**Supplementary Table 1S.** Rare *CHD2* variants found in patients with photosensitive epilepsy.

| Position (NCBI.37) | dbSNP ID | Consequence | Non-Reference allele counts cases* | Photosensitive Epilepsy MAF | ExAC non-Finnish European MAF | NHLBI ESP MAF | 1000 Genomes MAF |
|---|---|---|---|---|---|---|---|
| 15:93482864 | rs117844037 | missense | 6 | 5.17E-03 | 7.33E-03 | 3.85E-03 | 1.40E-03 |
| 15:93487683 | rs143043614 | missense | 1 | 8.62E-04 | 3.78E-04 | 6.16E-04 | NA |
| 15:93557995 | rs139646715 | missense | 1 | 8.62E-04 | 6.68E-04 | 6.16E-04 | 9.00E-04 |
| 15:93563313 | rs61752830 | missense | 1 | 8.62E-04 | 2.90E-05 | 7.70E-05 | NA |
| 15:93567811 | rs140365508 | missense | 1 | 8.62E-04 | 1.45E-05 | NA | 5.00E-04 |
| 15:93536168 | NA | missense | 1 | 8.62E-04 | 1.45E-05 | NA | NA |
| 15:93482909 | NA | missense | 1 | 8.62E-04 | NA | NA | NA |
| 15:93487750 | NA | splice site | 1 | 8.62E-04 | NA | NA | NA |
| 15:93496808 | NA | splice site | 1 | 8.62E-04 | NA | NA | NA |
| 15:93528855 | NA | missense | 1 | 8.62E-04 | NA | NA | NA |
| 15:93540316 | NA | frameshift deletion | 1 | 8.62E-04 | NA | NA | NA |
| 15:93541780 | NA | missense | 1 | 8.62E-04 | NA | NA | NA |
| 15:93543742 | NA | missense | 1 | 8.62E-04 | NA | NA | NA |
| 15:93543767 | NA | missense | 1 | 8.62E-04 | NA | NA | NA |
| 15:93545442 | NA | frameshift insertion | 1 | 8.62E-04 | NA | NA | NA |
| 15:93545502 | NA | frameshift deletion | 1 | 8.62E-04 | NA | NA | NA |
| 15:93563244 | NA | nonsense | 1 | 8.62E-04 | NA | NA | NA |

* Seventeen rare variants were identified. Some were recurrent, totaling 22 non-reference alleles in 580 patients. A variant was defined as rare when MAF < 0.01 in the ExAC dataset of non-Finnish European samples. MAF = minor allele frequency.

**Supplementary Table 2S.** *CHD2* variants in epilepsy cases and ExAC controls by MAF thresholds.

**MAF 5-10%**

| Position (NCBI.37) | dbSNP ID | Consequence | Non-Reference allele counts controls | ExAC non-Finnish European MAF (%) | Non-Reference allele counts Epilepsy Cases | Epilepsy Cases MAF (%) |
|---|---|---|---|---|---|---|
| 15:93552488 | rs34315566 | synonymous SNV | 4378 | 6.4 | 42 | 3.6 |

**MAF 1-5%**

| Position (NCBI.37) | dbSNP ID | Consequence | Non-Reference allele counts controls | ExAC non-Finnish European MAF (%) | Non-Reference allele counts Epilepsy Cases | Epilepsy Cases MAF (%) |
|---|---|---|---|---|---|---|
| 15:93557954 | rs56227200 | nonsynonymous SNV | 2277 | 3.4 | 31 | 2.7 |
| 15:93545488 | rs61756301 | nonsynonymous SNV | 1078 | 1.6 | 24 | 2.1 |

**MAF<1%**

| Position (NCBI.37) | dbSNP ID | Consequence | Non-Reference allele counts controls | ExAC non-Finnish European MAF (%) | Non-Reference allele counts Epilepsy Cases | Epilepsy Cases MAF (%) |
|---|---|---|---|---|---|---|
| 15:93482864 | rs117844037 | missense | 505 | 0.73 | 6 | 0.52 |
| 15:93557995 | rs139646715 | missense | 46 | 0.067 | 1 | 0.086 |
| 15:93487683 | rs143043614 | missense | 26 | 0.038 | 1 | 0.086 |
| 15:93563313 | rs61752830 | missense | 2 | 0.0029 | 1 | 0.086 |
| 15:93567811 | rs140365508 | missense | 1 | 0.0015 | 1 | 0.086 |
| 15:93536168 | NA | missense | 1 | 0.0015 | 1 | 0.086 |

For specified minor allele frequency (MAF) thresholds, the dbSNP ID (rs number), consequence, and MAF in non-Finnish European datasets and the epilepsy cases (n=580) are given for each variant found in both ExAC and the cases.