**Supplemental Figure Legends**

Supplemental Figure 1. HCN colocalization with GAP43 decreases at E17, HCN expression becomes more prominent in the apical layer of the OE. A: HCN1. B: HCN2. C: HCN4. Scale bars = 25 μm.

Supplemental Figure 2. HCN subunit expression in P2 OSN axons. A-C: HCN1, HCN2 and HCN4 colocalize with GAP43 in axon bundles. A': HCN1. B': HCN2. C': HCN4. Scale bar = 20 μm.

Supplemental Figure 3. HCN channels are expressed in the same subset of OSNs as ACIII, an established member of the OSN signal transduction cascade at E15 when the axons are sorting and targeting; HCNs (green), ACIII (red). A-A": HCN1 and ACIII. B-B": HCN2 and ACIII. C-C": HCN4 and ACIII. Scale bar = 5 μm.

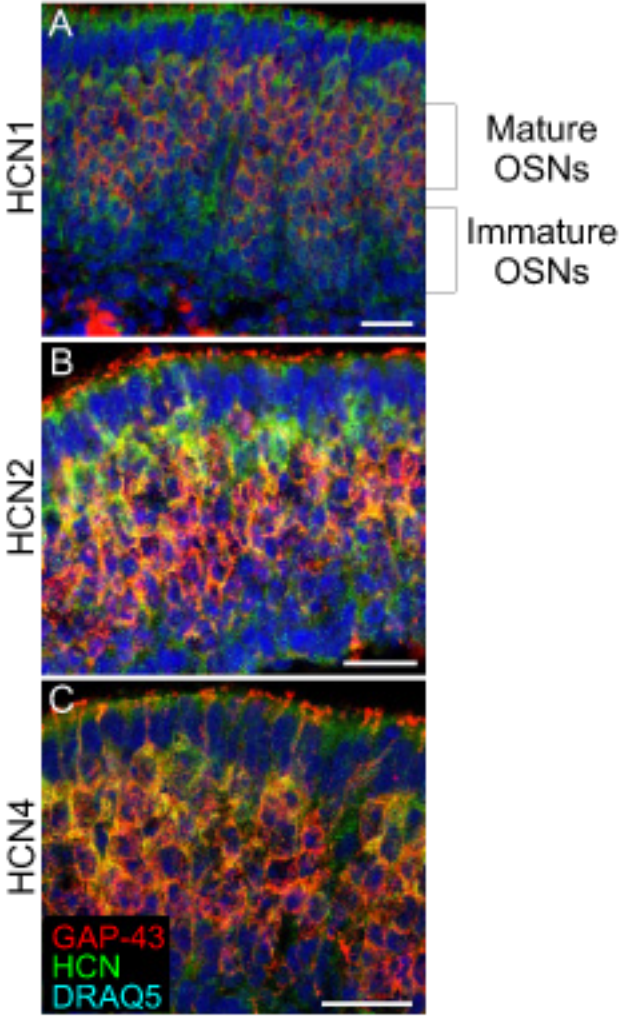
Supplemental Figure 4. Cultured dissociated cells express markers of OSNs. A, E: RGB image of cultured OSNs. B, F: NCAM. C, G: phalloidin. D: OMP. H: ACIII. Scale bar = 5 μm.

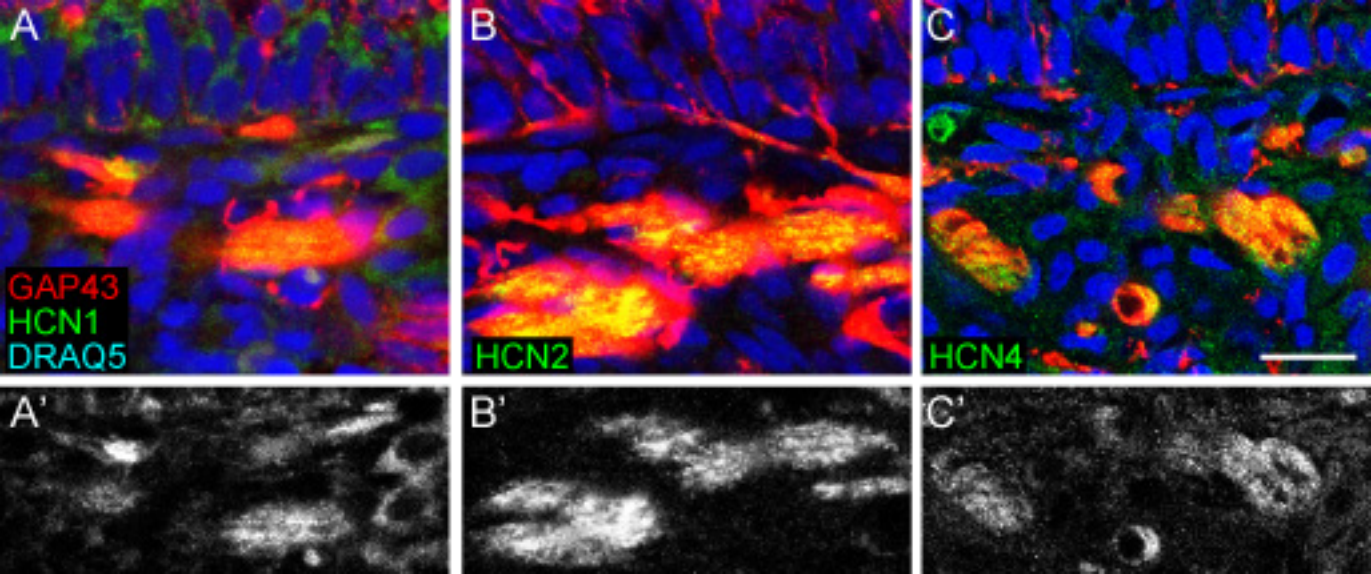
Supplemental Figure 5. At E13 axons reach the OB in WT and $HCN1^{-/-}$ mice. GAP43 labels the OSN axons in the putative nerve layer. MAP-2 labels the neurons of the putative OB. A: WT. B: $HCN1^{-/-}$. Scale bar = 50 μm.

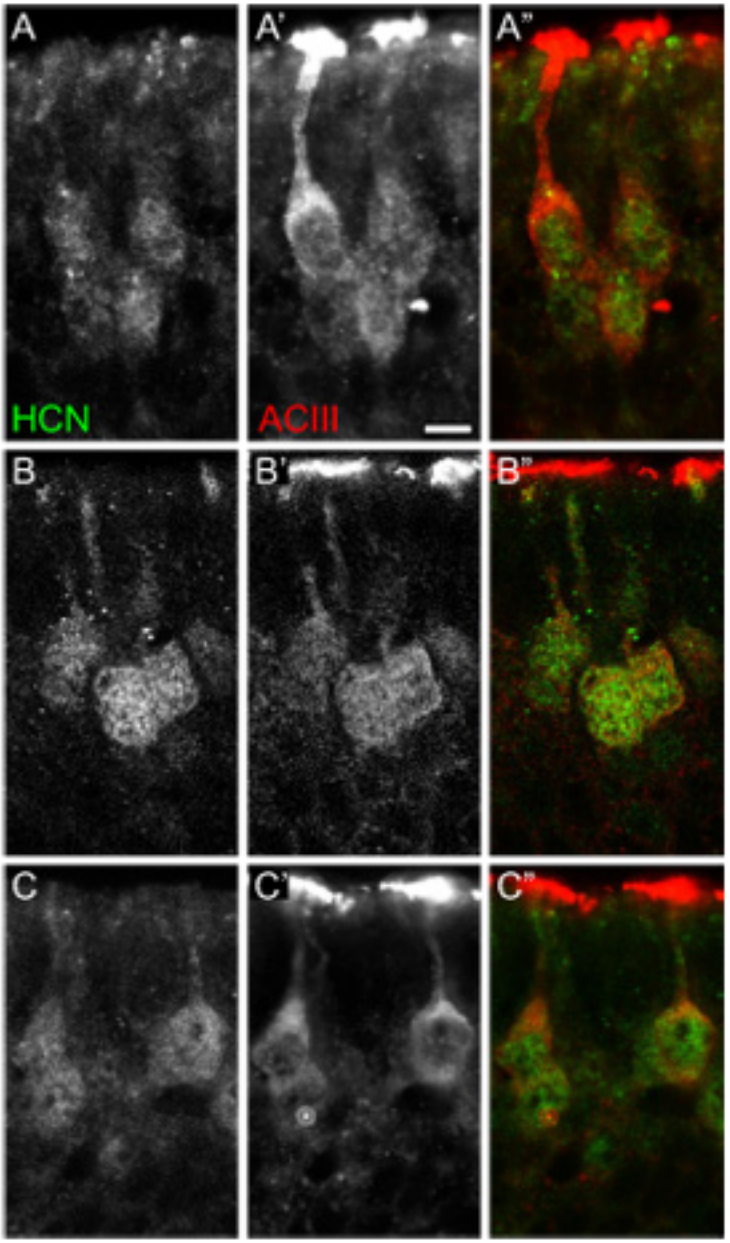
Supplemental Figure 6. In $HCN1^{-/-}$ mice peripherin labeling extends into the inner nerve layer increasing the peripherin:NCAM ratio. The graph is from measurements taken in the ventral caudal OB (0°) at E17.

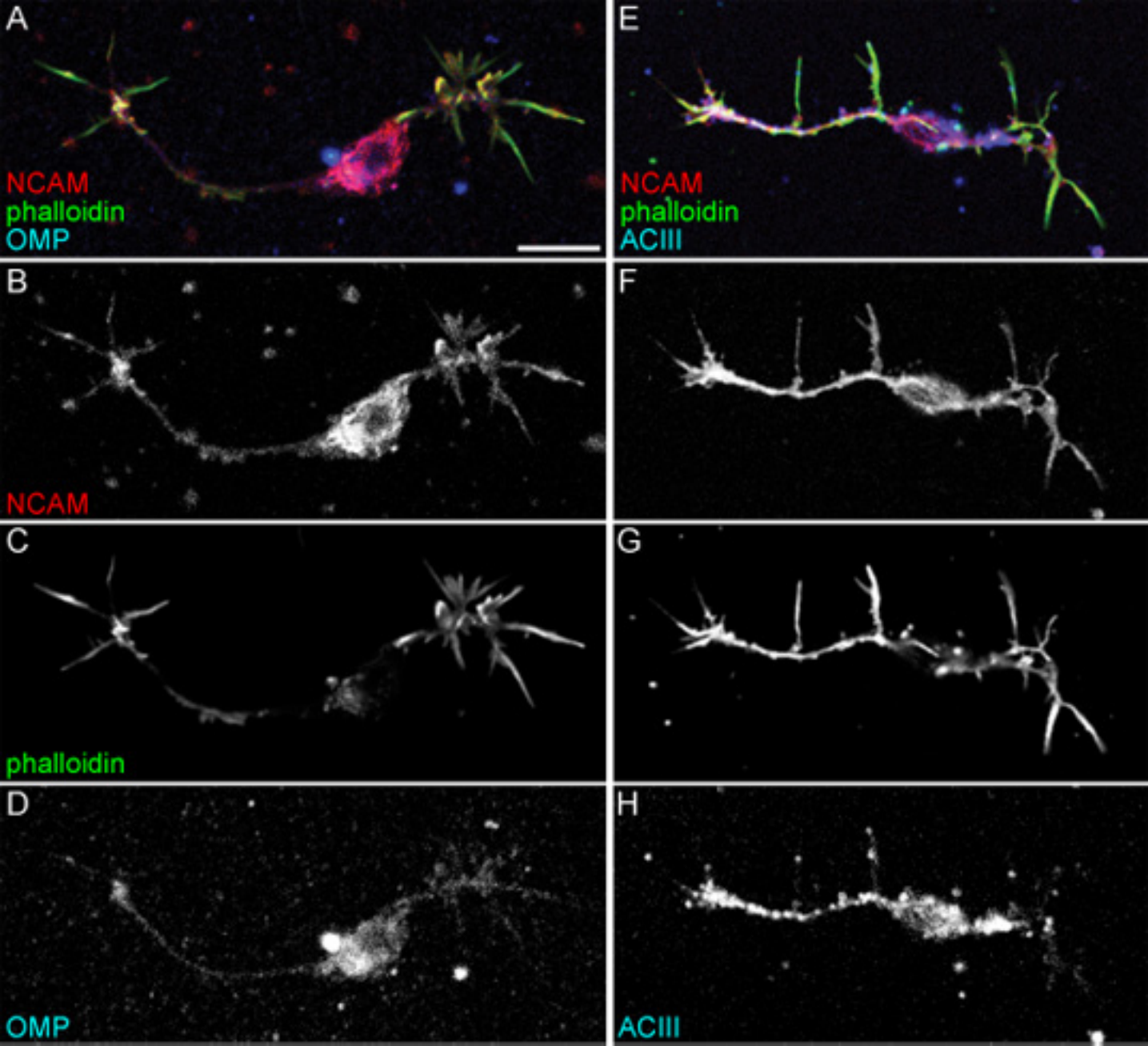
Supplemental Figure 7. Regional marker expression is not perturbed in the OB of $HCN1^{-/-}$ mice. A-B: NQO1 and OCAM labeling in intermediate OB sections of WT (A) and $HCN1^{-/-}$ (B) mice. C-D: Nrp-1 and NCAM labeling in rostral OB sections of WT (C) and $HCN1^{-/-}$ (D) mice. Scale bars = 100 μm for A and B and 60 μm for C and D.

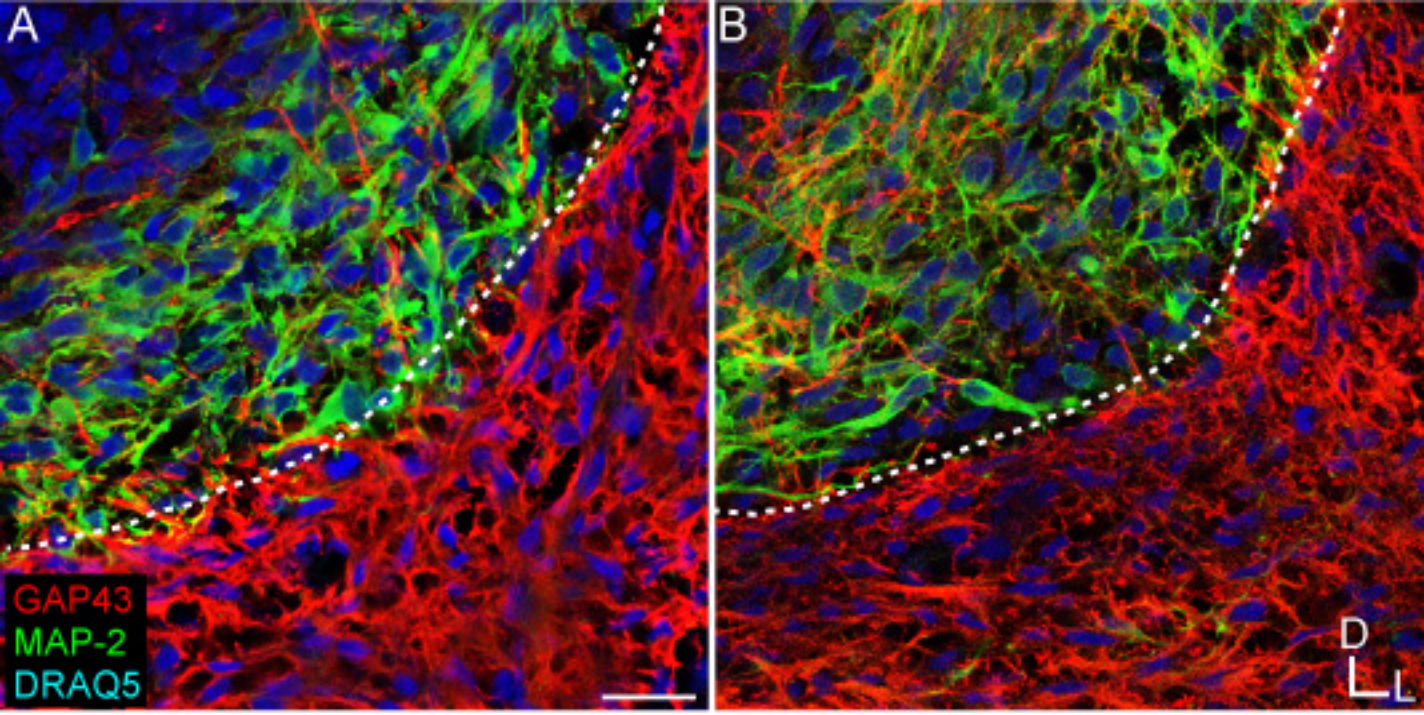
Supplemental Figure 8. There were no significant alterations in the position of the four M72-GFP glomeruli. A-B: Confocal z-stack images of M72-GFP glomeruli in WT (A) and $HCN1^{-/-}$ (B) mice. Scale bar = 25 μm. C: Distances between the indicated glomeruli (LM, left medial; LL, left lateral; RM, right medial; RL, right lateral; M-M, the distance between the medial glomeruli. D: The first two measurements are the angles of the lateral glomeruli between the ipsilateral medial and contralateral lateral glomerulus. The next two measurements are the angles of the medial glomeruli between the intersection of the midline and the line between the OB and cortex and the contralateral medial glomerulus. E: The distance between the M72-GFP glomerulus and the beginning of the AOB.

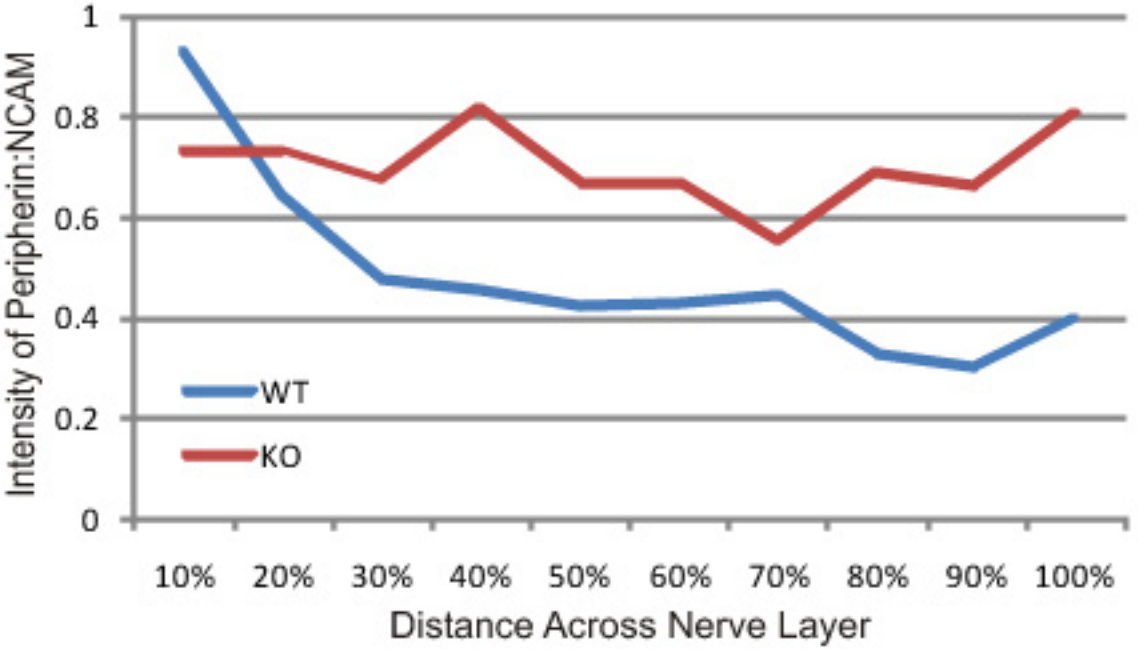

A
HCN1
Mature
OSNs
Immature
OSNs
B
HCN2
C
HCN4
GAP-43
HCN
DRAQ5

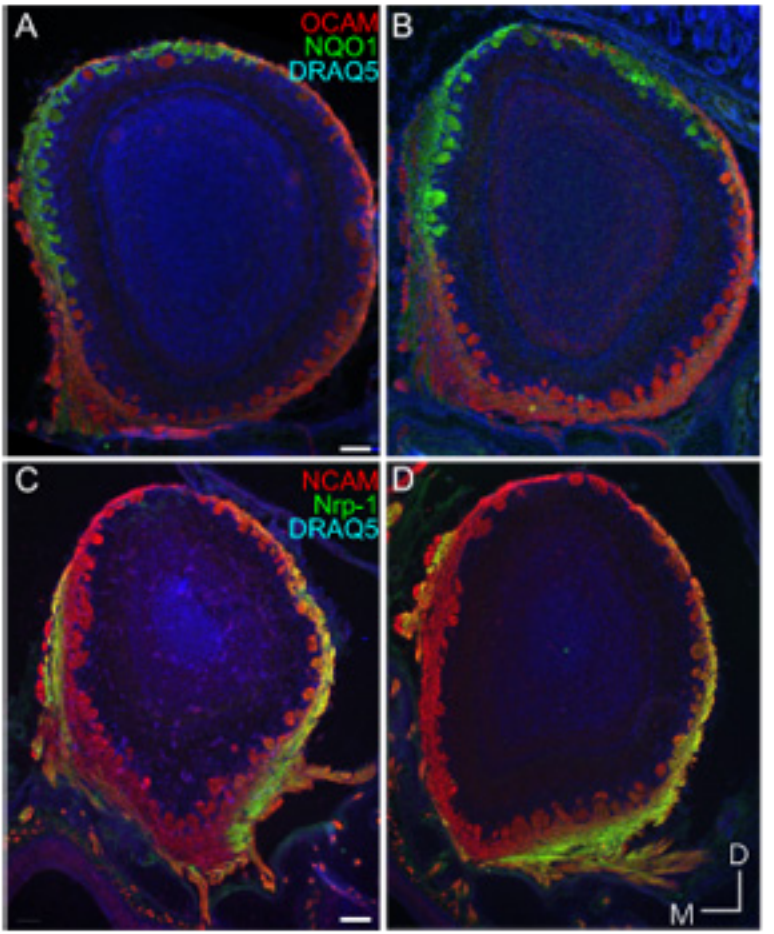

A
GAP43
HCN1
DRAQ5
B
HCN2
C
HCN4
A'
B'
C'

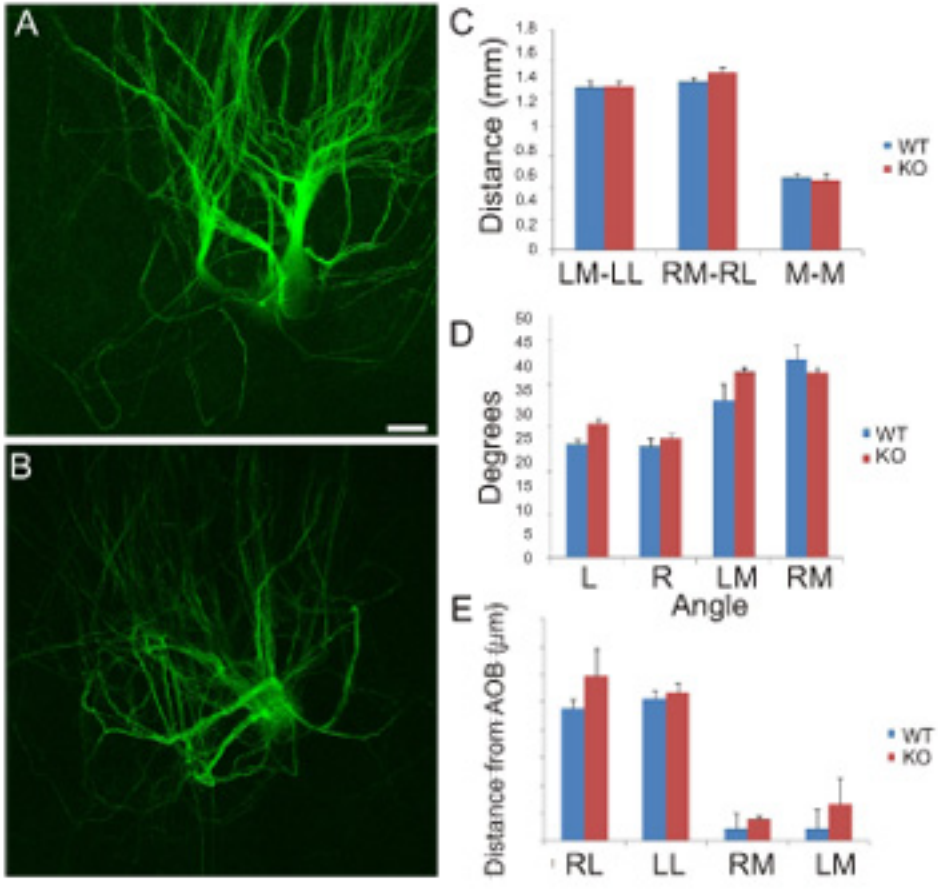

A
A'
A"
HCN
ACIII
B
B'
B"
C
C'
C"


A
NCAM
phalloidin
OMP
E
NCAM
phalloidin
ACIII
B
NCAM
F
C
phalloidin
G
D
OMP
H
ACIII


A
B
GAP43
MAP-2
DRAQ5
D
L
L


Intensity of Peripherin:NCAM
1
0.8
0.6
0.4
0.2
0
WT
KO
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Distance Across Nerve Layer


A
OCAM
NQO1
DRAQ5
B
C
NCAM
Nrp-1
DRAQ5
D
D
M


A
B
C
Distance (mm)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
LM-LL
RM-RL
M-M
WT
KO
D
Degrees
50
45
40
35
30
25
20
15
10
5
0
L
R
LM
RM
Angle
WT
KO
E
Distance from AOB (μm)
RL
LL
RM
LM
WT
KO