

Supplementary Table 2: Primer Design. *SCN4A* DIII-PD spans regions 21, 22 and 23 whereas DIV-PD is coded within exon 26. Sequencing primers are provided then mutagenic primers.

Primer Name (Domain-exon/mutation-direction)	Primer Sequence	Purpose
DIII-ex21-f	5-agc aaa tga acc cac ata ttg gca ct-3	Sequencing
DIII-ex21-r	5-ggt caa agg gca agc tga gaa gga-3	Sequencing
DIII-ex22,23-f	5-ccc aaa tcc cac tca tgg ct-3	Sequencing
DIII-ex22,23-r	5-gct gga aag gca aag gaa gc-3	Sequencing
DIV-ex26-f	5-gca cct ttt tgt atc ctt tct gc-3	Sequencing
DIV-ex26-r	5-tgc ttc agg gca tcc att tct cca-3	Sequencing
DIII-(D1277E, A1281P)-f	5-gca gtc cac agc tgg ata cat gat ctc cat cca acc ctt-3	Mutagenesis
DIII-(D1277E, A1281P)-r	5-aag ggt tgg atg gag atc atg tat cca gct gtg gac tcc-3	Mutagenesis
DIV-(D1568N)-f	5-ttc aga agc ccg ttc cag ccg gct gac-3	Mutagenesis
DIV-(D1568N)-r	5-gtc agc cgg ctg gaa cgg gct tct gaa-3	Mutagenesis

Note: Mutagenic primers above refer to positions in the *Thamnophis* channel. The corresponding positions in the *Rattus* channel which was mutated are: D1241E, A1245P, D1532N

Note: The mutagenesis pertaining to Nav1.4^{LVNV} (I1556L, I1561V, D1568N, G1569V in *Thamnophis* corresponding to I1520L, I1525V, D1532N, G1533V in *Rattus*) was carried out by Mutagenex Inc.