
Supplementary information

**Neural crest origin of sympathetic neurons
at the dawn of vertebrates**

In the format provided by the
authors and unedited

SI Table 1: Top Molecular Function GO terms

	Name	P-value	Adjusted p-value	Odds Ratio	Combined score
1	Protein Homodimerization Activity (GO:0042803)	7.29E-07	0.0003711	2.56	36.22
2	Adenyl Ribonucleotide Binding (GO:0032559)	0.00003671	0.009342	2.92	29.87
3	ATP Binding (GO:0005524)	0.00008307	0.01409	2.92	27.46
4	Insulin-Like Growth Factor I Binding (GO:0031994)	0.0001629	0.02072	19.65	171.39
5	Carboxylic Ester Hydrolase Activity (GO:0052689)	0.0002785	0.02759	4.21	34.49
6	Kinase Activity (GO:0016301)	0.0003252	0.02759	4.13	33.13
7	Insulin-Like Growth Factor Binding (GO:0005520)	0.0004231	0.03076	14.29	110.99
8	Carboxylic Acid Transmembrane Transporter Activity (GO:0046943)	0.000649	0.04129	5.31	38.98
9	Vascular Endothelial Growth Factor Receptor 2 Binding (GO:0043184)	0.0007919	0.04479	23.54	168.07
10	Monocarboxylic Acid Transmembrane Transporter Activity (GO:0008028)	0.001103	0.05395	7.29	49.61
11	Amino Acid:Monoatomic Cation Symporter Activity (GO:0005416)	0.001166	0.05395	19.61	132.46
12	Pyridoxal Phosphate Binding (GO:0030170)	0.00136	0.05769	9.82	64.82
13	Vinculin Binding (GO:0017166)	0.001635	0.06401	16.81	107.85
14	Endopeptidase Inhibitor Activity (GO:0004866)	0.002004	0.07285	3.45	21.45
15	Oxidoreduction-Driven Active Transmembrane Transporter Activity (GO:0015453)	0.002215	0.07453	4.92	30.09
16	Flavin Adenine Dinucleotide Binding (GO:0050660)	0.002435	0.07453	4.82	29.01
17	Oxidoreductase Activity, Acting On The CH-OH Group Of Donors, NAD Or NADP As Acceptor (GO:0016616)	0.002621	0.07453	3.63	21.57
18	2 Iron, 2 Sulfur Cluster Binding (GO:0051537)	0.002887	0.07453	13.07	76.44
19	Vascular Endothelial Growth Factor Receptor Binding (GO:0005172)	0.002887	0.07453	13.07	76.44
20	Cadherin Binding (GO:0045296)	0.002928	0.07453	2.24	13.05

Molecular Function GO analysis for lamprey TH⁺ neurons. Analysis is performed using the top 500 significantly upregulated transcripts with an enrichment cutoff of 1.5 log₂(Fold Change). p-values are determined using Fisher's exact test.

SI Table 2: Top Biological Process GO terms

Name	P-value	Adjusted p-value	Odds Ratio	Combined score
1 Proton Motive Force-Driven Mitochondrial ATP Synthesis (GO:0042776)	6.31E-08	0.0001736	10.42	172.78
2 Proton Motive Force-Driven ATP Synthesis (GO:0015986)	2.42E-07	0.0002798	8.93	136.03
3 Dicarboxylic Acid Metabolic Process (GO:0043648)	3.65E-07	0.0002798	9.93	147.17
4 Oxidative Phosphorylation (GO:0006119)	4.07E-07	0.0002798	8.41	123.8
5 Fatty Acid Metabolic Process (GO:0006631)	0.000002252	0.001149	5.17	67.26
6 Fatty Acid Catabolic Process (GO:0009062)	0.000002506	0.001149	7.78	100.37
7 Sodium Ion Export Across Plasma Membrane (GO:0036376)	0.000006556	0.002068	28.13	335.72
8 Aerobic Electron Transport Chain (GO:0019646)	0.000006909	0.002068	6.84	81.29
9 Potassium Ion Import Across Plasma Membrane (GO:1990573)	0.000008061	0.002068	9.31	109.19
10 Cellular Respiration (GO:0045333)	0.000008591	0.002068	5.91	68.88
11 Positive Regulation Of Endothelial Cell Migration (GO:0010595)	0.000008591	0.002068	5.91	68.88
12 Mitochondrial ATP Synthesis Coupled Electron Transport (GO:0042775)	0.000009016	0.002068	6.61	76.81
13 Glucose Metabolic Process (GO:0006006)	0.00001469	0.003109	7.13	79.35
14 Secondary Alcohol Metabolic Process (GO:1902652)	0.00001925	0.003784	8.11	88.1
15 Proton Transmembrane Transport (GO:1902600)	0.00002642	0.004816	7.72	81.35
16 ATP Biosynthetic Process (GO:0006754)	0.000028	0.004816	12.45	130.55
17 Fatty Acid Oxidation (GO:0019395)	0.00004129	0.006684	7.19	72.58
18 Regulation Of Heart Contraction (GO:0008016)	0.00005311	0.008119	5.94	58.46
19 Angiogenesis Involved In Wound Healing (GO:0060055)	0.0000719	0.009894	26.2	249.97
20 Basement Membrane Organization (GO:0071711)	0.0000719	0.009894	26.2	249.97

Biological Process GO analysis for lamprey TH⁺ neurons. Analysis is performed using the top 500 significantly upregulated transcripts with an enrichment cutoff of 1.5 log₂(Fold Change). p-values are determined using Fisher's exact test.