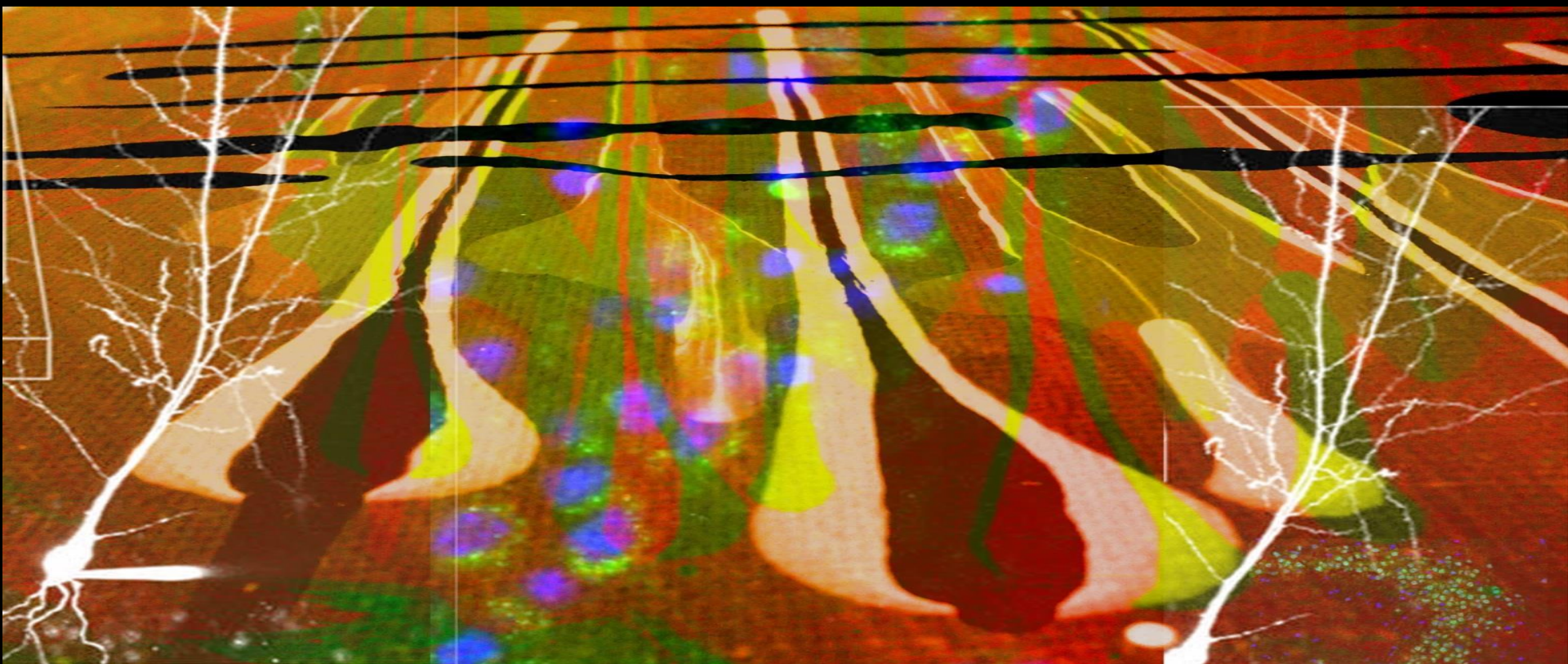
Overview of the Epigenetics Core, data generated at UF and UA on aged animals, samples prepped, and general experimental design for the entire project

Tom Foster
Dept of Neuroscience
McKnight Brain Institute
University of Florida



The Goal: Provide support for bioinformatic analysis of high-throughput RNA sequencing and epigenomics for human and animal studies.

Proof of concept project:

Examine DNA methylation and transcriptome in behaviorally characterized young and aged rats.

1) **Cognitive tasks**
2) **Tissue selection**
3) **Results of RNA analysis (UF)**

frontiers in
AGING NEUROSCIENCE

Challenges and opportunities in characterizing cognitive aging across species

1) Tests of cognitive domains that are age-sensitive in both humans and animal models.
2) An understanding of the anatomical substrate for the behavior

Water maze

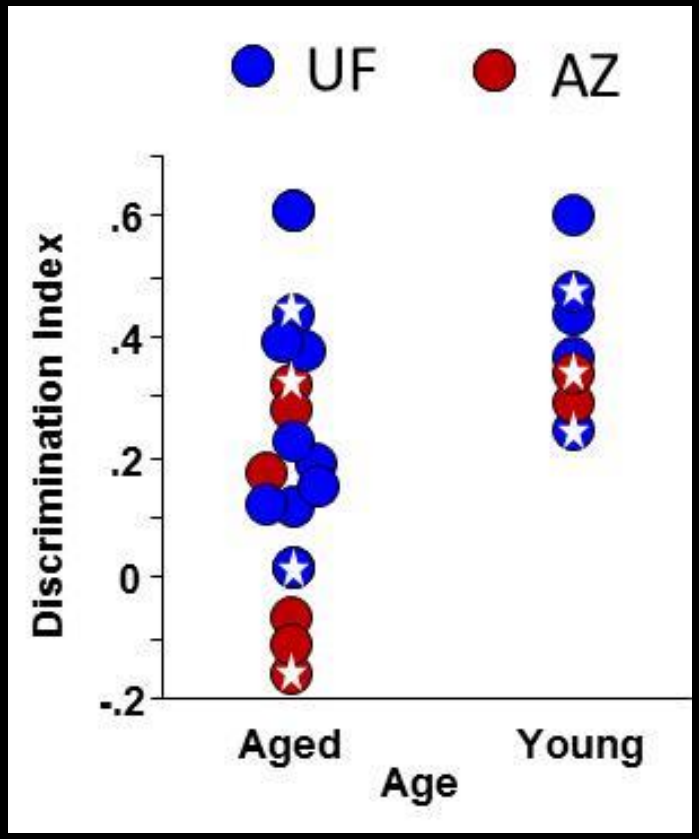
Spontaneous Object Recognition (Perirhinal)	Cheese Board (Hippocampus	Spatial Episodic Memory (Hippocampus)	Temporal Object Recognition (Frontal)	Novel Exploration (Hippocampus)

Set shift Operant task (Frontal)	Spatial Episodic Memory (Hippocampus)	Spontaneous Object Recognition (Perirhinal)	Inhibitory Avoidance (Hippocampus& Amygdala)

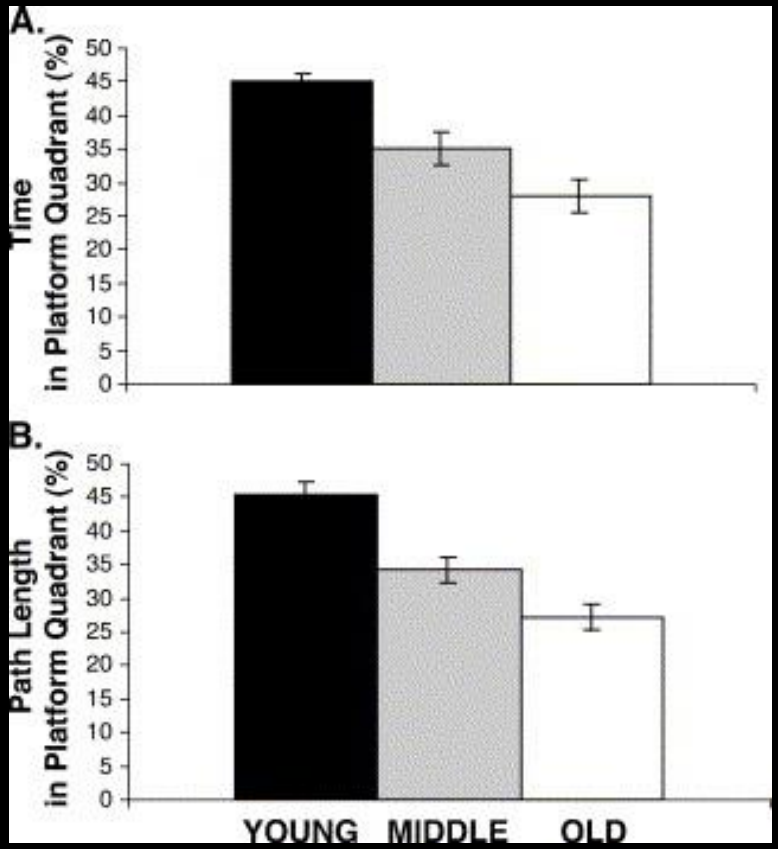
Young 7-8 months
Aged ~20 months

Episodic Spatial Memory on the Water Maze

Reliability

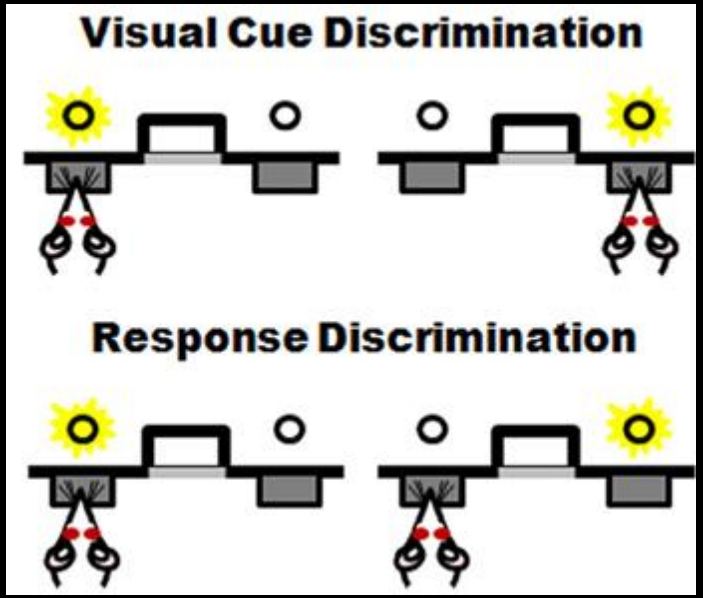


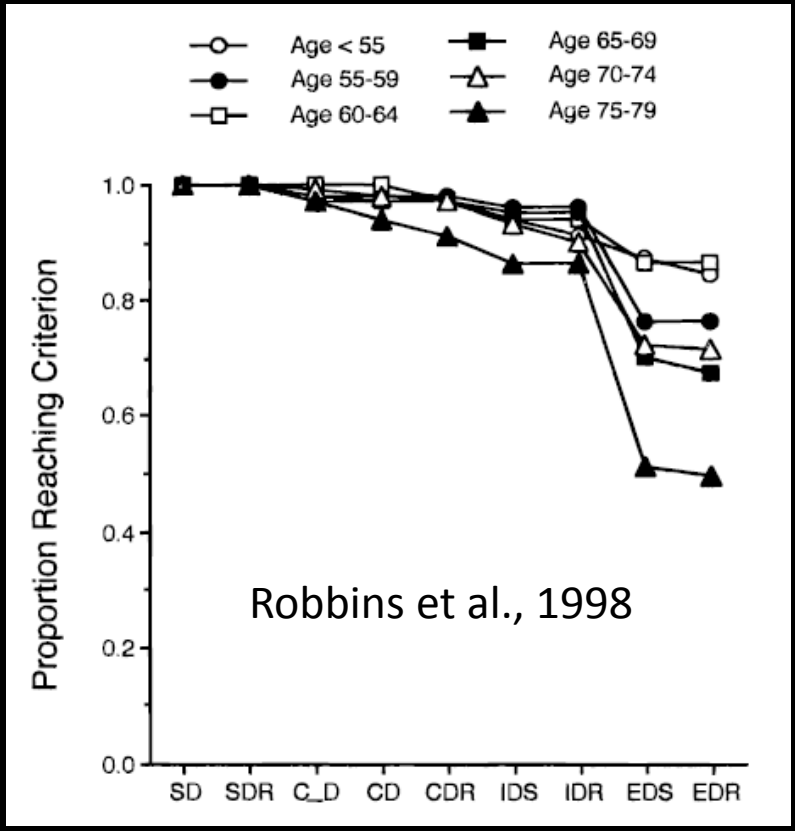
Face Validity

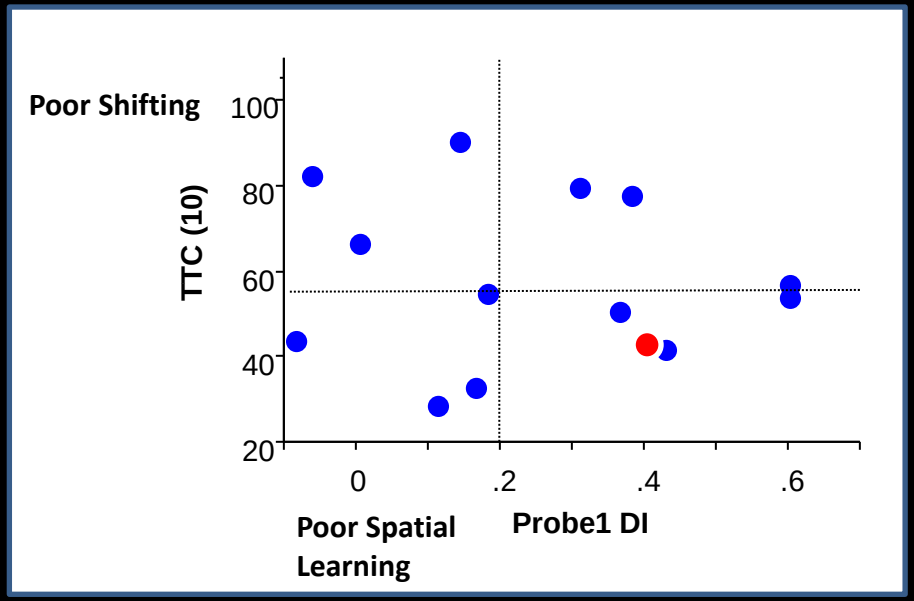


Driscoll et al., 2005

Set shift and frontal cortical function

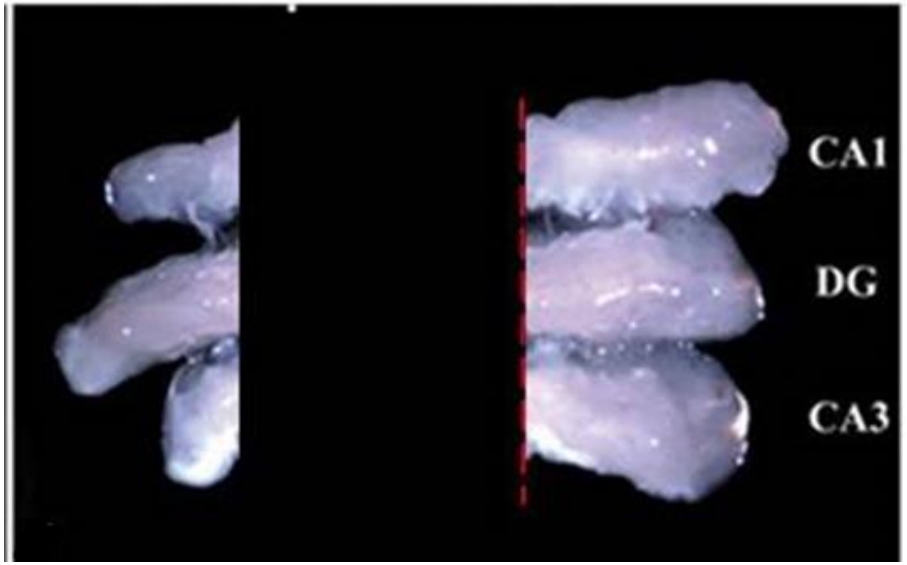






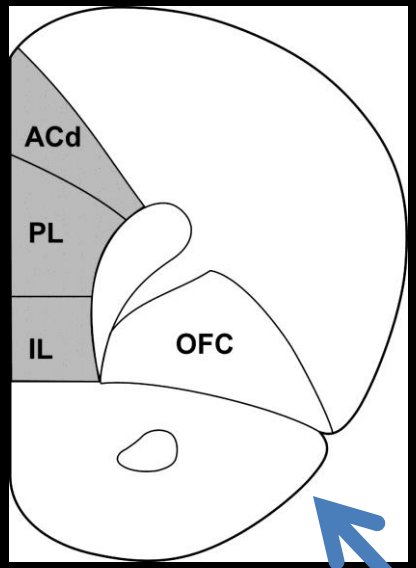
Hippocampal CA1, CA3, dentate gyrus dissected out and distributed

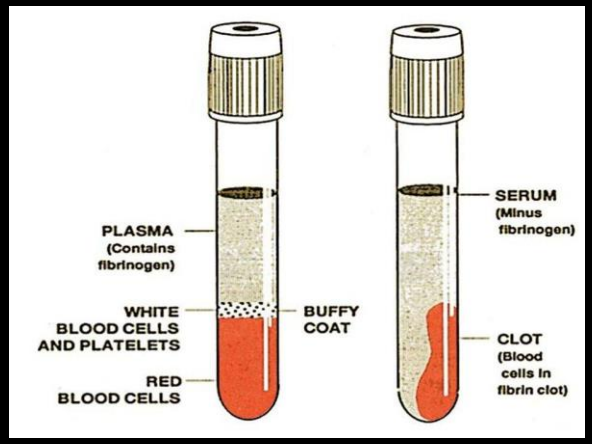
RNA to three different Institutions

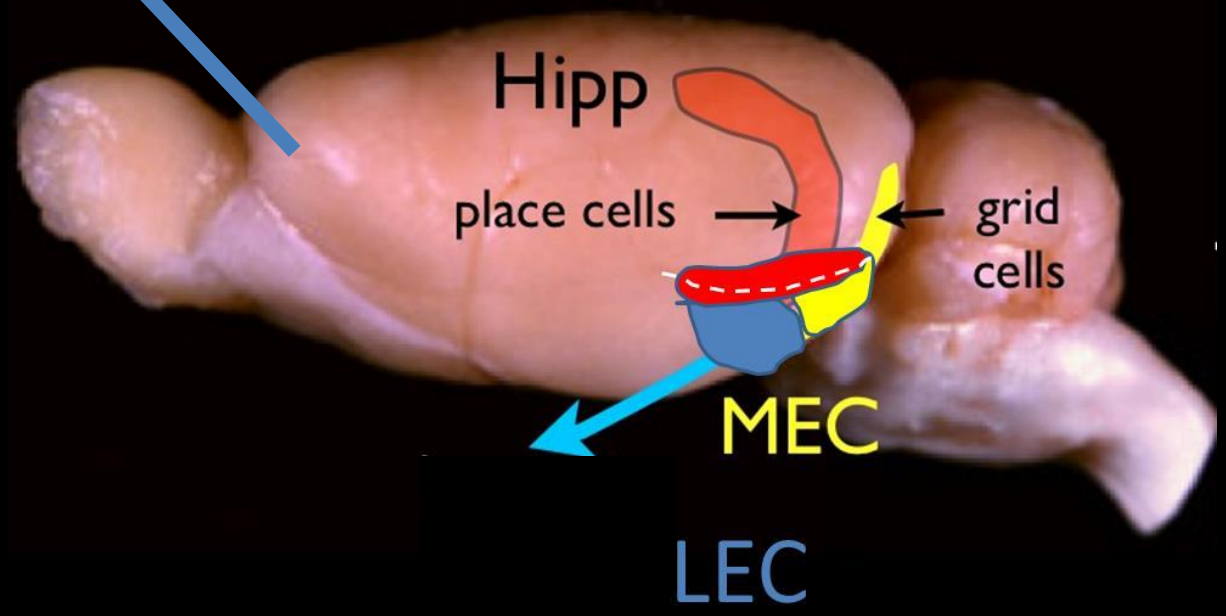


DNA to UAB

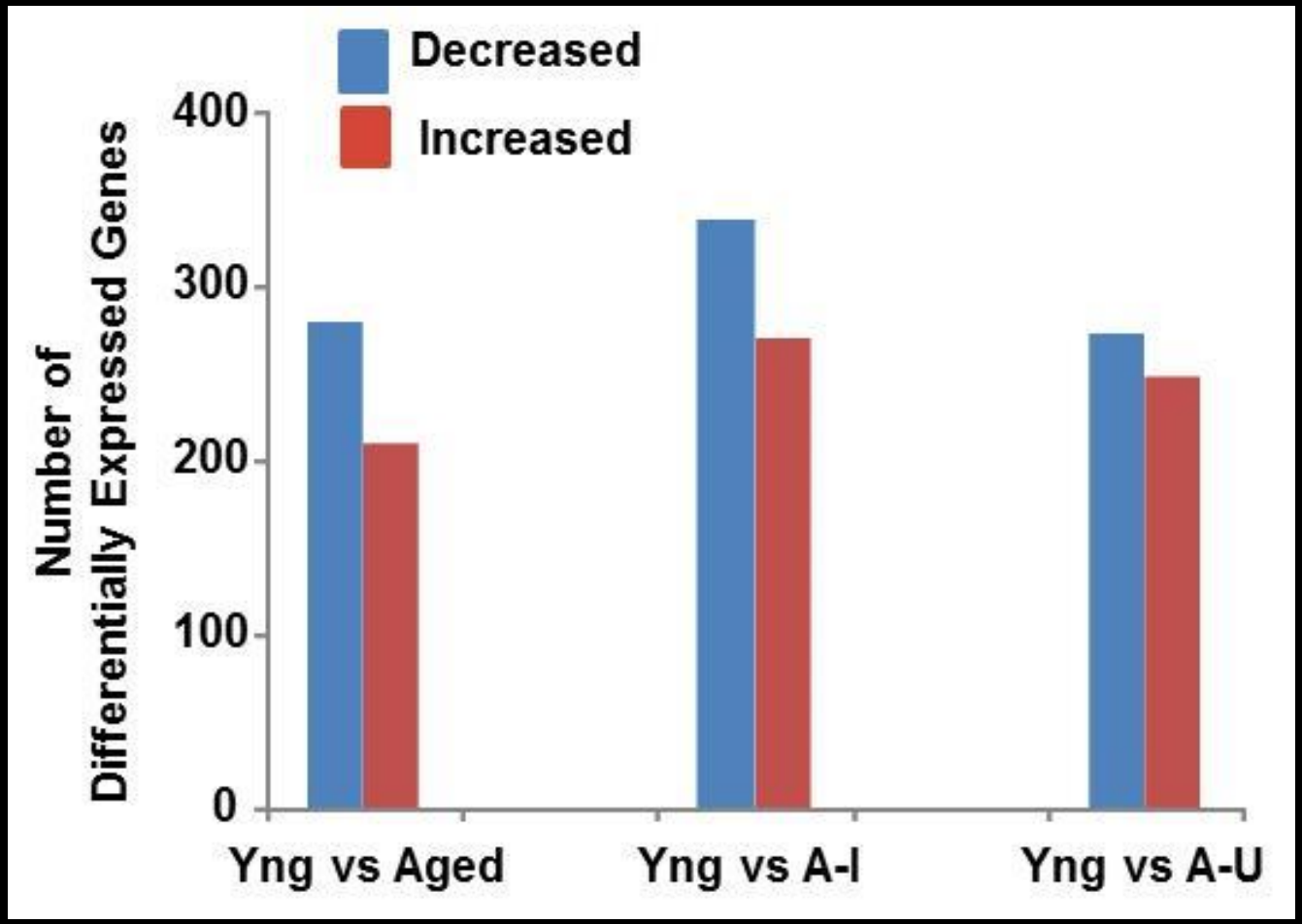
Other tissues have been processed or banked







N = 5 young, 11 aged



Decreased

Synaptic Transmission
Regulation of Transcription

Increased

Antigen Processing
Immune Response
Cell Death

http://david.abcc.ncifcrf.gov/term2term.jsp?annot=9,79,85,25,32,39,47,45,63,76&currentList=0

Options Classification Stringency Medium

Rerun using options | Create Sublist

105 Cluster(s)

Download File

						Count	P_Value	Benjamin
Annotation Cluster 1	**Enrichment Score: 3.01**							
	GOTERM_CC_FAT	plasma membrane part	RT			43	3.8E-4	2.2E-2
	GOTERM_CC_FAT	plasma membrane	RT			63	1.6E-3	4.2E-2
	SP_PIR_KEYWORDS	membrane	RT			81	1.6E-3	6.4E-2
Annotation Cluster 2	**Enrichment Score: 2.84**							
	GOTERM_BP_FAT	synaptic transmission	RT			15	3.3E-5	2.5E-2
	GOTERM_CC_FAT	synapse part	RT			16	8.0E-5	2.4E-2
	GOTERM_BP_FAT	transmission of nerve impulse	RT			16	1.5E-4	4.4E-2
	GOTERM_CC_FAT	synapse	RT			19	2.0E-4	2.9E-2
	GOTERM_CC_FAT	postsynaptic membrane	RT			11	2.0E-4	2.0E-2
	SP_PIR_KEYWORDS	synapse	RT			13	3.2E-4	2.6E-2
	GOTERM_BP_FAT	cell-cell signaling	RT			16	7.5E-4	1.5E-1
	SP_PIR_KEYWORDS	postsynaptic cell membrane	RT			9	9.8E-4	5.9E-2
	GOTERM_CC_FAT	cell junction	RT			18	2.8E-3	6.7E-2
	SP_PIR_KEYWORDS	cell junction	RT			14	3.7E-3	1.2E-1
	GOTERM_CC_FAT	postsynaptic density	RT			6	1.8E-2	2.5E-1
	SP_PIR_KEYWORDS	cell membrane	RT			26	1.7E-1	6.7E-1
	GOTERM_BP_FAT	neurological system process	RT			23	9.9E-1	1.0E0
Annotation Cluster 3	**Enrichment Score: 2.79**							
	GOTERM_CC_FAT	nuclear lumen	RT			33	3.3E-4	2.4E-2
	GOTERM_CC_FAT	membrane-enclosed lumen	RT			40	5.8E-4	2.8E-2
	GOTERM_CC_FAT	intracellular organelle lumen	RT			38	6.7E-4	2.8E-2
	GOTERM_CC_FAT	nucleoplasm part	RT			19	9.0E-4	2.9E-2

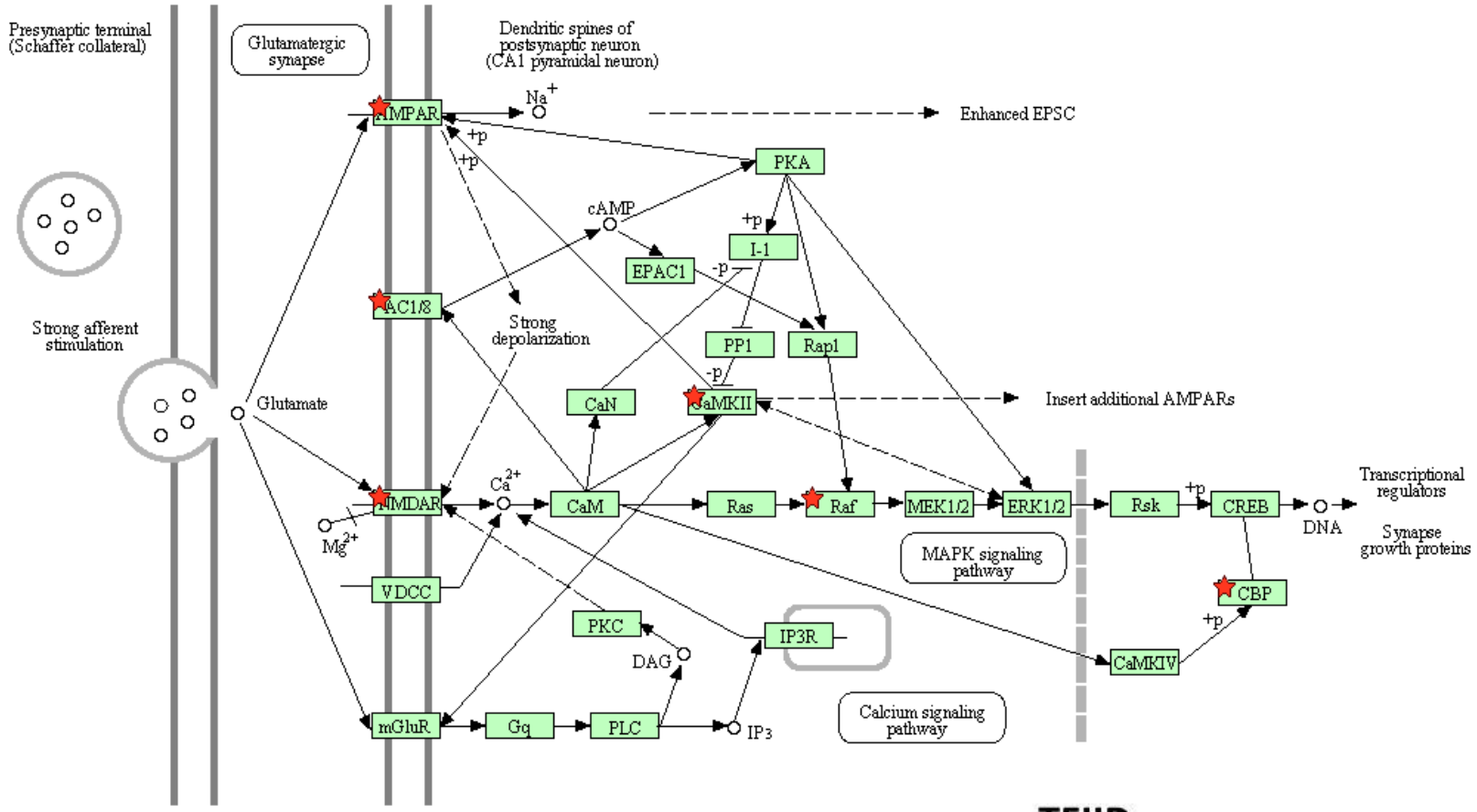
National Institute of Allergy and Infectious Di
The Database for Annotation, Visualization and Integrated Dis

Gene Report

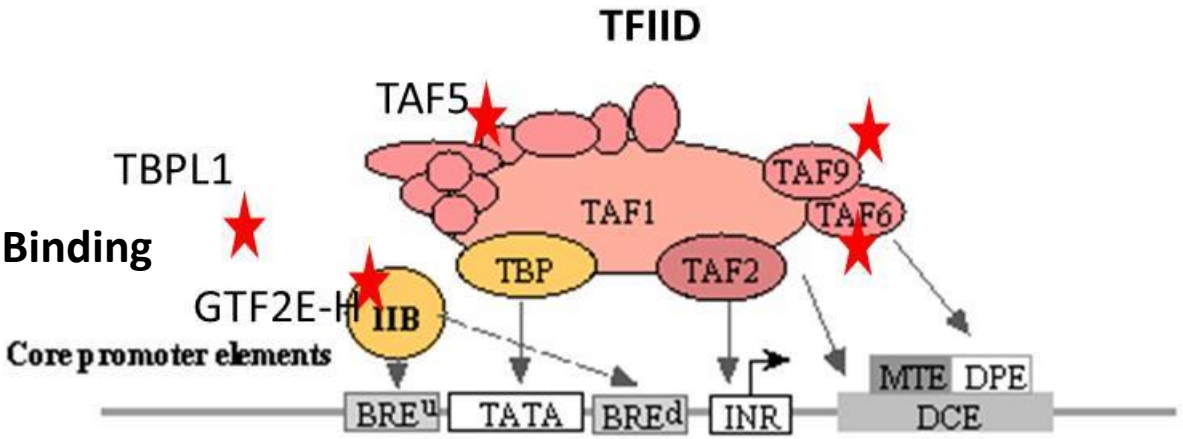
Current Gene List: List_1
Current Background: Rattus norvegicus
352 DAVID IDs
15 record(s)

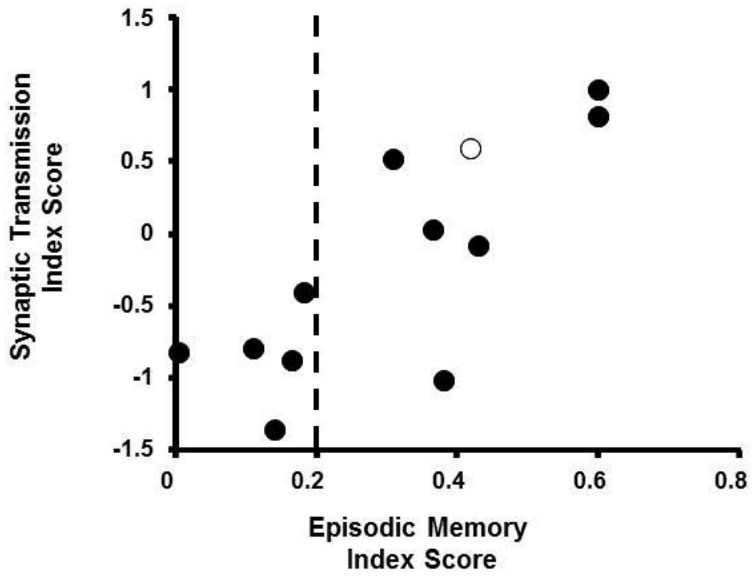
OFFICIAL_GENE_SYMBOL	GENE NAME	Related Genes	
Acp2	acid phosphatase 2, lysosomal	RG	Ratt
Agrn	agrin	RG	Ratt
Atxn1	ataxin 1	RG	Ratt
Ctnna2	catenin (cadherin associated protein), alpha 2	RG	Ratt
Gria1	glutamate receptor, ionotropic, AMPA 1	RG	Ratt
Grin2b	glutamate receptor, ionotropic, N-methyl D-aspartate 2B	RG	Ratt
Grid2	glutamate receptor, ionotropic, delta 2	RG	Ratt
Lin7a	lin-7 homolog a (C. elegans)	RG	Ratt
Ncan	neurocan	RG	Ratt
Nlgn1	neuroligin 1	RG	Ratt
Nlgn3	neuroligin 3	RG	Ratt
Npy	neuropeptide Y	RG	Ratt
Syn3	synapsin III	RG	Ratt
Unc13a	unc-13 homolog A (C. elegans)	RG	Ratt
Unc13b	unc-13 homolog B (C. elegans)	RG	Ratt

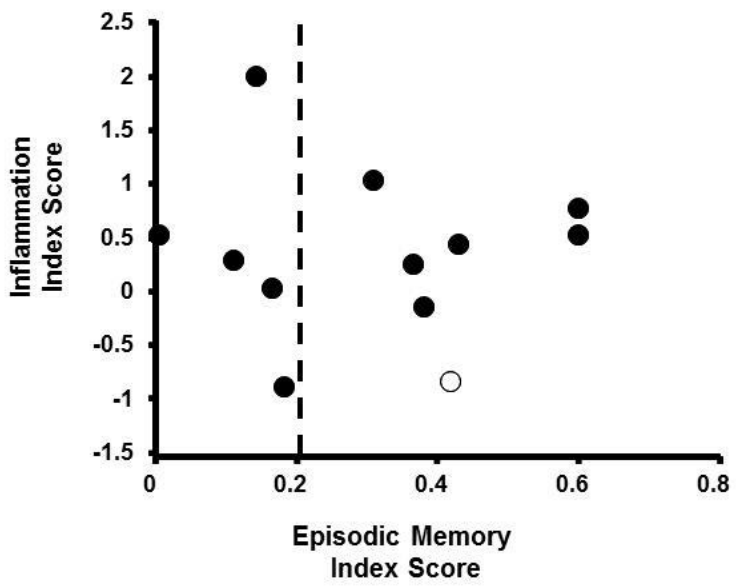
Long-Term Potentiation

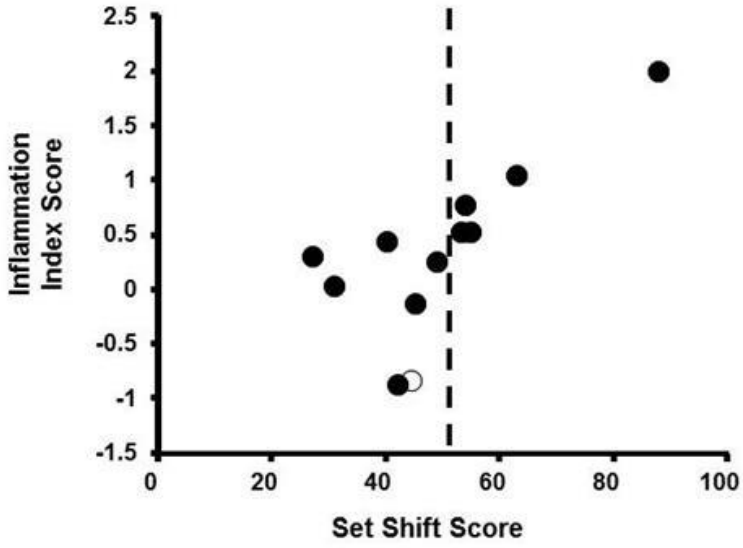


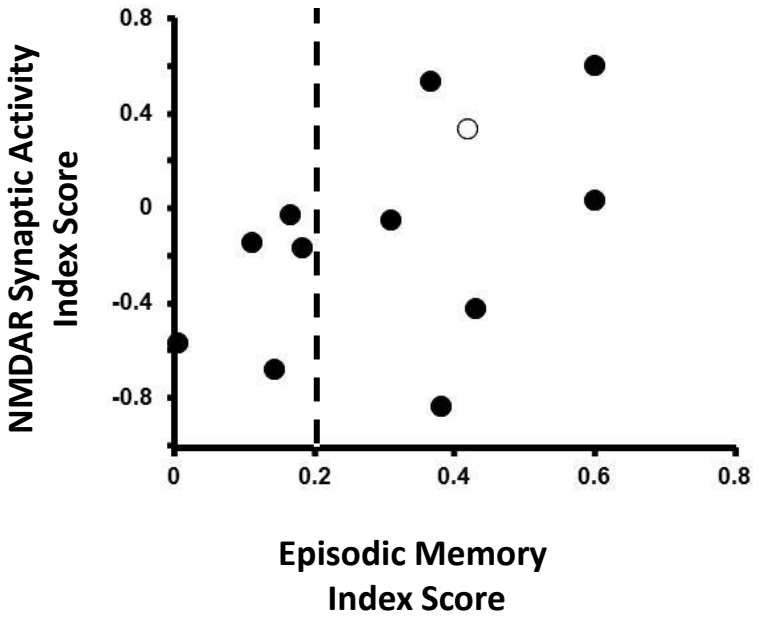
Transcription Factor Binding




Synaptic Transmission
Index Score
1.5
1
0.5
0
-0.5
-1
-1.5
0
0.2
0.4
0.6
0.8
Episodic Memory
Index Score


Inflammation
Index Score
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
0.2
0.4
0.6
0.8
Episodic Memory
Index Score


Inflammation
Index Score
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
0
20
40
60
80
100
Set Shift Score


NMDAR Synaptic Activity
Index Score
0.8
0.4
0
-0.4
-0.8
0
0.2
0.4
0.6
0.8
Episodic Memory
Index Score

Behavioral Characterization

Asha Rani
Ashok Kumar
Jen Bizon
Barry Setlow
Sofia Beas
Sarah Burke
Drew Maurer

Transcription & DNA methylation

Laura Ianov
Linda Bean
Leonid Moroz
Andrea Kohn
Alberto Riva
Jason Frazier
Scott Harden

Supported by the McKnight Brain Research Foundation and NIA