

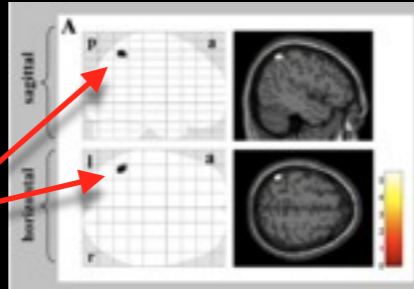
## Background:

- Synesthesia is a neurological condition in which multiple sensory modalities overlap
- example: color-sound synesthesia

- Increased activity has been detected in the inferior parietal cortex in sound-color synesthetes

- TBR1 identified as a candidate gene based on genomic mapping studies in sound-color synesthetes

Asher et al, Am J Hum Genet (2009)

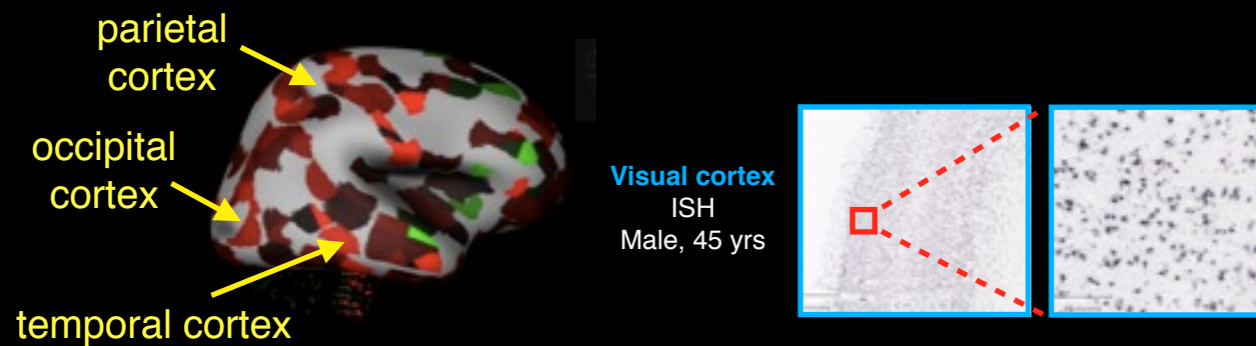


Asher et al, Neuropsychologia (Jan 2012)

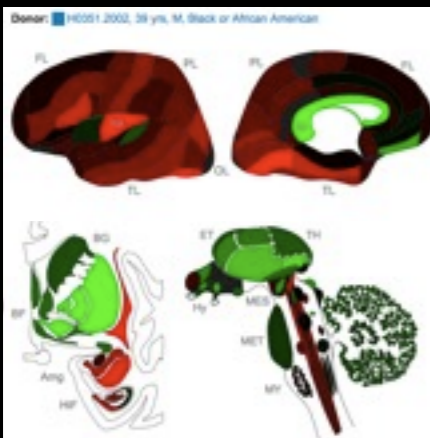
## Research Questions:

1. Where is TBR1 expressed in the adult human brain?
2. What genes correlate with TBR1 expression in these areas?

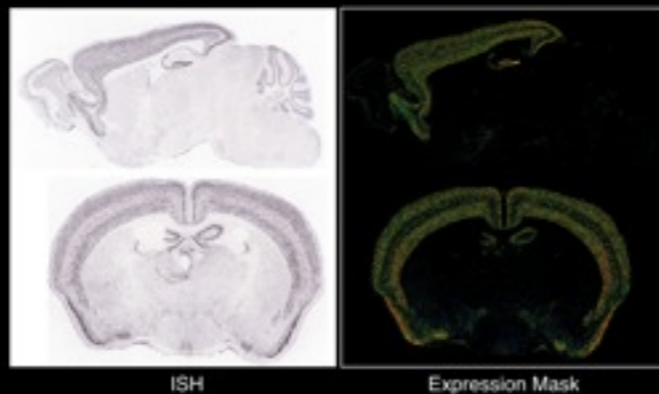
## 1. Where is TBR1 expressed? (Human/mouse microarray and ISH)



Visual cortex  
ISH  
Male, 45 yrs



Mouse Tbr1



ISH

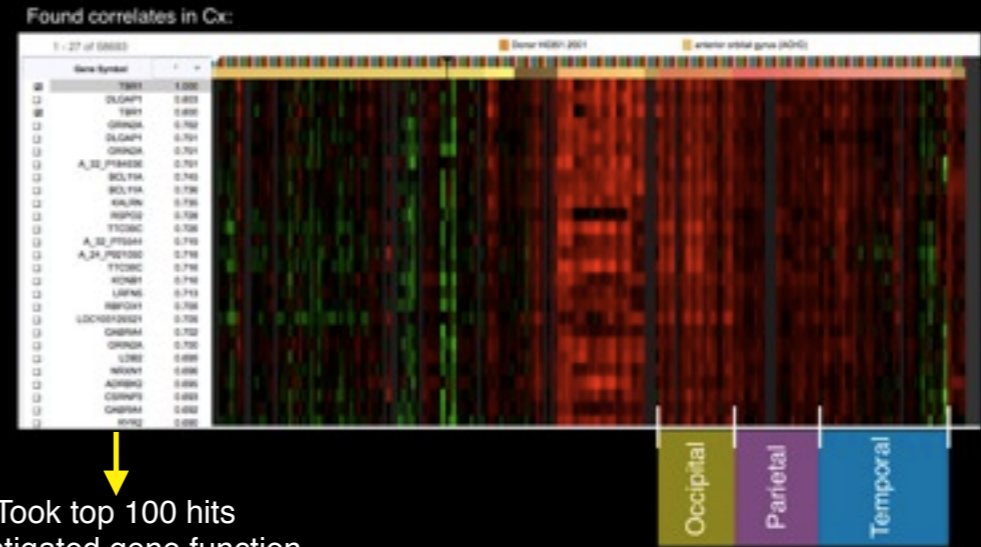
Expression Mask

## Conclusions:

- TBR1 is expressed in human cortical areas (temporal, occipital and parietal cortex)
- Expression pattern conserved in mouse (existing KO mouse may be a useful model)

## 2. What genes correlate with TBR1 expression?

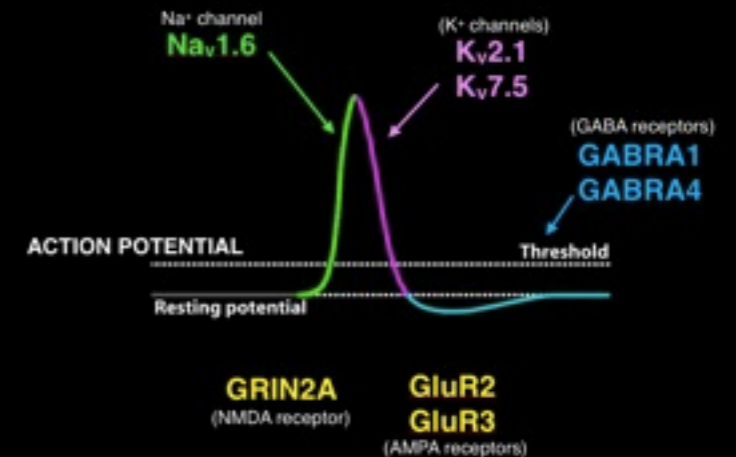
(Human microarray "find correlates" tool)



Took top 100 hits  
Investigated gene function

20 of top 100 hits  
were ion channel  
subunits

## Candidate ion channel subunits:



## Conclusions:

- TBR1 expression in cortex correlates with many ion channel subunits
- These findings may be relevant for synesthesia, as neuronal excitability may influence abnormal activation of cortical circuits in response to external stimuli

## Conclusions:

- TBR1 is expressed in adult cortex
- Expression correlates with several ion channel subunits
- Implications for neuronal excitability

## Future Directions:

- Test candidate gene expression in Tbr1 knockout mouse model
- Investigate influence of human SNPs in TBR1 on the expression of candidate genes