 77468370 | 0 | 0.553 |
| Ash2l | chr8(-) | 25830374 | 25830392 | 25828765 | 25828859 | 25831272 | 25831348 | 2.21E-10 | 0.552 |
| Uso1 | chr5(+) | 92183481 | 92183502 | 92181897 | 92182109 | 92187234 | 92187341 | 7.77E-16 | 0.535 |
| Ubr3 | chr2(+) | 69971401 | 69971434 | 69971151 | 69971233 | 69973148 | 69973609 | 0 | 0.528 |
| Kif2a | chr13(-) | 106969703 | 106969817 | 106968637 | 106968788 | 106974494 | 106974562 | 0.000165784 | 0.498 |
| Ppp1r12a | chr10(+) | 108248955 | 108249069 | 108243005 | 108243130 | 108249434 | 108249650 | 0 | 0.485 |
| Sorbs1 | chr19(-) | 40361041 | 40361104 | 40352517 | 40352565 | 40363201 | 40363265 | 3.12E-08 | 0.479 |
| Arl3 | chr19(-) | 46541442 | 46541510 | 46531108 | 46531386 | 46542351 | 46542537 | 0 | 0.471 |
| Cog1 | chr11(+) | 113661658 | 113661693 | 113661139 | 113661218 | 113662206 | 113662400 | 1.56E-09 | 0.467 |
| Abcd3 | chr3(-) | 121787979 | 121788049 | 121786008 | 121786071 | 121791733 | 121791822 | 2.22E-16 | 0.444 |
| Lrrfip2 | chr9(+) | 111179176 | 111179221 | 111179046 | 111179097 | 111179872 | 111179920 | 0 | 0.441 |
| Pip5k1a | chr3(-) | 95089148 | 95089187 | 95082790 | 95082828 | 95106375 | 95106856 | 1.15E-05 | 0.435 |
| Clip1 | chr5(-) | 123635173 | 123635278 | 123630452 | 123631169 | 123640493 | 123640554 | 0.000115708 | 0.425 |
| Clasp2 | chr9(+) | 113858580 | 113858604 | 113854172 | 113854346 | 113862185 | 113862287 | 2.45E-06 | 0.423 |
| Fbxw11 | chr11(+) | 32652747 | 32652904 | 32642903 | 32642935 | 32711771 | 32711997 | 2.73E-05 | 0.422 |
| Ranbp2 | chr10(+) | 58481318 | 58481396 | 58476156 | 58480819 | 58483028 | 58483199 | 4.23E-06 | 0.42 |
| Clasp2 | chr9(+) | 113862435 | 113862462 | 113862185 | 113862287 | 113868547 | 113868718 | 1.00E-10 | 0.42 |
| Sorbs1 | chr19(-) | 40361428 | 40361503 | 40352517 | 40352565 | 40363201 | 40363265 | 7.71E-09 | 0.416 |
| Prkca | chr11(-) | 107945556 | 107945604 | 107933386 | 107939680 | 107951465 | 107951606 | 2.24E-12 | 0.412 |
| Txnl1 | chr18(-) | 63665651 | 63665694 | 63662800 | 63664332 | 63671581 | 63671686 | 0 | 0.411 |
| Tbc1d13 | chr2(+) | 30135408 | 30135552 | 30134796 | 30134870 | 30137120 | 30137182 | 0.000204396 | 0.411 |
| Txnl1 | chr18(-) | 63665737 | 63665915 | 63662800 | 63664332 | 63671581 | 63671686 | 0 | 0.398 |
| Rock2 | chr12(+) | 16973439 | 16973610 | 16972980 | 16973149 | 16974841 | 16974912 | 4.81E-10 | 0.389 |
| Neb | chr2(-) | 52161370 | 52161498 | 52160655 | 52160748 | 52162067 | 52162172 | 0 | 0.387 |
| Tpd52 | chr3(-) | 8936438 | 8936480 | 8934991 | 8935040 | 8943550 | 8943577 | 7.71E-06 | 0.384 |
| Fry | chr5(+) | 150461388 | 150461397 | 150457744 | 150457915 | 150466243 | 150466441 | 2.20E-08 | 0.379 |
| Kif13a | chr13(-) | 46760262 | 46760304 | 46752080 | 46752872 | 46761272 | 46761424 | 7.43E-09 | 0.378 |
| Tmem65 | chr15(-) | 58807077 | 58807158 | 58797200 | 58797245 | 58822842 | 58823530 | 1.88E-12 | 0.373 |
| Ywhae | chr11(+) | 75762697 | 75762742 | 75759291 | 75759428 | 75764619 | 75764623 | 0 | 0.37 |
| Tmed2 | chr5(+) | 124543486 | 124543507 | 124543079 | 124543164 | 124546895 | 124547003 | 0 | 0.368 |
| Naca | chr10(+) | 128039170 | 128045086 | 128036488 | 128036560 | 128046167 | 128046253 | 0 | 0.365 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dysf | chr6(+) | 84096476 | 84096518 | 84087791 | 84087874 | 84097707 | 84097823 | 5.55E-06 | 0.365 |
| Rnf115 | chr3(+) | 96755152 | 96755204 | 96754334 | 96754393 | 96757976 | 96758034 | 2.61E-06 | 0.362 |
| Lrrfip1 | chr1(+) | 91087058 | 91087124 | 91084945 | 91085005 | 91091601 | 91091667 | 2.08E-06 | 0.361 |
| Sorbs1 | chr19(-) | 40361041 | 40361104 | 40352517 | 40352565 | 40361428 | 40361503 | 8.92E-05 | 0.359 |
| Atg13 | chr2(-) | 91682802 | 91682901 | 91682025 | 91682136 | 91684668 | 91684759 | 0.000143669 | 0.359 |
| R3hdm2 | chr10(+) | 127465130 | 127465184 | 127464981 | 127465013 | 127471767 | 127472000 | 0 | 0.354 |
| Mpzl1 | chr1(-) | 165601749 | 165601855 | 165592239 | 165593677 | 165604609 | 165604742 | 4.54E-06 | 0.354 |
| Pfkfb2 | chr1(-) | 130697016 | 130698085 | 130689182 | 130691148 | 130698678 | 130698743 | 6.00E-06 | 0.353 |
| Ank1 | chr8(+) | 23132096 | 23132471 | 23123831 | 23123978 | 23132561 | 23132634 | 3.60E-05 | 0.351 |
| Mapt | chr11(+) | 104305312 | 104305409 | 104302360 | 104302410 | 104306625 | 104306734 | 0.000774744 | 0.35 |
| Gtf2a1 | chr12(-) | 91575583 | 91575791 | 91572565 | 91572633 | 91586699 | 91586801 | 6.64E-07 | 0.349 |
| Phkb | chr8(+) | 86025197 | 86025288 | 86024280 | 86024338 | 86026456 | 86026547 | 4.91E-07 | 0.348 |
| Snx6 | chr12(-) | 54768711 | 54768766 | 54768050 | 54768142 | 54770718 | 54770982 | 1.11E-05 | 0.348 |
| Coro6 | chr11(+) | 77467749 | 77467869 | 77466505 | 77466599 | 77468265 | 77468413 | 0 | 0.347 |
| Abcc1 | chr16(+) | 14362178 | 14362294 | 14361557 | 14361643 | 14389806 | 14389983 | 1.62E-09 | 0.343 |
| Ank1 | chr8(+) | 23132096 | 23132483 | 23123831 | 23123978 | 23132561 | 23132634 | 8.23E-05 | 0.341 |
| Mia3 | chr1(-) | 183329585 | 183329657 | 183328203 | 183328345 | 183329745 | 183329819 | 0 | 0.339 |
| Clasp1 | chr1(+) | 118541674 | 118541698 | 118539265 | 118539369 | 118543101 | 118543346 | 0.000159588 | 0.338 |
| Rilpl1 | chr5(-) | 124495898 | 124495917 | 124493651 | 124493844 | 124501839 | 124501932 | 0.000200332 | 0.33 |
| Neb | chr2(-) | 52151282 | 52151456 | 52149589 | 52149697 | 52159476 | 52159569 | 0 | 0.329 |
| Srsf9 | chr5(+) | 115328346 | 115328430 | 115327394 | 115327499 | 115330497 | 115330658 | 1.46E-12 | 0.329 |
| Ppp3cb | chr14(-) | 20511473 | 20511500 | 20509415 | 20509500 | 20515522 | 20515600 | 8.38E-12 | 0.329 |
| Neb | chr2(-) | 52157831 | 52157924 | 52149589 | 52149697 | 52159476 | 52159569 | 0 | 0.323 |
| Rhot1 | chr11(+) | 80264243 | 80264450 | 80257513 | 80257636 | 80265741 | 80267486 | 0.000120412 | 0.321 |
| Ppp3ca | chr3(+) | 136932010 | 136932040 | 136928536 | 136928619 | 136935028 | 136935779 | 0 | 0.319 |
| Neb | chr2(-) | 52156354 | 52156447 | 52150536 | 52150629 | 52157831 | 52157924 | 6.11E-05 | 0.317 |
| Pex11a | chr7(-) | 79740164 | 79740280 | 79735956 | 79737910 | 79742909 | 79743080 | 3.54E-08 | 0.316 |
| Arl2bp | chr8(+) | 94667029 | 94667230 | 94666723 | 94666901 | 94667596 | 94667658 | 2.49E-10 | 0.315 |
| Las1l | chrX(-) | 95947397 | 95947448 | 95946866 | 95947073 | 95947769 | 95947855 | 1.20E-07 | 0.315 |
| Mlf1 | chr3(+) | 67391009 | 67391022 | 67384577 | 67384698 | 67392891 | 67392975 | 7.94E-07 | 0.314 |
| Ssr1 | chr13(-) | 37983094 | 37983109 | 37979742 | 37979806 | 37983392 | 37983486 | 1.01E-06 | 0.31 |
| Pkm | chr9(+) | 59663039 | 59663156 | 59661414 | 59661471 | 59665199 | 59665366 | 0.000340707 | 0.308 |
| Srsf9 | chr5(+) | 115331449 | 115331539 | 115330497 | 115330658 | 115332116 | 115332289 | 1.39E-06 | 0.306 |
| Car14 | chr3(-) | 95901458 | 95901480 | 95901092 | 95901272 | 95902110 | 95902131 | 5.71E-05 | 0.303 |
| Obscn | chr11(-) | 59054773 | 59055037 | 59054161 | 59054425 | 59067065 | 59067329 | 4.44E-16 | 0.302 |
| Stim2 | chr5(+) | 54110115 | 54110139 | 54109702 | 54109870 | 54110536 | 54110637 | 1.25E-05 | 0.301 |
| Mlip | chr9(-) | 77216976 | 77217048 | 77190671 | 77190737 | 77239391 | 77239784 | 0.001121544 | 0.299 |
| Fermt2 | chr14(-) | 45463245 | 45463269 | 45462714 | 45462735 | 45464723 | 45464945 | 4.06E-13 | 0.299 |
| Csde1 | chr3(+) | 103036574 | 103036721 | 103028788 | 103029212 | 103038691 | 103038890 | 1.85E-08 | 0.295 |
| Lpin1 | chr12(-) | 16571163 | 16571262 | 16568389 | 16568519 | 16573659 | 16573785 | 3.61E-14 | 0.293 |
| Arfgap2 | chr2(+) | 91269069 | 91269111 | 91268451 | 91268508 | 91269451 | 91269504 | 1.73E-06 | 0.293 |
| Vps39 | chr2(-) | 120346856 | 120346889 | 120346327 | 120346392 | 120350163 | 120350229 | 2.57E-05 | 0.293 |
| Meaf6 | chr4(+) | 125103429 | 125103570 | 125102838 | 125103031 | 125107651 | 125107709 | 0.000483733 | 0.292 |
| Reep1 | chr6(+) | 71805342 | 71805494 | 71795146 | 71795324 | 71807790 | 71810246 | 1.10E-13 | 0.291 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Cltc | chr11(-) | 86696175 | 86696213 | 86695316 | 86695690 | 86697264 | 86697340 | 4.62E-07 | 0.291 |
| Mpp5 | chr12(+) | 78828617 | 78828774 | 78826260 | 78826332 | 78829652 | 78829820 | 0.000103887 | 0.29 |
| Tpm3 | chr3(+) | 90091012 | 90091091 | 90090009 | 90090079 | 90099527 | 90100896 | 4.16E-12 | 0.288 |
| Prpf18 | chr2(-) | 4648096 | 4648123 | 4645568 | 4645673 | 4648240 | 4648318 | 1.22E-07 | 0.287 |
| Adss | chr1(-) | 177770439 | 177770512 | 177769924 | 177770022 | 177771140 | 177771265 | 2.03E-05 | 0.286 |
| Rmnd1 | chr10(-) | 4428368 | 4428465 | 4427522 | 4427691 | 4429076 | 4429165 | 5.02E-12 | 0.285 |
| Usp25 | chr16(+) | 77097648 | 77097762 | 77093602 | 77093742 | 77107884 | 77108063 | 7.32E-05 | 0.28 |
| Neb | chr2(-) | 52151363 | 52151456 | 52150536 | 52150629 | 52159476 | 52159569 | 2.04E-09 | 0.279 |
| Kif13a | chr13(-) | 46808156 | 46808276 | 46802515 | 46802729 | 46808890 | 46809057 | 2.58E-05 | 0.279 |
| Ccdc85c | chr12(-) | 108216786 | 108216825 | 108211514 | 108211622 | 108221708 | 108221782 | 7.48E-08 | 0.276 |
| Nudt6 | chr3(-) | 37415650 | 37415692 | 37412359 | 37412415 | 37416700 | 37416904 | 0.000930924 | 0.275 |
| Trdn | chr10(+) | 33333231 | 33333248 | 33332435 | 33332465 | 33334981 | 33335014 | 6.43E-10 | 0.273 |
| Arhgap12 | chr18(-) | 6111684 | 6112439 | 6069830 | 6070091 | 6115813 | 6115850 | 9.62E-05 | 0.271 |
| Obscn | chr11(-) | 59054773 | 59055037 | 59052444 | 59052711 | 59067065 | 59067329 | 4.41E-07 | 0.27 |
| Mapt | chr11(+) | 104307880 | 104307934 | 104306625 | 104306758 | 104310268 | 104310534 | 1.29E-05 | 0.269 |
| Zfp746 | chr6(-) | 48082153 | 48082267 | 48067168 | 48067360 | 48083092 | 48083174 | 1.53E-05 | 0.267 |
| R3hdm2 | chr10(+) | 127481692 | 127481794 | 127476519 | 127476698 | 127483975 | 127484218 | 1.38E-05 | 0.266 |
| Rnps1 | chr17(+) | 24418037 | 24418228 | 24415040 | 24415162 | 24418456 | 24418612 | 0.000382901 | 0.266 |
| Mybpc1 | chr10(-) | 88521276 | 88521335 | 88519933 | 88519943 | 88522966 | 88523187 | 0 | 0.264 |
| Cyld | chr8(+) | 88718289 | 88718298 | 88709890 | 88709996 | 88719297 | 88719396 | 2.91E-06 | 0.261 |
| Mef2d | chr3(+) | 88161780 | 88161951 | 88161190 | 88161381 | 88162957 | 88163087 | 3.67E-06 | 0.261 |
| Chtop | chr3(-) | 90505394 | 90505478 | 90503095 | 90503282 | 90506107 | 90506261 | 6.70E-06 | 0.26 |
| Qrich1 | chr9(+) | 108519717 | 108519753 | 108518766 | 108518826 | 108528588 | 108528859 | 0.00119629 | 0.26 |
| Neb | chr2(-) | 52150536 | 52150629 | 52149589 | 52149697 | 52159476 | 52159569 | 0 | 0.256 |
| Fxr1 | chr3(+) | 34064973 | 34065054 | 34064212 | 34064319 | 34068916 | 34069342 | 0 | 0.256 |
| Rock2 | chr12(+) | 16982650 | 16982747 | 16977888 | 16978102 | 16984637 | 16987823 | 1.37E-07 | 0.256 |
| Psma4 | chr9(+) | 54951343 | 54951428 | 54950814 | 54950903 | 54952081 | 54952108 | 1.82E-09 | 0.256 |
| Fxr1 | chr3(+) | 34068160 | 34068252 | 34064118 | 34064319 | 34068916 | 34069345 | 0 | 0.255 |
| Lims1 | chr10(+) | 58418647 | 58418835 | 58418398 | 58418474 | 58421453 | 58421664 | 0.000202918 | 0.254 |
| Taf12 | chr4(+) | 132281993 | 132282078 | 132274415 | 132274487 | 132282793 | 132283045 | 0.001067477 | 0.254 |
| Mybpc1 | chr10(-) | 88521276 | 88521335 | 88518338 | 88518569 | 88522966 | 88523187 | 0 | 0.253 |
| R3hdm2 | chr10(+) | 127481692 | 127481755 | 127476519 | 127476698 | 127483975 | 127484218 | 2.54E-06 | 0.252 |
| Calu | chr6(+) | 29361559 | 29361753 | 29361293 | 29361487 | 29366039 | 29366206 | 1.09E-07 | 0.252 |
| Coro6 | chr11(+) | 77467278 | 77467343 | 77466505 | 77466599 | 77468265 | 77468413 | 0.001408138 | 0.251 |
| Itgb1 | chr8(+) | 128726982 | 128727063 | 128726019 | 128726186 | 128732022 | 128732389 | 9.86E-14 | 0.25 |
| Tead1 | chr7(+) | 112842039 | 112842102 | 112839415 | 112839480 | 112856797 | 112856932 | 1.66E-05 | 0.25 |
| Itga7 | chr10(+) | 128956610 | 128956723 | 128953945 | 128954071 | 128957620 | 128958279 | 1.40E-11 | 0.249 |
| Msl3 | chrX(-) | 168672262 | 168672345 | 168671794 | 168671890 | 168673727 | 168673898 | 6.79E-05 | 0.249 |
| Hnrnph2 | chrX(+) | 134602917 | 134602962 | 134602699 | 134602762 | 134604854 | 134607054 | 9.59E-05 | 0.247 |
| Fam168b | chr1(-) | 34824019 | 34824055 | 34819866 | 34820009 | 34828766 | 34828847 | 2.24E-05 | 0.246 |
| Ndrg3 | chr2(-) | 156929931 | 156929970 | 156927344 | 156928881 | 156931215 | 156931267 | 1.04E-08 | 0.245 |
| Neb | chr2(-) | 52153055 | 52153148 | 52150536 | 52150629 | 52157831 | 52157924 | 7.52E-07 | 0.242 |
| Neb | chr2(-) | 52151363 | 52151456 | 52149589 | 52149697 | 52159476 | 52159569 | 0 | 0.241 |
| Palld | chr8(-) | 61514987 | 61515034 | 61511432 | 61513524 | 61515202 | 61515336 | 0.000288005 | 0.238 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Neb | chr2(-) | 52157290 | 52157383 | 52150536 | 52150629 | 52157831 | 52157912 | 4.71E-07 | 0.237 |
| Lsmem1 | chr12(-) | 40185284 | 40185420 | 40175492 | 40177228 | 40199206 | 40199490 | 0.000821033 | 0.237 |
| Ppp3cb | chr14(-) | 20511473 | 20511500 | 20509415 | 20509497 | 20515522 | 20515600 | 4.37E-05 | 0.235 |
| Hgsnat | chr8(-) | 25973580 | 25973690 | 25972841 | 25972957 | 25976524 | 25976753 | 0.000378235 | 0.235 |
| Lrrfip1 | chr1(+) | 91088633 | 91088711 | 91084945 | 91085005 | 91091601 | 91091667 | 9.85E-07 | 0.234 |
| Obscn | chr11(-) | 59064186 | 59064450 | 59054161 | 59054425 | 59067065 | 59067329 | 1.32E-07 | 0.231 |
| Cobl | chr11(-) | 12373328 | 12373373 | 12369593 | 12369691 | 12375809 | 12376038 | 0 | 0.228 |
| Ndufaf5 | chr2(+) | 140202854 | 140203036 | 140193582 | 140193643 | 140203287 | 140203370 | 0.00020981 | 0.227 |
| Mybpc1 | chr10(-) | 88575128 | 88575164 | 88573415 | 88573529 | 88585659 | 88585695 | 0 | 0.226 |
| Akap9 | chr5(+) | 4031110 | 4031149 | 4029839 | 4030052 | 4032680 | 4032913 | 1.57E-05 | 0.225 |
| Tacc2 | chr7(+) | 130744526 | 130744616 | 130742129 | 130742301 | 130751189 | 130751333 | 2.73E-14 | 0.225 |
| Ankrd33b | chr15(-) | 31325089 | 31325215 | 31304991 | 31305132 | 31367038 | 31367726 | 3.92E-05 | 0.224 |
| Usp28 | chr9(+) | 49032508 | 49032688 | 49032213 | 49032353 | 49033576 | 49033672 | 1.95E-12 | 0.222 |
| Mlip | chr9(-) | 77229484 | 77230954 | 77190671 | 77190737 | 77239391 | 77239784 | 0.000128413 | 0.222 |
| Ppp1r12a | chr10(+) | 108233135 | 108233175 | 108230436 | 108230596 | 108233998 | 108234143 | 1.67E-06 | 0.219 |
| Rilpl1 | chr5(-) | 124496173 | 124496270 | 124493651 | 124493844 | 124501839 | 124501952 | 0.000405519 | 0.219 |
| Reep1 | chr6(+) | 71805330 | 71805494 | 71799165 | 71799201 | 71807790 | 71810246 | 2.15E-11 | 0.217 |
| Kcnma1 | chr14(-) | 23336039 | 23336120 | 23330839 | 23330970 | 23336944 | 23337058 | 9.47E-06 | 0.217 |
| Slc38a10 | chr11(-) | 120108466 | 120108553 | 120106433 | 120106610 | 120109431 | 120109536 | 0.000191387 | 0.216 |
| Exoc3 | chr13(-) | 74207545 | 74207591 | 74206906 | 74207097 | 74208657 | 74208709 | 1.52E-06 | 0.215 |
| Cd47 | chr16(+) | 49899855 | 49899900 | 49898039 | 49898132 | 49906780 | 49906812 | 0.000758076 | 0.214 |
| Acot8 | chr2(-) | 164802996 | 164803133 | 164799557 | 164799945 | 164804689 | 164804822 | 0.000839648 | 0.213 |
| Cltc | chr11(-) | 86701060 | 86701081 | 86697264 | 86697340 | 86702208 | 86702430 | 0.000159345 | 0.211 |
| Ubap2l | chr3(-) | 90031295 | 90031370 | 90028324 | 90028377 | 90034064 | 90034177 | 3.50E-06 | 0.21 |
| Ablim2 | chr5(+) | 35831685 | 35831742 | 35828123 | 35828182 | 35833052 | 35833130 | 3.74E-13 | 0.21 |
| Sema6c | chr3(+) | 95171790 | 95171886 | 95171557 | 95171602 | 95172254 | 95174024 | 3.25E-05 | 0.21 |
| Nudt13 | chr14(+) | 20295087 | 20295266 | 20294722 | 20294792 | 20300586 | 20300679 | 0.000111466 | 0.21 |
| Phtf2 | chr5(-) | 20812940 | 20812993 | 20807403 | 20807473 | 20813239 | 20813296 | 6.22E-05 | 0.208 |
| Fbxw11 | chr11(+) | 32652747 | 32652904 | 32642903 | 32642935 | 32680200 | 32680302 | 0.000451942 | 0.206 |
| Nudt13 | chr14(+) | 20295087 | 20295268 | 20294745 | 20294792 | 20300586 | 20300679 | 0.000535889 | 0.206 |
| Diaph1 | chr18(-) | 37847945 | 37848004 | 37843602 | 37845498 | 37851550 | 37851637 | 1.52E-10 | 0.204 |
| Mff | chr1(+) | 82741817 | 82741976 | 82735418 | 82735507 | 82747082 | 82747142 | 3.22E-05 | 0.203 |
| Bnip3l | chr14(-) | 66988885 | 66988941 | 66985238 | 66987775 | 66989134 | 66989284 | 0.000246869 | 0.203 |
| Pdlim3 | chr8(+) | 45908468 | 45908656 | 45900479 | 45900559 | 45915128 | 45915259 | 0.0003718 | 0.2 |
| Lrrfip1 | chr1(+) | 91108579 | 91108672 | 91107298 | 91107390 | 91112156 | 91112297 | 0.0000262 | 0.185 |
| Ccnl2 | chr4(+) | 155819705 | 155819932 | 155818586 | 155818664 | 155820328 | 155820428 | 0.000148076 | -0.201 |
| Ric8b | chr10(+) | 84970728 | 84970824 | 84969862 | 84970091 | 84980047 | 84980192 | 0.000603069 | -0.201 |
| Pigq | chr17(-) | 25931673 | 25931827 | 25931461 | 25931573 | 25932104 | 25932231 | 0.000130055 | -0.203 |
| Spopl | chr(-) | 23545443 | 23545579 | 23544745 | 23544897 | 23571842 | 23572104 | 0.000107668 | -0.204 |
| Mafg | chr11(-) | 120630487 | 120630647 | 120629817 | 120629881 | 120631242 | 120631440 | 0.000805968 | -0.209 |
| Upf3b | chrX(-) | 37099065 | 37099104 | 37096857 | 37097018 | 37099506 | 37099689 | 1.29E-06 | -0.214 |
| Camk2b | chr11(-) | 5976764 | 5976893 | 5972812 | 5972888 | 5979672 | 5979721 | 0.001093124 | -0.216 |
| Wdyhv1 | chr15(+) | 58150981 | 58151062 | 58150605 | 58150656 | 58152596 | 58152745 | 9.37E-08 | -0.222 |
| Celf2 | chr2(-) | 6549831 | 6549975 | 6546239 | 6547213 | 6553784 | 6553982 | 0.00047644 | -0.223 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ifi27 | chr12(+) | 103437452 | 103437524 | 103436562 | 103436682 | 103437675 | 103437705 | 0.001112669 | -0.229 |
| Tnnt3 | chr7(+) | 142514158 | 142514366 | 142513532 | 142513705 | 142515775 | 142516008 | 7.28E-06 | -0.232 |
| Gpbp1 | chr13(-) | 111447895 | 111447955 | 111440631 | 111440816 | 111448932 | 111448999 | 9.22E-06 | -0.234 |
| Ank3 | chr10(+) | 70006802 | 70006853 | 70004609 | 70004991 | 70008777 | 70008864 | 0.001020413 | -0.234 |
| Rreb1 | chr13(+) | 37941542 | 37941704 | 37929557 | 37932489 | 37946856 | 37947663 | 0.000484832 | -0.236 |
| Pum1 | chr4(+) | 130753941 | 130754178 | 130752575 | 130752872 | 130762753 | 130763021 | 0.000943248 | -0.24 |
| Hcfc2 | chr10(+) | 82709008 | 82709217 | 82702442 | 82702603 | 82709963 | 82710048 | 0.000635687 | -0.244 |
| Ryr1 | chr7(-) | 29044918 | 29044936 | 29043848 | 29043929 | 29045603 | 29045677 | 0 | -0.251 |
| Slc22a23 | chr13(-) | 34193248 | 34193272 | 34192155 | 34192279 | 34193393 | 34193426 | 7.73E-07 | -0.253 |
| Phkb | chr8(+) | 86026456 | 86026547 | 86025197 | 86025288 | 86029481 | 86029684 | 7.49E-07 | -0.261 |
| Huwe1 | chrX(+) | 151859454 | 151859688 | 151857807 | 151857913 | 151860166 | 151860546 | 0.001113899 | -0.263 |
| Ythdc1 | chr5(+) | 86809304 | 86809340 | 86804495 | 86804591 | 86815628 | 86815730 | 0.000448125 | -0.274 |
| Zfp62 | chr11(+) | 49214554 | 49214654 | 49213589 | 49213642 | 49215063 | 49218816 | 0.00063644 | -0.279 |
| Hnrnpr | chr4(+) | 136314089 | 136314255 | 136311684 | 136311747 | 136316360 | 136316479 | 3.93E-06 | -0.28 |
| Ank3 | chr10(+) | 70006799 | 70006853 | 70004609 | 70004991 | 70008777 | 70008864 | 0.000232871 | -0.281 |
| Papola | chr12(+) | 105811036 | 105811109 | 105809523 | 105809662 | 105812273 | 105812394 | 0.000206811 | -0.282 |
| Klhl26 | chr8(-) | 70455465 | 70455648 | 70450679 | 70453019 | 70476849 | 70476950 | 0.000536474 | -0.283 |
| Hnrnpr | chr4(+) | 136314086 | 136314255 | 136311590 | 136311747 | 136316360 | 136316479 | 3.11E-06 | -0.286 |
| Tatdn1 | chr15(-) | 58909576 | 58909649 | 58905740 | 58905811 | 58916151 | 58916192 | 5.91E-06 | -0.286 |
| Smad2 | chr18(+) | 76302078 | 76302216 | 76299782 | 76299995 | 76302382 | 76302642 | 0.00014589 | -0.29 |
| Per2 | chr1(-) | 91423689 | 91424486 | 91421367 | 91421554 | 91427738 | 91427978 | 0.000175668 | -0.322 |
| Socs6 | chr18(-) | 88886991 | 88887052 | 88870249 | 88870918 | 88887208 | 88887247 | 0.00029919 | -0.323 |
| Babam2 | chr5(+) | 31701825 | 31701927 | 31698049 | 31698077 | 31702030 | 31702092 | 3.85E-08 | -0.352 |
| Snhg5 | chr9(-) | 88521917 | 88521975 | 88521649 | 88521716 | 88522306 | 88522381 | 0.000706106 | -0.361 |
| Rsad1 | chr11(-) | 94548158 | 94548363 | 94544419 | 94544785 | 94548470 | 94548604 | 0.000341226 | -0.366 |
| Kansl1l | chr1(-) | 66802105 | 66802168 | 66777966 | 66778108 | 66817373 | 66817562 | 0.0001558 | -0.377 |
| Mettl3 | chr14(-) | 52298639 | 52298815 | 52298034 | 52298085 | 52299700 | 52300105 | 2.00E-05 | -0.385 |
| Fam193a | chr5(+) | 34440347 | 34440590 | 34440120 | 34440233 | 34443300 | 34443454 | 2.28E-06 | -0.41 |
| Tmem234 | chr4(+) | 129601869 | 129601961 | 129601406 | 129601533 | 129602194 | 129602261 | 5.96E-05 | -0.421 |
| Ctbs | chr3(+) | 146454162 | 146454485 | 146450477 | 146450630 | 146454947 | 146455156 | 0.0007709 | -0.46 |
| Clasp1 | chr1(+) | 118547655 | 118547658 | 118545392 | 118545456 | 118547864 | 118548028 | 1.09E-06 | -0.469 |
| Dbt | chr3(+) | 116520236 | 116520360 | 116513127 | 116513191 | 116533254 | 116533436 | 2.86E-08 | -0.535 |
| Abcd3 | chr3(-) | 121786001 | 121786148 | 121784472 | 121784570 | 121787979 | 121788049 | 2.54E-10 | -0.57 |

**A3SS**

| gene | chr | longExonStart | longExonEnd | shortES | shortEE | flankingES | flankingEE | P-Value | IncLevelDiffer |
|---|---|---|---|---|---|---|---|---|---|
| Pdlim5 | chr3(-) | 142312122 | 142312541 | 142312122 | 142312214 | 142314405 | 142314448 | 7.86616E-06 | 0.637 |
| Ank1 | chr8(+) | 23132096 | 23132634 | 23132561 | 23132634 | 23123831 | 23123978 | 7.28723E-05 | 0.331 |
| Tnnt3 | chr7(+) | 142514155 | 142514366 | 142514325 | 142514366 | 142513532 | 142513705 | 2.21156E-13 | -0.296 |
| Got2 | chr8(-) | 95865056 | 95865268 | 95865056 | 95865247 | 95866820 | 95867207 | 0.000142511 | 0.253 |
| Odf2l | chr3(+) | 145145875 | 145148616 | 145148530 | 145148616 | 145144311 | 145144416 | 2.98E-07 | 0.242 |
| Lamp1 | chr8(+) | 13165845 | 13165967 | 13165851 | 13165967 | 13159160 | 13159434 | 6.10E-05 | -0.201 |
| Asb10 | chr5(-) | 24533650 | 24533798 | 24533650 | 24533794 | 24534106 | 24534220 | 7.48E-05 | -0.259 |
| Cbx7 | chr15(-) | 79918752 | 79919104 | 79918752 | 79918927 | 79921371 | 79921438 | 1.03E-05 | -0.278 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Nptn | chr9(+) | 58650496 | 58650518 | 58650508 | 58650518 | 58643528 | 58643802 | 3.02E-08 | -0.352 |
| Atp2a2 | chr5(-) | 122456454 | 122456617 | 122456454 | 122456570 | 122457302 | 122457426 | 4.37E-11 | -0.373 |

**A5SS**

| gene | chr | longExonStart | longExonEnd | shortES | shortEE | flankingES | flankingEE | P-Value | IncLevelDiffer |
|---|---|---|---|---|---|---|---|---|---|
| Mia3 | chr1(-) | 183329585 | 183329819 | 183329745 | 183329819 | 183328203 | 183328345 | 5.66214E-15 | 0.449 |
| Lrrfip2 | chr9(+) | 111179063 | 111179221 | 111179063 | 111179097 | 111179872 | 111179920 | 4.65739E-13 | 0.438 |
| Chd9 | chr8(+) | 91036325 | 91036598 | 91036325 | 91036550 | 91037406 | 91037575 | 1.14338E-05 | 0.538 |
| Tnk2 | chr16(+) | 32678668 | 32678785 | 32678668 | 32678713 | 32679458 | 32680807 | 1.31535E-05 | 0.412 |
| Tacc2 | chr7(+) | 130734948 | 130735243 | 130734948 | 130735150 | 130739811 | 130739873 | 7.77156E-16 | 0.248 |
| Snhg5 | chr9(-) | 88521917 | 88522381 | 88522306 | 88522381 | 88521649 | 88521716 | 1.10878E-05 | -0.308 |

**RI**

| gene | chr | riExonStart | riExonEnd | upstreamES | upstreamEE | downstreamES | downstreamEE | P-Value | IncLevelDiffer |
|---|---|---|---|---|---|---|---|---|---|
| Zfp326 | chr5(+) | 105886316 | 105888839 | 105886316 | 105886428 | 105888433 | 105888839 | 1.44915E-05 | 0.637 |
| Lyl1 | chr8(+) | 84702639 | 84702995 | 84702639 | 84702690 | 84702790 | 84702995 | 0.000191645 | 0.292 |
| Galt | chr4(+) | 41756512 | 41756995 | 41756512 | 41756561 | 41756938 | 41756995 | 0.000142222 | 0.253 |
| Myzap | chr9(-) | 71552238 | 71555737 | 71552238 | 71552364 | 71555584 | 71555737 | 0.000215629 | 0.229 |
| Isyna1 | chr8(+) | 70595138 | 70595554 | 70595138 | 70595271 | 70595360 | 70595554 | 0.00023002 | 0.226 |
| Neu2 | chr1(+) | 87594549 | 87595089 | 87594549 | 87594617 | 87594877 | 87595089 | 0.000558379 | -0.401 |
| Rad52 | chr6(+) | 119918586 | 119919077 | 119918586 | 119918786 | 119918925 | 119919077 | 4.41186E-07 | -0.462 |

**MXE**

| gene | chr | 1stExonStart | 1stExonEnd | 2ndExonStart | 2ndExonEnd | upstreamES | upstreamEE | downstreamES | downstreamEE | P-Value | IncLevelDiffer |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lrrfip1 | chr1(+) | 91082140 | 91082179 | 91084945 | 91085005 | 91079030 | 91079081 | 91088633 | 91088711 | 0 | 0.685 |
| Abcd3 | chr3(-) | 121786001 | 121786071 | 121787979 | 121788049 | 121784472 | 121784570 | 121791733 | 121791822 | 0 | 0.603 |
| Lrrfip1 | chr1(+) | 91076943 | 91076991 | 91079030 | 91079081 | 91073323 | 91073341 | 91084945 | 91085005 | 1.53E-12 | 0.344 |
| Lrrfip1 | chr1(+) | 91084945 | 91085005 | 91088633 | 91088711 | 91082140 | 91082179 | 91091601 | 91091667 | 8.35E-08 | 0.29 |
| Tmem234 | chr4(+) | 129601406 | 129601533 | 129601869 | 129601961 | 129600982 | 129601243 | 129602194 | 129602261 | 0.000558288 | 0.267 |
| Neb | chr2(-) | 52160655 | 52160748 | 52161370 | 52161475 | 52151363 | 52151456 | 52162067 | 52162172 | 0 | 0.238 |
| Lrrfip2 | chr9(+) | 111179176 | 111179221 | 111179872 | 111179920 | 111179046 | 111179097 | 111180215 | 111180272 | 0.000422588 | 0.223 |
| Tnnt3 | chr7(+) | 142513664 | 142513705 | 142514326 | 142514366 | 142512531 | 142512622 | 142515775 | 142516003 | 4.02E-08 | 0.206 |
| Reep1 | chr6(+) | 71799165 | 71799201 | 71805342 | 71805494 | 71795146 | 71795324 | 71807790 | 71810246 | 4.83E-09 | -0.228 |
| Slc8a3 | chr12(-) | 81209453 | 81209471 | 81214065 | 81214169 | 81204891 | 81205016 | 81314259 | 81316104 | 0.00000631 | -0.235 |
| Neb | chr2(-) | 52161370 | 52161475 | 52162067 | 52162171 | 52160655 | 52160748 | 52162904 | 52163009 | 0 | -0.246 |
| Pdlim5 | chr3(-) | 142306283 | 142306298 | 142312122 | 142312214 | 142304704 | 142304722 | 142314405 | 142314448 | 0 | -0.403 |
| Pdlim5 | chr3(-) | 142309495 | 142309544 | 142312122 | 142312214 | 142306283 | 142306298 | 142314405 | 142314448 | 4.44E-16 | -0.469 |
| Atp11a | chr8(+) | 12861639 | 12861724 | 12863758 | 12863868 | 12859313 | 12859479 | 12864919 | 12868667 | 0.000000357 | -0.565 |
| Lrrfip1 | chr1(+) | 91082140 | 91082179 | 91084945 | 91085005 | 91079030 | 91079081 | 91093559 | 91093637 | 0 | 0.84 |
| Lrrfip1 | chr1(+) | 91084945 | 91085005 | 91093559 | 91093637 | 91082140 | 91082179 | 91100576 | 91100612 | 0 | 0.354 |
| Lrrfip1 | chr1(+) | 91082140 | 91082179 | 91091601 | 91091667 | 91079030 | 91079081 | 91093559 | 91093637 | 0 | 0.345 |
| Phkb | chr8(+) | 86025197 | 86025288 | 86026456 | 86026547 | 86024280 | 86024338 | 86029481 | 86029684 | 8.11129E-12 | 0.338 |
| Clk4 | chr11(+) | 51268768 | 51268846 | 51270536 | 51270595 | 51268164 | 51268231 | 51271799 | 51272022 | 0.001014603 | 0.304 |
| Arhgap12 | chr18(-) | 6069830 | 6070091 | 6111684 | 6112439 | 6064340 | 6064421 | 6115813 | 6115850 | 3.97665E-05 | 0.284 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lrrfip1 | chr1(+) | 91087058 | 91087124 | 91088633 | 91088762 | 91084945 | 91085005 | 91091601 | 91091667 | 2.20981E-07 | 0.277 |
| Rab7 | chr6(-) | 88015631 | 88015718 | 88038809 | 88038880 | 88013637 | 88013698 | 88045072 | 88045231 | 5.64223E-06 | 0.264 |
| Nme6 | chr9(+) | 109839607 | 109839710 | 109841475 | 109841515 | 109833195 | 109833295 | 109841926 | 109842087 | 0.0020038 | 0.24 |
| Slc25a3 | chr10(-) | 91121921 | 91122043 | 91122206 | 91122331 | 91119526 | 91119706 | 91123557 | 91123706 | 0 | 0.208 |
| Mef2d | chr3(+) | 88158033 | 88158171 | 88158220 | 88158355 | 88156321 | 88156525 | 88159121 | 88159332 | 6.03951E-06 | -0.153 |
| Nt5c2 | chr19(-) | 46898802 | 46898894 | 46924261 | 46924335 | 46898621 | 46898679 | 46950845 | 46950965 | 0.001618525 | -0.215 |
| Ldb3 | chr14(-) | 34572989 | 34573012 | 34576985 | 34577344 | 34567397 | 34567567 | 34578594 | 34578670 | 0 | -0.238 |
| Pacsin3 | chr2(+) | 91256301 | 91256408 | 91256889 | 91256926 | 91256143 | 91256190 | 91259863 | 91259927 | 2.63363E-05 | -0.249 |
| Haus7 | chrX(-) | 73448810 | 73448902 | 73452998 | 73453060 | 73448191 | 73448350 | 73454866 | 73454934 | 0.000789618 | -0.297 |
| Rbpms | chr8(-) | 33806716 | 33806850 | 33834303 | 33834454 | 33795081 | 33795150 | 33862985 | 33863048 | 0.001709407 | -0.321 |
| Arl2bp | chr8(+) | 94667596 | 94667658 | 94670320 | 94670427 | 94666599 | 94666901 | 94671294 | 94671380 | 1.0522E-09 | -0.34 |
| D630024D03Rik | chr11(-) | 31802829 | 31802981 | 31804035 | 31804197 | 31802331 | 31802448 | 31824292 | 31824524 | 0.00118454 | -0.341 |
| Cbwd1 | chr19(-) | 24953259 | 24953351 | 24955335 | 24955432 | 24949201 | 24949261 | 24957903 | 24957990 | 2.5156E-05 | -0.343 |
| Lrrfip1 | chr1(+) | 91084945 | 91085005 | 91091601 | 91091667 | 91079030 | 91079081 | 91093559 | 91093637 | 0 | -0.396 |

column-index

chr: chromosome

+/-: plus / minus strand

exonStart: Start position of alternative exon in chromosome

exonEnd: End position of alternative exon in chromosome

upstreamES: Constitutive up-stream exon start site in chromosome

upstreamEE: Constitutive up-stream exon end site in chromosome

downstreamES: Constitutive down-stream exon start site in chromosome

downstreamEE: Constitutive down-stream exon end site in chromosome

IncLevelDiffer: Inclusion level difference

SE: Skipped exon

A3SS: Alternative 3’ splice site

A5SS: Alternative 5’ splice site

RI: Retained intron

MXE: Mutually exclusive exon

**Table S4. Rbm24-regulated AS events associated with myogenic differentiation.**

| gene symbol | splicing type | alternative exon loci | C2C12 Differ ΔPSI[#] | UKO mice ΔIncLevelDiffer[#] |
|---|---|---|---|---|
| Ppfibp1 | SE | chr7(+): 146996808-146996901 | 0.42 | 0.63 |
| R3hdm1 | SE | chr1(+): 128162768-128162858 | 0.22 | 0.59 |
| Cad | SE | chr5(+): 31075470-31075521 | 0.2 | 0.57 |
| Uso1 | SE | chr5(+): 92183481-92183502 | 0.63 | 0.54 |
| Cog1 | SE | chr11(+): 113661658-113661693 | 0.2 | 0.47 |
| Ranbp2 | SE | chr10(+): 58481318-58481396 | 0.31 | 0.42 |
| Ppp3ca | SE | chr3(+): 136932010-136932040 | 0.38 | 0.32 |
| Tmed2 | SE | chr5(+): 124543486-124543507 | 0.42 | 0.37 |
| Naca | SE | chr10(+): 128039170-128045086 | 0.31 | 0.37 |
| R3hdm2 | SE | chr10(+): 127465130-127465184 | 0.23 | 0.35 |
| Lpin1 | SE | chr12(-): 16571163-16571262 | 0.2 | 0.29 |
| Ssr1 | SE | chr13(-): 37983094-37983109 | 0.23 | 0.31 |
| Stim2 | SE | chr5(+): 54110115-54110139 | 0.27 | 0.3 |
| Csde1 | SE | chr3(+): 103036574-103036721 | 0.32 | 0.3 |
| Arfgap2 | SE | chr2(+): 91269069-91269111 | 0.38 | 0.29 |
| Cltc | SE | chr11(-): 86701060-86701081 | 0.24 | 0.21 |
| Tpm3 | SE | chr3(+): 90091012-90091091 | 0.46 | 0.29 |
| Prpf18 | SE | chr2(-): 4648096-4648123 | 0.2 | 0.29 |
| Rnps1 | SE | chr17(+): 24418037-24418228 | 0.2 | 0.27 |
| Psma4 | SE | chr9(+): 54951343-54951428 | 0.23 | 0.26 |
| Hnrnph2 | SE | chrX(+): 134602917-134602962 | 0.31 | 0.25 |
| Tacc2 | SE | chr7(+): 130744526-130744616 | 0.32 | 0.23 |
| Sema6c | SE | chr3(+): 95171790-95171886 | 0.41 | 0.21 |
| Upf3b | SE | chrx(-): 37099065-37099104 | 0.22 | 0.21 |
| Tnk2 | A3SS | chr16(+): 32678668-32678785 | 0.35 | 0.41 |
| Ubr3 | SE | chr2(+): 69971401-69971434 | 0.64 | 0.53 |
| Fxr1 | SE | chr3(+): 34064973-34065054; 34068160-34068252 | 0.82 | 0.26 |
| Txnl1 | SE | chr18(-): 63665651-63665694 | 0.3 | 0.41 |
| Lrrfip1 | SE | chr1(+): 91108579-91108672; 91110354 -91110447 | 0.48 | 0.19 |
| Lrrfip2 | SE | chr9(+): 111179176-111179221 | 0.46 | 0.44 |
| Coro6 | SE | chr11(+): 77467749-77467869 | 0.78 | 0.35 |
| Itga7 | SE | chr10(+): 128956610-128956723 | 0.27 | 0.25 |
| Rock2 | SE | chr12(+): 16973439-16973610 | 0.44 | 0.39 |
| Sorbs1 | SE | chr19(-): 40361428-40361503 | 0.53 | 0.42 |
| Taf12 | SE | chr4(+): 132281993-132282078 | 0.33 | 0.25 |
| Mef2d | MXE | chr3(+): 88158033-88158171; 88158220-88158355 | 0.47 | 0.15 |
| Ppp1r12a | SE | chr10(+): 108248955-108249069 | 0.43 | 0.49 |

| | | | | |
|---|---|---|---|---|
| Cobl | SE | chr11(-): 12373328-12373373 | 0.53 | 0.23 |
| Usp28 | SE | chr9(+): 49032508-49032688 | 0.62 | 0.22 |
| Kif13a | SE | chr13(-): 46808156-46808276 | 0.23 | 0.28 |
| Palld | SE | chr8(-): 61514987-61515034 | 0.24 | 0.24 |
| Phtf2 | SE | chr5(-): 20812940-20812993 | 0.39 | 0.21 |
| Usp25 | SE | chr16(+): 77097648-77097762 | 0.33 | 0.28 |
| Bnip3l | SE | chr14(-): 66988885-66988941 | 0.37 | 0.2 |
| Pdlim5 | A3SS | chr3(-): 142312122-142312541 | 0.23 | 0.64 |
| Slc25a3 | MXE | chr10(-): 91121921-91122043; 91122206-91122331 | 0.57 | 0.21 |
| Pdlim3 | SE | chr8(+): 45908468-45908656 | 0.52 | 0.2 |

**Legend**: Genes abnormally spliced in skeletal muslcle in response to deletion of Rbm24 are compared with genes alternatively spliced during myoblast differentiation to identify potential alternative splicing events which are involved in myogenic differentiation regulation. The loci of alternative exons in genome (GRCm38/mm10) are shown. Abbreviations: A3SS, alternative 3' splice site; MXE, mutually exclusive exon; SE, skipped exon. C2C12 Differ ΔPSI[#]: Inclusion level difference (absolute value) of each alternative exon during C2C12 differentiation. PSI, percent spliced in. UKO mice ΔIncLevelDiffer[#]: Inclusion level difference (absolute value) of each alternative exon in skeletal muscle of Rbm24 knockout mice.

**Table S5. Rbm24 and Rbfox2 regulate a common set of AS events.**

| Gene Symbol | Splicing Type | Alternative cassette loci | Rbfox2 KD ΔPSI[#] | Rbm24 KO ΔIncLevel Difference[#] |
|---|---|---|---|---|
| Ubr3 | SE | chr2(+): 69971401-69971434 | 0.24 | 0.53 |
| Fxr1 | SE | chr3(+): 34064973-34065054; 34068160-34068252 | 0.33 | 0.25 |
| Txnl1 | SE | chr18(-): 63665651-63665694 | 0.28 | 0.41 |
| Lrrfip1 | SE | chr1(+): 91108579-91108672; 91110354 -91110447 | 0.23 | 0.24 |
| Coro6 | SE | chr11(+): 77467749-77467869 | 0.21 | 0.26 |
| Itga7 | SE | chr10(+):128956610-128956723 | 0.26 | 0.25 |
| Rock2 | SE | chr12(+):16973439-16973610 | 0.4 | 0.39 |
| Sorbs1 | SE | chr19(-): 40361041-40361104 | 0.44 | 0.48 |
| Ccdc85c | SE | chr12(-): 108216786-108216825 | 0.22 | 0.23 |
| Clasp1 | SE | chr1(+): 118547655-118547658 | 0.39 | 0.47 |
| Ranbp2 | SE | chr10(+): 58481318-58481396 | 0.24 | 0.42 |
| Taf12 | SE | chr4(+):132281993-132282078 | 0.31 | 0.25 |
| Mef2d | MXE | chr3(+): 88158033-88158171; 88158220-88158355 | 0.39 | 0.15 |
| Cobl | SE | chr11(-): 12373328-12373373 | 0.50 | 0.23 |
| Usp28 | SE | chr9(+): 49032508-49032688 | 0.45 | 0.32 |
| Kif13a | SE | chr13(-): 46808156-46808276 | 0.22 | 0.28 |
| Palld | SE | chr8(-): 61514987-61515034 | 0.23 | 0.24 |
| Phtf2 | SE | chr5(-): 20812940-20812993 | 0.39 | 0.21 |
| Usp25 | SE | chr16(+): 77097648-77097762 | 0.26 | 0.28 |
| Bnip3l | SE | chr14(-): 66988899-66988941 | 0.31 | 0.20 |
| Pdlim5 | A3SS | chr3(-): 142312122-142312541 | 0.21 | 0.35 |
| Slc25a3 | MXE | chr10(-): 91121921-91122043; 91122206-91122331 | 0.23 | 0.21 |
| Pdlim3 | SE | chr8(+): 45908468-45908656 | 0.35 | 0.20 |

#: the absolute value of ΔPSI or ΔIncLevelDifference.

**Legend**: We compared AS events in response to Rbm24 in adult skeletal muscle with AS events in response to Rbfox2 during myogenesis (C2C12 differentiation). In total, 23 AS events were identified to be regulated by both Rbm24 and Rbfox2. Abbreviations: AS: alternative splicing; SE: skipped exons; MXE: mutually exclusive exons. PSI: percent spliced in; IncLevelDifference: inclusion level difference.

**Table S6. Primer list.**

| Clone primer | Sequence 5'-3' |
|---|---|
| Lrrfip1 Mini-F-*Kpn*I | acttaagcttggtaccGACAGAAATATGCCACCGAGCT |
| Lrrfip1 Mini-R-*Xba*I | gtttaaacgggccctctagaCTAGGGTCCCCTCCCCGGCCGA |
| Mef2d Mini-F-*Kpn*I | acttaagcttggtaccGATTTCCATCAACCGTGGCTA |
| Mef2d Mini-R-*Xba*I | gtttaaacgggccctctagaTACACATACAGAAACGCTGCAA |
| Rock2 Mini-F-*Kpn*I | acttaagcttggtaccAATTATTTTCTTATCTTTGCAG |
| Rock2 Mini-R-*Xba*I | gtttaaacgggccctctagaTGTCTGAAAGTATAGGCATGTC |
| Plvcs-Mef2d-F-*Xba*I | ctagtctagaATGGGGAGGAAAAAGATTCAGAT |
| Plvcs-Mef2d-R-*Mlu*I | cgacgcgtTCACTTTAATGTCCAAGTATCCAG |
| Pxj40-Rbm24-F-*Xho*I | ctcgagATGCACACGACCCAGAAGGAC |
| Pxj40-Rbm24-R-*Kpn*I | ggtaccCTATTGCATTCGGTCTGTCTGC |

| shRNA primer | Sequence 5'-3' |
|---|---|
| Pll3.7-mshRbm24-F-2014 | Tagctgctgcaggctatgtaac TTCAAGAGA gttacatagcctgcagcagctTTTTTTC |
| Pll3.7-mshRbm24-R-2014 | TCGAGAAAAAAagctgctgcaggctatgtaacTCTCTTGAAgttacatagcctgcagcagctA |
| Pll3.7-mshCTL-F | TgtagcgcggtgtattatacTTCAAGAGAgtataatacaccgcgctacTTTTTTC |
| Pll3.7-mshCTL-F | TCGAGAAAAAAgtagcgcggtgtattatacTCTCTTGAAgtataatacaccgcgctacA |

| qPCR primer | Sequence 5'-3' |
|---|---|
| cTnT-F | GCAGAAGAGGTTGGTCCTGATG |
| cTnT-R | CACCAAGTTGGGCATGAAGAG |
| Tmem8c-F | ATCGCTACCAAGAGGCGTT |
| Tmem8c-R | CACAGCACAGACAAACCAGG |
| eMHC-F | TCTAGCCGGATGGTGGTCC |
| eMHC-R | GAATTGTCAGGAGCCACGAAA |
| Mmp13-F | TTTGAGAACACGGGGAAGA |
| Mmp13-R | ACTTTGTTGCCAATTCCAGG |
| Col12a1-F | ATACCATACAAAGGCGGCAAC |
| Col12a1-R | CGTCCGTGATAATAATTGCCACT |
| Pax7-F | TGGGGTCTTCATCAACGGTC |
| Pax7-R | ATCGGCACAGAATCTTGGAGA |
| Myog-F | GCAGGCTCAAGAAAGTGAATGA |
| Myog-R | TAGGCGCTCAATGTACTGGAT |
| Myod1-F | ATGGATTACAGCGGCCCC |
| Myod1-R | TGTGGAGATGCGCTCCACTA |
| GAPDH-F | CAATCTGTCCGTCGTGGATC |
| GAPDH-R | CCTGCTTCACCACCTTCTTG |
| Rbm24-F | ACTTGGGAGCAAAACCAAGA |
| Rbm24-R | GAAGCTGTTGAACGCCAAA |
| Rbfox2-F | ACAACAACTCCTGACGCAAT |
| Rbfox2-R | GCTACTCTGTTCTCCATGAGGC |
| hRbm24-F | CCAAGGATCATGCAACCAG |

| | |
|---|---|
| hRbm24-R | GCAGGTATCCCGAAAGGTCT |
| hHprt-F | CTGAGGATTTGGAAAGGGTG |
| hHprt-R | TTATGTCCCCTGTTGACTGG |
| Ppp3ca-constitutive-F | CTGTATGGATGCCTTCGACT |
| Ppp3ca-constitutive-R | AGCCTCTGACTGTGTTGTGA |
| Prkca-constitutive-F | CAAATGGGCTTTCGGATCCTT |
| Prkca-constitutive-R | CCGGCATCTTCATTAGCTCT |
| Itgb1-constitutive-F | GCTCCCACTTCAATCTCACC |
| Itgb1-constitutive-R | AAGAACAATTCCAGCAACCAC |
| Pdlim5-constitutive-F | ATTTAACTGTGCTCATTGCAAA |
| Pdlim5-constitutive-R | ATCATGCCAAGTGTATCCCA |
| Rock2-constitutive-F | GGCATCACAGAAGGTTTATGCAA |
| Rock2-constitutive-R | ACATCTCTGTGTATTAAGCCCAT |
| Naca-constitutive-F | TCAGTACCAGAGCTCGAGGA |
| Naca-constitutive-R | TGCCTTCTTCTCACTTCGACT |
| Mef2d-constitutive-F | TGACATCATCCCTTACGGACCC |
| Mef2d-constitutive-R | ATGACCCGCAGATCAGGC |
| Lrrfip1-constitutive-F | CCAGCTAGACAATGAGAAGACCAA |
| Lrrfip1-constitutive-R | TCTTTCACTTCGGCAAACTGGA |

| **Alternative splicing primer** | **Sequence 5'-3'** |
|---|---|
| Pdlim5-F | CCAAGAGTGAGCCGGTT |
| Pdlim5-R | TGTCCTCAATCAGCCGTTT |
| Itga7-F | CCTTGCTGGTACTGCT |
| Itga7-R | CCATATCTCAACGTGATGC |
| Clasp2-F | GAGCCAAGCTTTCTACACC |
| Clasp2-R | GACTCGTTGAGCACCA |
| Sorbs1-F | TTGTACCAGTCTTTCGATCGC |
| Sorbs1-R | AATATCGAGGGGAATGGACATCA |
| Rmnd1-F | GTTTCTGAGACACCCGACT |
| Rmnd1-R | AGTGGTCTTAATGTAAGCCAA |
| Cog1-F | CTGAGCATGACAAGCACAA |
| Cog1-R | AAGCTTGAATAATGAAGGTGCAG |
| Tmed2-F | GCTCCCAAAGGACAAGACA |
| Tmed2-R | CATGTACTCCTGTTCGTGCT |
| Cltc-F | ATAAATTAGATGCTTCGGAGT |
| Cltc-R | AACCATAACCAAAAGGTGC |
| Tmem65-F | GCGACTTCATCTACAGCC |
| Tmem65-R | CCATATCTCAGCTGTCCT |
| Lffrip1-F | TCCTGCAGTTCCAGTTTGCC |
| Lffrip1-R | CTTTTGTTATCTTCGTAGGGG |
| Ash2l-F | CCATTTAGGTTCCCACTAGCAG |
| Ash2l-R | AGGAGCCAAGCGTAAGCA |
| Txnl1-F | GTACTCCAGTCCAGGCAACA |

| | |
|---|---|
| Txnl1-R | AGTTTCCGAAGAGAATCAAGCA |
| Psma4-F | TGCTTGGCCATCCGGGTT |
| Psma4-R | CTGGAGAAAATATTGTGGTCCT |
| Ubr3-F | CACGAGCTCTGACGCTTT |
| Ubr3-R | AACTTCTATGTCATCAAGCCAT |
| Tmed2-F | GCTCCCAAAGGACAAGACA |
| Tmed2-R | CATGTACTCCTGTTCGTGCT |
| Cltc-F | ATAAATTAGATGCTTCGGAGT |
| Cltc-R | AACCATAACCAAAAGGTGC |
| Tmem65-F | GCGACTTCATCTACAGCC |
| Tmem65-R | CCATATCTCAGCTGTCCT |
| Lpin1-F | ATCGTATCCCAGTTCGGACA |
| Lpin1-R | TTATTCTTTGGCGTCAACCTG |
| Stim2-F | TGTCCCTGACGCACTACAGA |
| Stim2-R | ATCTTGTGGTCTACTTCGTCCA |
| Ryr1-F | CTGGACCTCAATGCCTTCG |
| Ryr1-R | CCATTGTTGTGCCCCTCG |
| Trdn-F | AAAATGAGAAAACCTACAGA |
| Trdn-R | TGCTTTTTTGAGTTTTTCAC |
| Fxr1-F | ACCACAGTACTAACCGTCGT |
| Fxr1-R | AGTTGGACCATTTATTGCCTT |
| Ank2-F | ATGTTCCTGAGACAATGACGGAG |
| Ank2-R | CCGAAGGTAGTTCATGCCAT |
| Lrrfip1-F | TTCTGACGAAGACGAGCGCTTG |
| Lrrfip1-R | TGCCAGATCTTCTACTTAGGGAC |
| R3hdm1-F | AAAACTATGGGAAGATTTCGG |
| R3hdm1-R | GTTTCATCTTTTGAGGGCTT |
| Coro6-F | GAGCCTGGACGACATACACC |
| Coro6-R | GCCACACAAGTAGACGATGC |
| Ppp1r12a-F | TACTTCCAGCACGCAGGCA |
| Ppp1r12a-R | TCTTTCGAAGCCCTAACCTCC |
| Rock2-F | CATTGAACAGCTGCGGTCAC |
| Rock2-R | GCACAGGCAATGACAACCA |
| Ranbp2-F | ATCTTCTGATGGCAAAGTCAA |
| Ranbp2-R | GCCAGGCCTATTCTTATAACAAA |
| R3hdm2-F | GGCCTTCTTCCTTGTACTGC |
| R3hdm2-R | CGGCTAAGGCTCATTTGTCC |
| Ppp3cb-F | ACAGAAGGTGAAGACCAGTT |
| Ppp3cb-R | CTTGCCAATTGCTCGGAT |
| Ppp3ca-F | CCTGACCCCAACTGGCAT |
| Ppp3ca-R | CATCCTCTCGTTAATTCGGTCT |
| Prkca-F | TGCCTTCTTCAGGAGAATCG |
| Prkca-R | TTTTGAGTTTCATACTGCACT |
| Hprt-F | TGATGAACCAGGTTATGACC |

| | |
|---|---|
| Hprt-R | GTTGAGAGATCATCTCCACC |
| Mef2d-1-F | TGACCTTCACCAAGCGGAA |
| Mef2d-1-R | TGTCACAGCCGTTGAAACCC |
| Mef2d-2-F | TGACCTTCACCAAGCGGAA |
| Mef2d-2-R | ATCATCTTATCAAACTCCTCGTCT |
| Cobl-F | AACTACCTGAGAACGCAGA |
| Cobl-R | CTGTCTCATCATTGCCAAG |
| Bnip3l-F | AGACACCCTAAACGTGCT |
| Bnip3l-R | CTTCACAGGCCACACGAA |
| Usp25-F | AGCAGCCATCAAGAAGTGAC |
| Usp25-R | GTTTGGCTTGGGCAACTTTC |
| Usp28-F | TCCGATGCTTGTCTTCTGAG |
| Usp28-R | GACAAGAACATGCTGAAGGC |

| **Genotyping primer** | **Sequence 5'-3'** |
|---|---|
| Mdx-F | AACTCATCAAATATGCGTGTTAGTG |
| Mdx-mutant-R | GTCACTCAGATAGTTGAAGCCATTTAA |
| Mdx-wt-R | GTCACTCAGATAGTTGAAGCCATTTAG |
| Rbm24-FRT-TF2 | CATGGATGTTGGTGGTGCTGTC |
| Rbm24-FRT-TR2 | GACCTGGCGGTAGACAGACATTG |
| Cre-F | ATTTGCCTGCATTACCGGTC |
| Cre-R | ATCAACGTTTTCTTTTCGG |

**Table S7. Annotation of alternative exon loci in each gel image in Figures (6E, 7B, 7C, 7D, 7F, S3B and S4B, respectively).**

| gene symbol | chr | strand | alternative exon loci |
|---|---|---|---|
| Ppp3ca | chr3 | + | 136932011-136932040 |
| Prkca | chr11 | - | 107945556-107945604 |
| Rock2 | chr12 | + | 16982650-16982747 |
| Itgb1 | chr8 | + | 128726982-128727049 |
| Pdlim5 | chr3 | - | 142306284-142306298; 142312122-142312541 |
| Tmed2 | chr5 | + | 124543486-124543507 |
| Cltc | chr11 | - | 86696175-86696213 |
| Ranbp2 | chr10 | + | 58481318-58481396 |
| Mef2d | chr3 | + | 88158033-88158171; 88158220-88158355 |
| Naca | chr10 | + | 128039170-128045086 |
| Lrrfip1 | chr1 | + | 91108579-91108672; 91110354-91110447 |
| Fxr1 | chr3 | + | 34064973-34065054; 34068160-34068252 |
| Itga7 | chr10 | + | 128956610-128956723 |
| Ppp1r12a | chr10 | + | 108248955-108249069 |
| Sorbs1 | chr19 | - | 40361041-40361104 |
| Clasp2 | chr9 | + | 113862436-113862462 |
| Usp25 | chr16 | + | 77097648-77097762 |
| Usp28 | chr9 | + | 49032508-49032688 |
| Cog1 | chr11 | + | 113661658-113661693 |
| Ubr3 | chr2 | + | 69971401-69971434 |
| Tmem65 | chr15 | + | 58807077-58807158 |

**Legend**: The loci of alternative exons in each Figure are annotated. Mouse genome, GRCm38/mm10, is referred.

## Figure S1

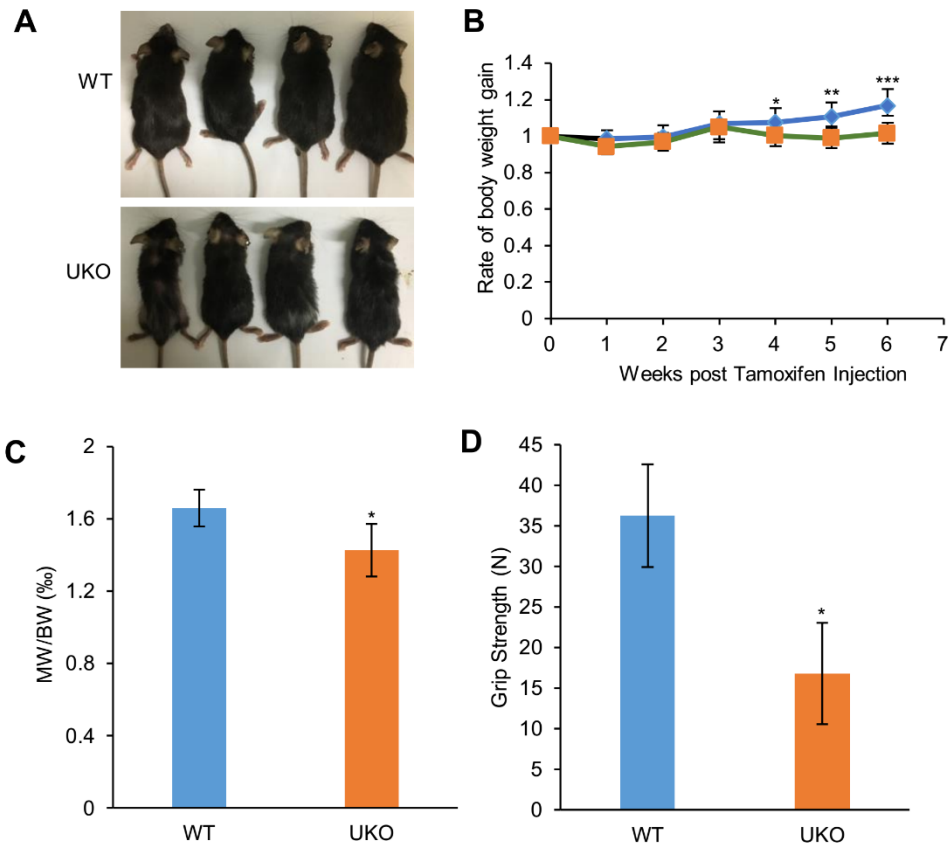


**Figure S1. Inducible deletion of Rbm24 leads to a loss of muscle mass and strength, related to Figure 1.**

(A) Visual comparison of the body sizes between the WT and UKO mice 1 month after tamoxifen injection. UKO mice showed leaner and smaller body sizes compared with the WT littermates. (B) Statistical analysis of BW. The 8-week-old male mice were administrated tamoxifen to induce Rbm24 knockout, and body weight was examined every week. At 4 weeks after tamoxifen administration, the BW began to decrease significantly in the UKO mice. The BW was normalized to the original weight prior to tamoxifen treatment. Data are presented as mean ± SEM, n = 14-16, $*P < 0.05$, $**P < 0.01$, $***P < 0.001$, unpaired t-test. (C) Statistical analysis of TA MW. Approximately 2 months after tamoxifen injection, TA MW was significantly reduced in the UKO mice. The TA MW was normalized to BW. Data are presented as mean ± SEM, n = 8, $*P < 0.05$, unpaired t-test. (D) Muscle strength assay. Muscle strength was assessed using an inverted cage flip test. Muscle strength is expressed in terms of physical impulse which is calculated as time (s) ∗ body mass (g) ∗ 0.00980665 N/g. A total of 9 mice in each group were tested in triplicate. Data are presented as mean ± SEM, n = 9, $*P < 0.05$, unpaired t-test. Abbreviations: BW: body weight; MW: muscle weight; TA muscle: tibialis anterior muscle; UKO: UBC-CreERT2, $Rbm24^{loxP/loxP}$.

## Figure S2

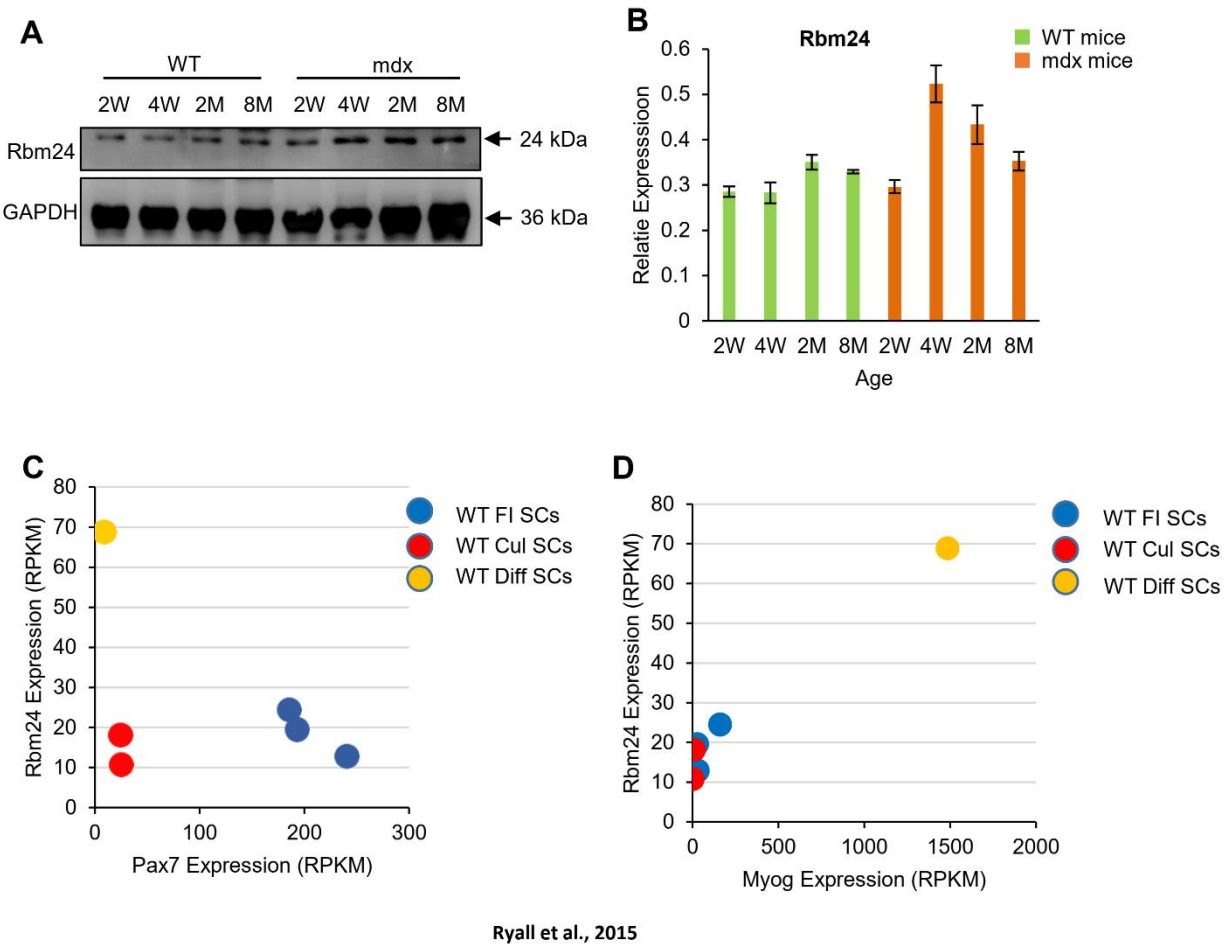


**Figure S2. Analysis of Rbm24 expression in mdx mice and satellite cells, related to Figure 2.**

(A) Rbm24 expression in the TA muscle of mdx mice compared with WT mice of the same age. Dynamic Rbm24 expression was assessed in mdx mice and WT mice (C57BL/6) during development using western blotting. GAPDH was used as the loading control. (B) Histogram showing the expression levels of Rbm24 in (A). Expression of Rbm24 was normalized to GAPDH. Data are presented as mean ± SEM from three independent experiments. (C) Co-expression analysis of Rbm24 with Pax7 in satellite cells of different statuses. (D) Co-expression analysis of Rbm24 with Myogenin in satellite cells of different statuses. Gene expression data were from the RNA-Seq results of mice satellite cells. Gene expression levels are presented as RPKM values. Each point indicates the Rbm24 expression in satellite cells of different statuses, indicated as the differential expression of the marker genes Pax7 or Myogenin. Abbreviations: RPKM: reads per kilobase per million mapped reads; TA muscle: tibialis anterior muscle; WT: wild type; WT FI SCs: wild type freshly isolated satellite cells (quiescent satellite cells); WT Cul SCs: wild type cultured satellite cells (activated satellite cells); WT Diff SCs: wild type differentiated satellite cells (differentiated satellite cells).

**Figure S3**

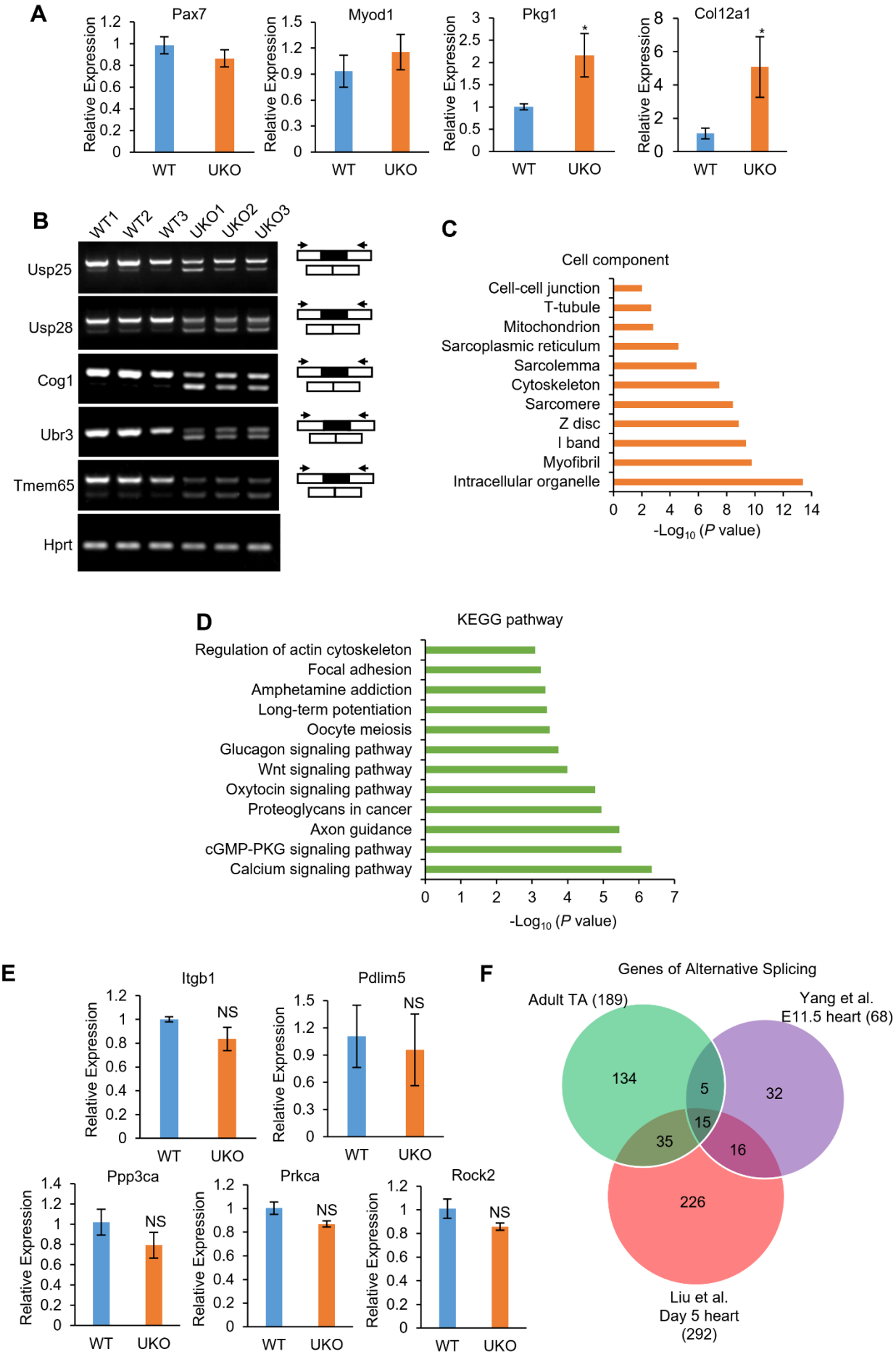
A
Pax7
Myod1
Pkg1
Col12a1
Relative Expression
WT
UKO
B
WT1
WT2
WT3
UKO1
UKO2
UKO3
Usp25
Usp28
Cog1
Ubr3
Tmem65
Hprt
C
Cell component
Cell-cell junction
T-tubule
Mitochondrion
Sarcoplasmic reticulum
Sarcolemma
Cytoskeleton
Sarcomere
Z disc
I band
Myofibril
Intracellular organelle
-Log10 (P value)
D
KEGG pathway
Regulation of actin cytoskeleton
Focal adhesion
Amphetamine addiction
Long-term potentiation
Oocyte meiosis
Glucagon signaling pathway
Wnt signaling pathway
Oxytocin signaling pathway
Proteoglycans in cancer
Axon guidance
cGMP-PKG signaling pathway
Calcium signaling pathway
-Log10 (P value)
E
Itgb1
Pdlim5
Ppp3ca
Prkca
Rock2
NS
Relative Expression
WT
UKO
F
Genes of Alternative Splicing
Adult TA (189)
Yang et al.
E11.5 heart (68)
Liu et al.
Day 5 heart
(292)
134
5
32
15
35
16
226

**Figure S3. Analysis of RNA-Seq results, related to Figure 6.**

(A) qPCR analysis of differentially expressed genes. Total RNAs were extracted from the TA muscle of 2-month-old mice 3 days after tamoxifen injection, and were reverse transcribed (n = 3 per group). Data are presented as mean ± SEM. *$P$ < 0.05, unpaired t-test. (B) RT-PCR analysis of AS events based on RNA-Seq. Total RNAs were extracted from the TA muscle of 2-month-old mice 3 days after tamoxifen injection for further AS assay. The primers are indicated by the arrows. White boxes, flanking constitutive exons; gray and black boxes, alternative exons. (C) GO analysis (cell component analysis) showing the enrichment of genes involved in muscle cell structures. (D) KEGG pathway analysis of alternatively spliced genes. Multiple pathways essential for muscle development and muscle function were significantly enriched, such as the calcium signaling pathway and Wnt signaling pathway. (E) qPCR to analyze the expression of Ppp3ca, Prkca, Rock2, Itgb1, and Pdlim5. Total RNAs were extracted from TA muscle of adult mice 3 days after tamoxifen treatment and then reverse transcribed (n = 3 per group). Data are presented as mean ± SEM, NS, not significant. (F) A comparison of the Rbm24-regulated genes in adult TA muscle, E11.5 heart and Day 5 heart. Abbreviations: AS: alternative splicing; Day 5 heart: mice heart at 5 days after birth; E11.5 heart: embryonic heart at 11.5 days post fertilization; GO: Gene Ontology; KEGG: Kyoto Encyclopedia of Genes and Genomes; qRT-PCR: quantitative real-time polymerase chain reaction; TA: tibialis anterior muscle.

## Figure S4

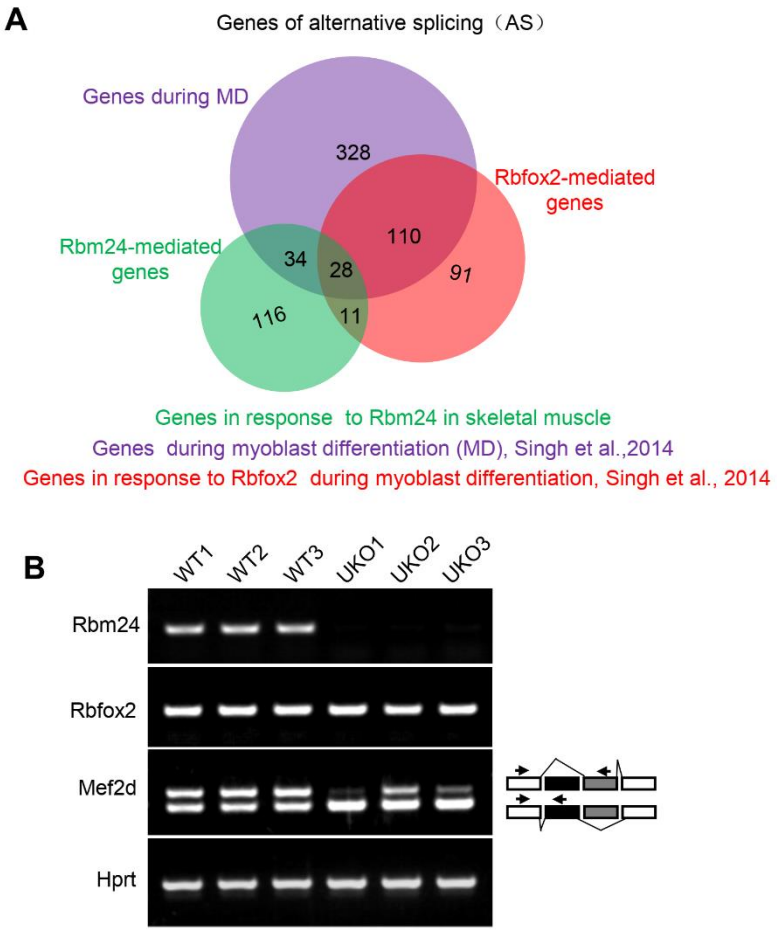


**Figure S4. Rbm24 regulates AS events associated with myogenic differentiation, related to Figure 7.**

(A) A comparison between genes that were alternatively spliced in the skeletal muscle of Rbm24 knockout mice with genes that were alternatively spliced during C2C12 differentiation with or without Rbfox2 knockdown. There are 62 Rbm24-regulated genes found to be alternatively spliced during C2C12 differentiation. There are 39 genes found to be alternatively spliced in an Rbm24- and Rbfox2-dependent manner. Among these 39 genes, 28 genes were found to be alternatively spliced during myoblast differentiation. (B) RT-PCR analysis of the expression levels of Rbm24 and Rbfox2 and AS of Mef2d in TA muscle of WT and Rbm24 knockout mice. Rbfox2 expression was not affected in Rbm24 knockout mice due to deletion of Rbm24. White box, constitutive exons; gray and black box, alternative exons. The primers used for RT-PCR are indicated by arrows. Hprt was used as loading control. Abbreviations: AS: alternative splicing; RT-PCR: reverse transcription-polymerase chain reaction; TA muscle: tibialis anterior muscle; WT: wild type.