

**Supplemental Table 4. Proteins with significantly altered phosphorylation in *Obscn-Δlg58/59* atria at 12-months.**

| UniProt Accession | Gene           | Protein Name                                                         | Site                                  | Fold Change | P-value  |
|-------------------|----------------|----------------------------------------------------------------------|---------------------------------------|-------------|----------|
| Q3UHIJ0           | <i>AAK1</i>    | AP2 associated kinase 1                                              | Ser/Tyr <sub>10-37</sub>              | 2.27        | 1.03E-02 |
| Q9QYC0            | <i>ADD1</i>    | Adducin 1 (alpha)                                                    | Thr614;<br>Ser/Thr <sub>598-629</sub> | 2.82        | 2.26E-03 |
| O54774            | <i>AP3D1</i>   | Adaptor-related protein complex 3, delta 1 subunit                   | Ser/Thr <sub>859-895</sub>            | 4.01        | 2.50E-04 |
| O35841            | <i>API5</i>    | Apoptosis inhibitor 5                                                | Ser464                                | -2.43       | 4.37E-02 |
| Q9WV35            | <i>APOBEC2</i> | Apolipoprotein B mRNA editing enzyme, catalytic polypeptide 2        | Ser15                                 | 3.86        | 2.36E-02 |
| O55143            | <i>ATP2A2</i>  | ATPase, Ca <sup>++</sup> transporting, cardiac muscle, slow twitch 2 | Ser/Thr/Tyr <sub>372-397</sub>        | -3.43       | 7.80E-03 |
| Q6PHZ2            | <i>CAMK2D</i>  | Calcium/calmodulin-dependent protein kinase II, delta                | Ser/Thr <sub>323-344</sub>            | 2.31        | 3.25E-02 |
| Q6PHZ2            | <i>CAMK2D</i>  | Calcium/calmodulin-dependent protein kinase II, delta                | Thr331                                | 2.57        | 9.26E-03 |
| P51125            | <i>CAST</i>    | Calpastatin                                                          | Ser219                                | -4.32       | 1.20E-02 |
| O54724            | <i>CAVIN1</i>  | Caveolae associated 1                                                | Ser204; Ser205                        | 3.22        | 2.22E-02 |
| Q63918            | <i>CAVIN2</i>  | Caveolae associated 2                                                | Ser204;<br>Ser/Thr <sub>192-227</sub> | -6.29       | 4.03E-03 |
| Q63918            | <i>CAVIN2</i>  | Caveolae associated 2                                                | Ser359                                | 3.14        | 1.74E-03 |
| Q63918            | <i>CAVIN2</i>  | Caveolae associated 2                                                | Ser218;<br>Ser/Thr <sub>192-222</sub> | 3.78        | 3.75E-07 |
| Q63918            | <i>CAVIN2</i>  | Caveolae associated 2                                                | Ser363                                | 13.57       | 1.11E-05 |
| E9QLJ0            | <i>CMYA5</i>   | Cardiomyopathy associated 5 (myospryn)                               | Ser155                                | -2.17       | 3.27E-04 |
| E9QLJ0            | <i>CMYA5</i>   | Cardiomyopathy associated 5 (myospryn)                               | Ser705                                | 2.31        | 4.36E-02 |
| Q60598            | <i>CTTN</i>    | Cortactin                                                            | Thr401;<br>Ser405; Ser407             | -5.94       | 4.38E-06 |
| P11531            | <i>DMD</i>     | Dystrophin, muscular dystrophy                                       | Ser/Thr <sub>3624-3664</sub>          | -3.56       | 3.08E-03 |
| Q9WV69            | <i>DMTN</i>    | Dematin actin binding protein                                        | Ser226                                | 2.98        | 2.60E-02 |
| E9QP49            | <i>EHBP1L1</i> | EH domain binding protein 1-like 1                                   | Thr164*                               | 2.45        | 1.27E-03 |
| Q61554            | <i>FBNI</i>    | Fibrillin 1                                                          | Ser2704                               | -2.81       | 1.05E-02 |
| Q61554            | <i>FBNI</i>    | Fibrillin 1                                                          | Ser2705                               | 3.40        | 6.44E-05 |
| Q9DB70            | <i>FUNDC1</i>  | FUN14 domain containing 1                                            | Ser13                                 | -9.45       | 1.20E-03 |

|            |                 |                                                               |                            |       |          |
|------------|-----------------|---------------------------------------------------------------|----------------------------|-------|----------|
| Q6P5B5     | <i>FXR2</i>     | Fragile X mental retardation, autosomal homolog 2             | Ser535                     | -3.56 | 2.83E-05 |
| P23242     | <i>GJA1</i>     | Gap junction protein, alpha 1 (connexin-43)                   | Ser/Thr <sub>320-345</sub> | -2.97 | 2.21E-02 |
| P23242     | <i>GJA1</i>     | Gap junction protein, alpha 1 (connexin-43)                   | Ser325; Thr326             | 8.22  | 4.17E-02 |
| Q9JLM9     | <i>GRB14</i>    | Growth factor receptor bound protein 14                       | Ser373                     | 2.34  | 2.41E-03 |
| Q9Z1E4     | <i>GYS1</i>     | Glycogen synthase 1, muscle                                   | Ser728                     | -2.49 | 1.47E-02 |
| A0A0R4J008 | <i>HDAC2</i>    | Histone deacetylase 2                                         | Ser394                     | -6.24 | 3.15E-03 |
| P18608     | <i>HMGNI</i>    | High mobility group nucleosomal binding domain 1              | Ser87                      | 2.38  | 3.93E-02 |
| Q8VDM6     | <i>HNRNPUL1</i> | Heterogeneous nuclear ribonucleoprotein U-like 1              | Ser721                     | -2.27 | 2.17E-05 |
| Q3TEA8     | <i>HP1BP3</i>   | Heterochromatin protein 1, binding protein 3                  | Thr85                      | -2.28 | 4.75E-02 |
| G5E8J6     | <i>HRC</i>      | Histidine rich calcium binding protein                        | Ser272                     | -2.66 | 5.28E-03 |
| Q3U2G2     | <i>HSPA4</i>    | Heat shock protein 4 (70 kDa)                                 | Thr540                     | -3.87 | 6.20E-05 |
| E9Q0J5     | <i>KIF21A</i>   | Kinesin family member 21A                                     | Ser/Thr <sub>853-883</sub> | 2.43  | 8.82E-03 |
| Q9QXD8     | <i>LIMD1</i>    | LIM domains containing 1                                      | Ser417*                    | -2.30 | 1.08E-02 |
| P63085     | <i>MAPK1</i>    | Mitogen-activated protein kinase 1                            | Thr183; Thr188             | 2.35  | 2.03E-02 |
| P47811     | <i>MAPK14</i>   | Mitogen-activated protein kinase 14                           | Thr185                     | -2.43 | 2.55E-03 |
| Q3UIK0     | <i>MYBPC3</i>   | Myosin binding protein C, cardiac                             | Ser268*                    | -2.53 | 3.92E-03 |
| Q9QVP4     | <i>MYL7</i>     | Myosin, light polypeptide 7, regulatory                       | Ser23                      | -2.71 | 2.89E-02 |
| Q3UIZ8     | <i>MYLK3</i>    | Myosin light chain kinase 3                                   | Ser155                     | -5.92 | 2.16E-02 |
| Q9JJW5     | <i>MYOZ2</i>    | Myozenin 2                                                    | Thr107                     | -4.09 | 1.47E-02 |
| Q80XU3     | <i>NUCKS1</i>   | Nuclear casein kinase and cyclin-dependent kinase substrate 1 | Ser79                      | 2.85  | 2.04E-02 |
| Q80XU3     | <i>NUCKS1</i>   | Nuclear casein kinase and cyclin-dependent kinase substrate 1 | Ser79                      | 2.91  | 1.75E-02 |
| Q5QNNQ6    | <i>OSPB2</i>    | Oxysterol binding protein 2                                   | Ser281                     | 2.87  | 5.50E-04 |

|            |                 |                                                              |                            |       |          |
|------------|-----------------|--------------------------------------------------------------|----------------------------|-------|----------|
| Q9ET54     | <i>PALLD</i>    | Palladin, cytoskeletal associated protein                    | Ser1009                    | 12.90 | 5.09E-08 |
| P49586     | <i>PCYT1A</i>   | Phosphate cytidylyltransferase 1, choline, alpha isoform     | Ser/Thr <sub>318-328</sub> | 2.72  | 1.53E-03 |
| Q80UU9     | <i>PGRMC2</i>   | Progesterone receptor membrane component 2                   | Thr205                     | 2.48  | 1.08E-02 |
| Q9QXS1     | <i>PLEC</i>     | Plectin                                                      | Ser4415                    | 2.84  | 5.83E-04 |
| Q8C8U0     | <i>PPFIBP1</i>  | PTPRF interacting protein, binding protein 1 (liprin beta 1) | Ser541                     | 3.73  | 9.15E-04 |
| Q8BXN7     | <i>PPMIK</i>    | Protein phosphatase 1K, (PP2C domain containing)             | Ser248                     | -2.83 | 1.39E-04 |
| Q7TSI3     | <i>PPP6R1</i>   | Protein phosphatase 6, regulatory subunit 1                  | Ser662                     | -2.84 | 7.67E-03 |
| Q5U3K5     | <i>RABL6</i>    | RAB, member RAS oncogene family-like 6                       | Ser594; Thr597             | -3.75 | 7.15E-07 |
| A0A1W2P712 | <i>RALGAPA1</i> | Ral GTPase activating protein, alpha subunit 1               | Ser772                     | 2.58  | 4.85E-06 |
| Q61193     | <i>RGL2</i>     | Ral guanine nucleotide dissociation stimulator-like 2        | Ser617                     | -3.33 | 7.44E-05 |
| E9Q401     | <i>RYR2</i>     | Ryanodine receptor 2, cardiac                                | Ser2810                    | 3.52  | 7.81E-04 |
| F8WJE0     | <i>SAMHD1</i>   | SAM domain and HD domain, 1                                  | Thr52                      | 4.47  | 1.53E-05 |
| Q64213     | <i>SF1</i>      | Splicing factor 1                                            | Ser80                      | 2.26  | 1.65E-02 |
| Q62417     | <i>SORBS1</i>   | Sorbin and SH3 domain containing 1                           | Thr409                     | 2.97  | 3.70E-03 |
| E9QQ25     | <i>SPEG</i>     | SPEG complex locus                                           | Ser2200*                   | -7.06 | 3.89E-03 |
| E9QQ25     | <i>SPEG</i>     | SPEG complex locus                                           | Ser2182                    | -3.74 | 4.62E-03 |
| Q52KI8     | <i>SRRM1</i>    | Serine/arginine repetitive matrix 1                          | Thr913                     | -2.73 | 1.18E-02 |
| Q8BTI8     | <i>SRRM2</i>    | Serine/arginine repetitive matrix 2                          | Ser1216                    | -2.63 | 3.28E-05 |
| Q70IV5     | <i>SYNM</i>     | Synemin, intermediate filament protein                       | Ser1087                    | 2.77  | 7.53E-05 |
| E9Q1U2     | <i>SYNPO2</i>   | Synaptopodin 2                                               | Ser629                     | 58.93 | 1.72E-09 |
| B2RQK7     | <i>SYNPO2L</i>  | Synaptopodin 2-like                                          | Thr88*; Ser97              | 4.39  | 7.66E-03 |
| Q5SVR0     | <i>TBC1D9B</i>  | TBC1 domain family, member 9B                                | Ser/Thr <sub>411-458</sub> | -4.62 | 6.32E-03 |
| O70548     | <i>TCAP</i>     | Titin-cap                                                    | Ser161                     | -2.23 | 2.32E-02 |
| Q9ERA6     | <i>TFIP11</i>   | Tuftelin interacting protein 11                              | Ser211                     | -2.73 | 6.43E-03 |
| P24529     | <i>TH</i>       | Tyrosine hydroxylase                                         | Thr30                      | -6.58 | 1.20E-06 |
| Q61029     | <i>TMPO</i>     | Thymopoietin                                                 | Ser179                     | 2.34  | 4.24E-02 |

|        |              |                                          |                       |       |          |
|--------|--------------|------------------------------------------|-----------------------|-------|----------|
| E9Q0S6 | <i>TNSI</i>  | Tensin 1                                 | Ser1451               | -2.71 | 4.47E-02 |
| Q64511 | <i>TOP2B</i> | Topoisomerase (DNA) II<br>beta           | Ser1387               | 5.19  | 1.68E-03 |
| A2ASS6 | <i>TTN</i>   | Titin                                    | Ser33875;<br>Ser33880 | 2.34  | 9.82E-03 |
| A2ASS6 | <i>TTN</i>   | Titin                                    | Ser9459               | 4.52  | 1.25E-03 |
| A2ASS6 | <i>TTN</i>   | Titin                                    | Ser34470              | 6.20  | 1.05E-04 |
| Q64727 | <i>VCL</i>   | Vinculin                                 | Ser721                | 10.97 | 1.25E-04 |
| Q4U4S6 | <i>XIRP2</i> | Xin actin-binding repeat<br>containing 2 | Ser2031*              | -2.88 | 6.90E-04 |

Rows that contain multiple phosphorylation sites represent peptides that are doubly or triply phosphorylated. Ambiguous phosphorylation sites (with a probability <75%) are indicated by the range of amino acids corresponding to the identified peptide as a subscript. Amino acid numbering corresponds to the UniProt accession number listed with each protein. Phosphorylation sites marked with \* indicate a novel phosphorylation site not previously annotated in PhosphoSitePlus (v. 6.6.0.4.). Ser, Serine; Thr, Threonine; Tyr, Tyrosine.