The Basis of Who We Are

Noah Buckley

Robert Hevner, M.D., Ph.D.

Ray Daza, Research Scientist
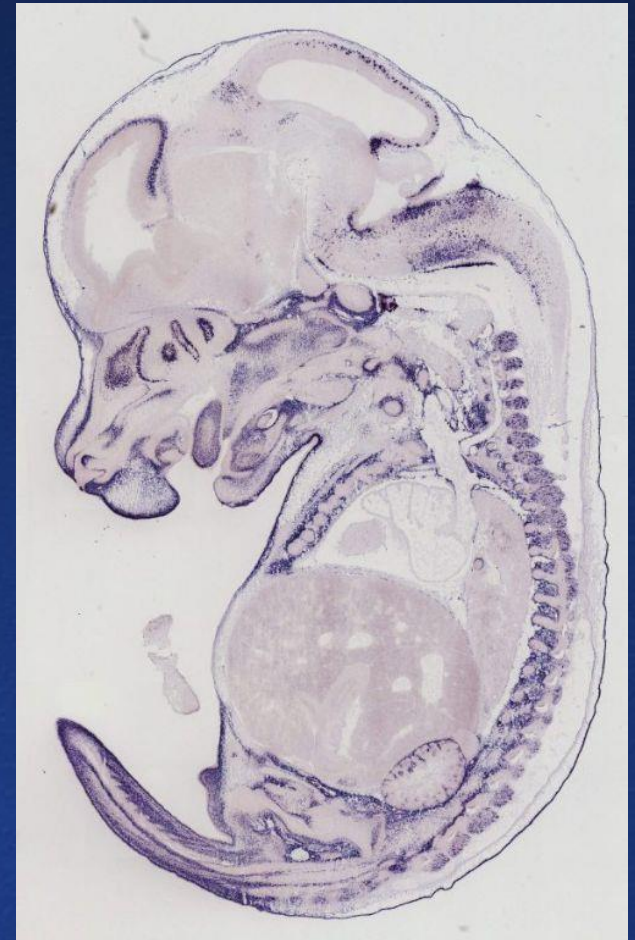
The Hevner Laboratory:
Research in Gene Regulation

ଔ Before genetic engineering can become a reality, we must first understand the ways in which genes interact and express themselves.

ଔ The Hevner lab aims to understand how genetic manipulation may alter genetic expression by identifying which genes are regulated by **Tbr1** and **Tbr2**.

ଔ Most recent publication identified "**Auts2**, a frontal cortex marker gene linked to autism and mental retardation, as a direct target of Tbr1 binding and activation." (Hevner, 2010)
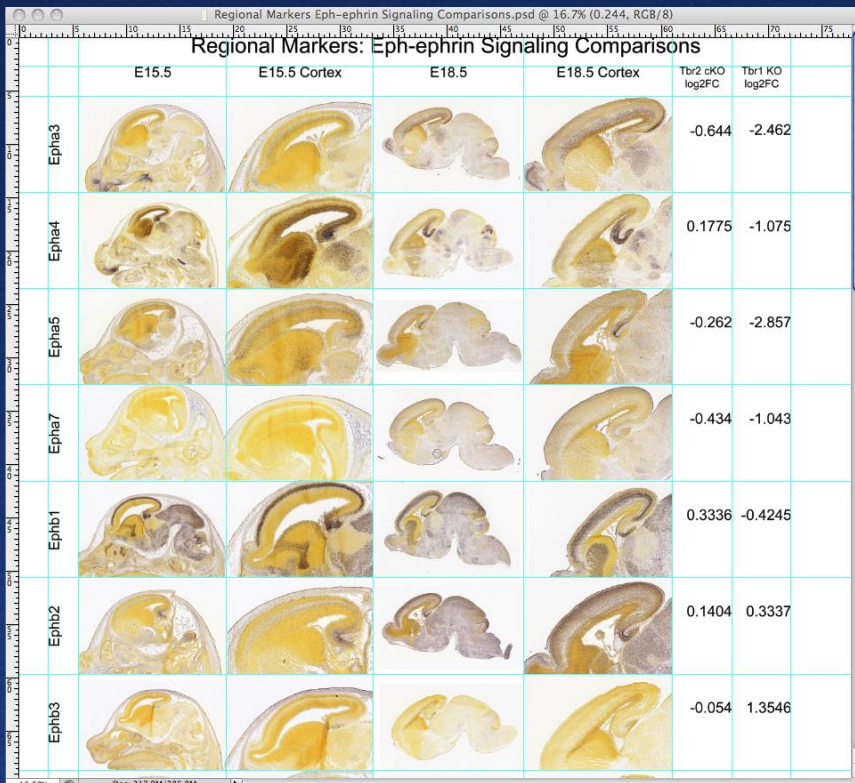
Methods

- Genotyping by PCR determines which animals are KO/WT.

- Chromatin Immunoprecipitation (ChIP) identifies direct targets of Tbr1/Tbr2 binding and activation.

- Microarray Data quantitatively identifies which genes may potentially be regional markers as well as Tbr1/Tbr2 overlap.

- Data mining from previous studies, ABM, genepaint.org, supports microarray data, identifies regional markers.

- Immunohistochemistry displays region shifts in Tbr1/Tbr2 KOs.

My Contribution/Results

Identifying New Regional Markers

Regional Markers: Eph-ephrin Signaling Comparisons

	E15.5	E15.5 Cortex	E18.5	E18.5 Cortex	Tbr2 cKO log2FC	Tbr1 KO log2FC
Epha3					-0.644	-2.462
Epha4					0.1775	-1.075
Epha5					-0.262	-2.857
Epha7					-0.434	-1.043
Ephb1					0.3336	-0.4245
Ephb2					0.1404	0.3337
Ephb3					-0.054	1.3546

Identify and Consolidate Which Genes Overlap

	A Symbol	B log2 FC (Tbr1)	C log2 FC (Tbr2)	D Tbr1 expression	E Tbr2 expression
2	6430704M03Rik	-0.98669	-0.57272	Downregulated	Downregulated
3	AW125753 // Fam84a	-1.20943	-1.55903	Downregulated	Downregulated
4	Bcl6	-0.71535	-1.37484	Downregulated	Downregulated
5	Bicd1	-1.42973	0.514073	Downregulated	Upregulated
6	Crabp1	3.024681	0.967551	Upregulated	Upregulated
7	Cxxc5	0.416286	0.404299	Upregulated	Upregulated
8	Dpy19l1	-1.97699	-0.48166	Downregulated	Downregulated
9	Ebf3	2.436336	2.657695	Upregulated	Upregulated
10	Epha3	-2.46215	-0.6477	Downregulated	Downregulated
11	Epha7	-1.0429	-0.43391	Downregulated	Downregulated
12	Fat3	-2.16762	-0.62207	Downregulated	Downregulated
13	Fstl5	-0.8093	0.683356	Downregulated	Upregulated
14	Galntl4	1.783941	0.478257	Upregulated	Upregulated
15	Gria4	-1.43475	0.797602	Downregulated	Upregulated
16	Grik2	-0.70014	0.441825	Downregulated	Upregulated
17	Immp1l	-0.77014	0.416009	Downregulated	Upregulated
18	Kcnd2	-0.91505	0.803727	Downregulated	Upregulated
19	Kcng1	-1.5862	-0.54871	Downregulated	Downregulated
20	Kcnn2	-2.26432	-0.42326	Downregulated	Downregulated
21	Kit	-0.83074	-0.52965	Downregulated	Downregulated
22	Lmo2	0.538716	0.709538	Upregulated	Upregulated
23	Map2k6	-0.87477	-0.42395	Downregulated	Downregulated
24	Mef2c	-2.61412	-0.46762	Downregulated	Downregulated
25	Nhlh1	0.784235	1.303713	Upregulated	Upregulated
26	Nrp1	-1.51981	0.610881	Downregulated	Upregulated
27	Nrp2	1.441905	0.8296	Upregulated	Upregulated
28	Nrxn1	-2.12411	0.500265	Downregulated	Upregulated
29	Ntng2	-1.01786	-0.72906	Downregulated	Downregulated
30	Odz4	-0.75158	-0.46284	Downregulated	Downregulated
31	Pbx3	-1.07565	-0.43309	Downregulated	Downregulated
32	Pde1c	-0.49092	0.699592	Downregulated	Upregulated
33	Plxna4	-1.20925	-1.47732	Downregulated	Downregulated
34	Pou3f2	-0.46165	-0.42639	Downregulated	Downregulated
35	Prelp	1.118993	0.466008	Upregulated	Upregulated
36	Slitl2	1.405549	0.409231	Upregulated	Upregulated

Final Conclusions:
What I Learned

ଔ Gained valuable lab experience.

ଔ Immersed myself in the micro level of development, providing a nice counterbalance to prior learning focused on the macro level.

ଔ Expanded on what little knowledge I had of microbiology and provided myself a jumping off point for future studies in the field.