**Supplementary File 2**

**2A** List of primers used for Sanger verification of the identified variants by WES.

|  |  |  |  |
| --- | --- | --- | --- |
| Primer name | Primer sequence (5’-3’) | Tm (°C) | Product length (bp) |
| CCDC146-Int8F | ATTGCTGGGTCAAACGGTAG | 57.3 | 422 |
| CCDC146-Int9R | GGCAGCAAAAACAACTTCCT  | 55.3 |
| CCDC146-Ex15F  | CAGCTGATAGAGCGGGAAGA | 59.3 | 457 |
| CCDC146-Int15R  | TCCAAGAAAAGCAGAAAATGC | 54.0 |

**2B** List of primers used for knock-out mice genotyping.

|  |  |  |  |
| --- | --- | --- | --- |
| Primer name | Primer sequence (5’-3’) | Tm (°C) | Product length (bp) |
| Ccdc146-Ex2F3 | GGGAGGAACAGGAGAAGGAG | 61.4 | 151 |
| Ccdc146-Ex2R3 | TCATGCAGACAGAGGAAAGC | 57.3 |

**2C** List of primers used for knock-in mice (HA-Tag) genotyping.

|  |  |  |  |
| --- | --- | --- | --- |
| Primer name | Primer sequence (5’-3’) | Tm (°C) | Product length (bp) |
| shCCD\_ki-F1 | ACTTGGTGGGTGTTGTCCTA | 58.49 | 149 |
| shCCD\_ki-R1 | TCCCTCCTCTTCATCTTCAGT | 57.52 |
| lgCCD\_ki-F1 | AGAAATCAGGGAGGGGTTGC | 59.67 | 504 |
| lgCCD\_ki-R1 | AATTGATGAGCCGCTCCTCC | 60.18 |