

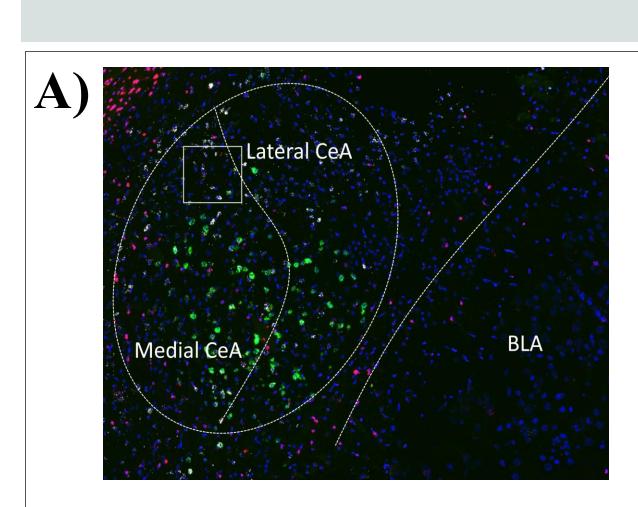
Dopamine Receptor Changes in the Central Amygdala Across Brain Development

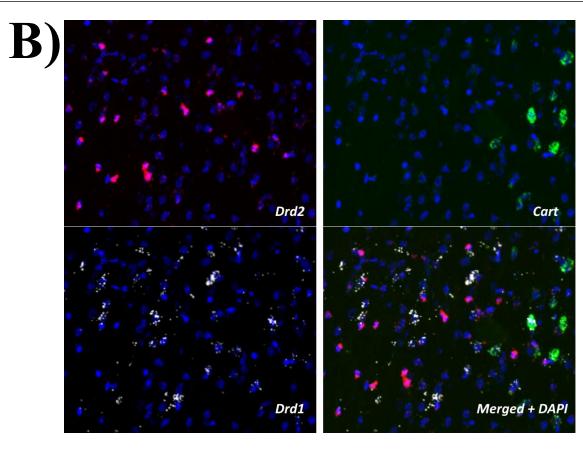
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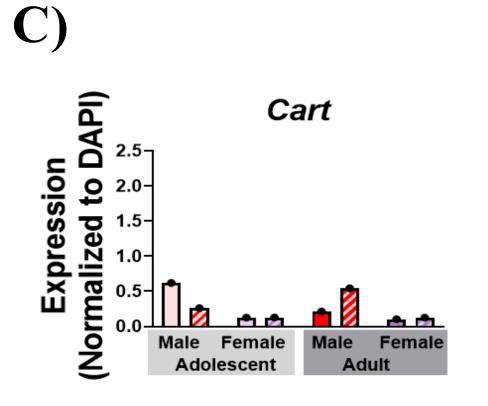
Introduction

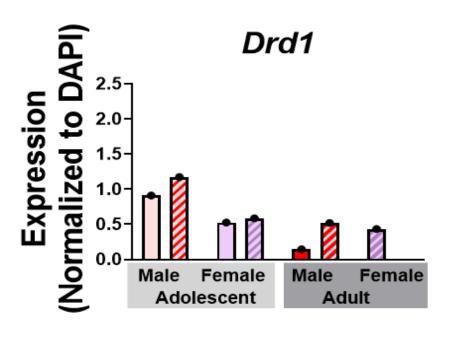
- •The central amygdala (CeA) regulates fear and anxiety.
- Dopamine (DA) in the CeA affects stress and emotional behavior.
- Disrupted DA signaling is linked to anxiety disorders.
- •Tyrosine hydroxylase (TH) marks DA input; Drd1 and Drd2 are key DA receptors.
- Cart (Cocaine- and amphetamine-regulated transcript) is a DA-regulated peptide involved in stress and reward.
- Most studies focus on adults; developmental patterns remain unclear.
- Adolescence is a critical period for brain development and anxiety risk.
- •Examining TH, *Drd1*, *Drd2*, and *Cart* across ages may reveal age-related changes in anxiety vulnerability.
- **Hypothesis**: DA input to the CeA changes with development and may underlie shifts in anxiety behavior.

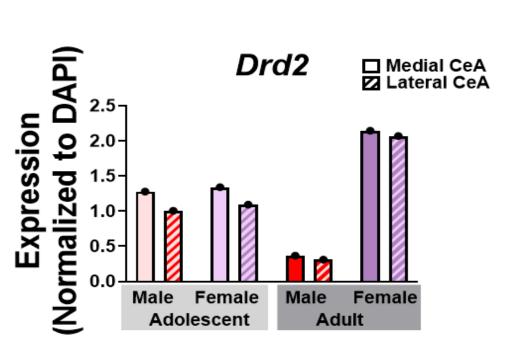
Expression of different cell types in the CeA across development





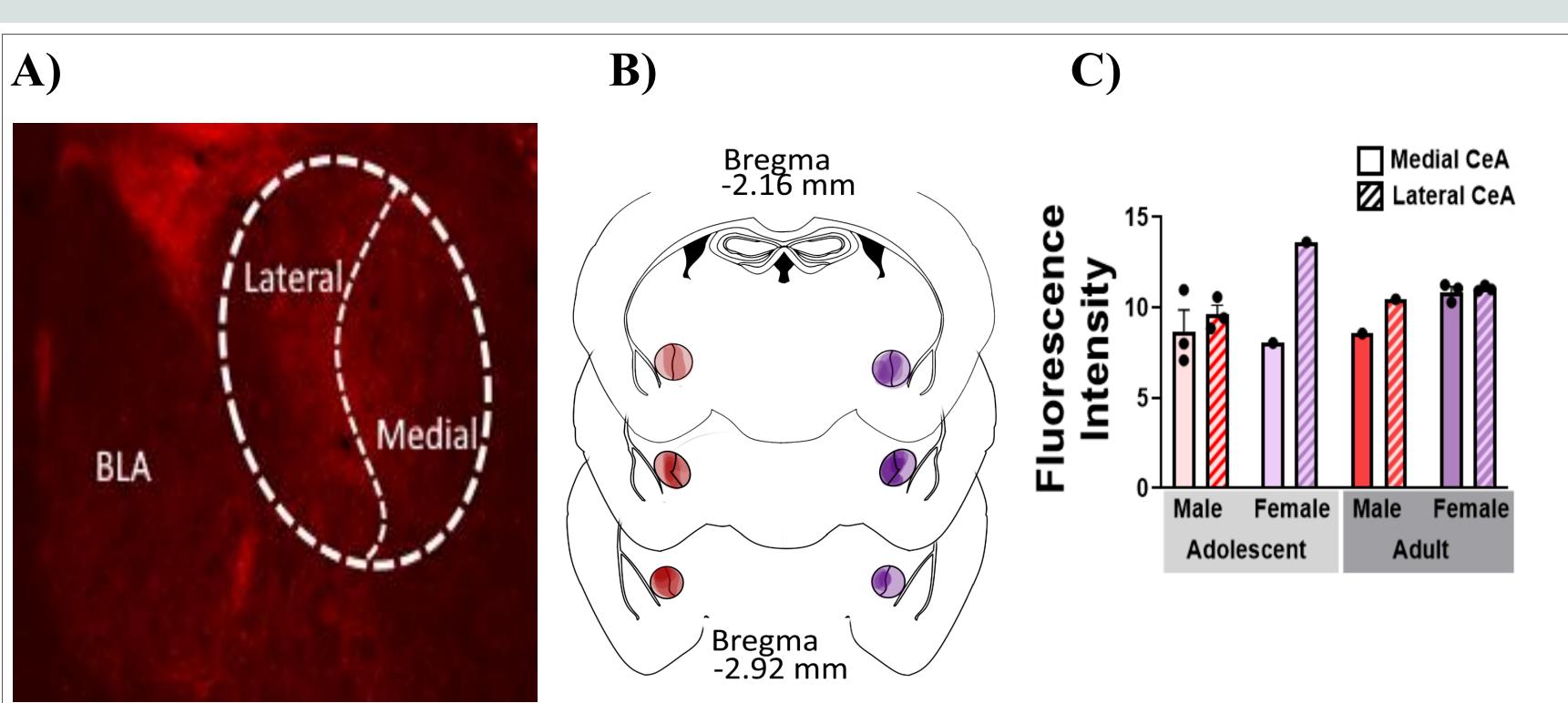






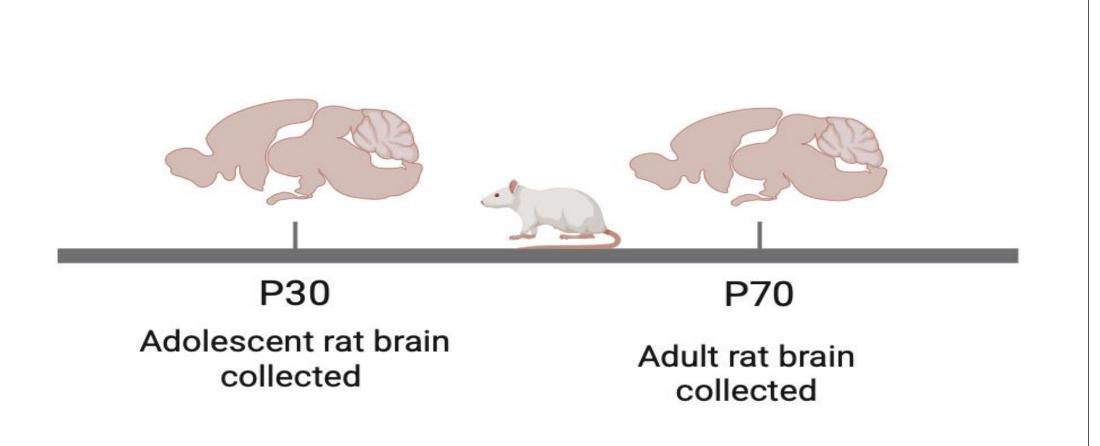
(A) Representative fluorescence image of the central amygdala (CeA) and basolateral amygdala (BLA). Labeled regions show medial and lateral CeA and BLA. Colored puncta represent marker expression; DAPI (blue) labels nuclei. (B) Coexpression of *Drd1*, *Drd2*, *and Cart in the Central Amygdala*. Fluorescent in situ hybridization images depicting Drd2 (red), Cart (green), and Drd1 (white) mRNA expression in the central amygdala. DAPI (blue) stains cell nuclei, and the merged panel shows co-localization.(C) Expression of *Cart*, *Drd1*, and *Drd2* in the medial and lateral CeA across age and sex. Bar graphs show expression levels normalized to DAPI in adolescent and adult male and female subjects. Medial CeA: open bars; Lateral CeA: hatched bars. Data are mean ± SEM; individual points shown.

TH innervation into the CeA across development



- (A) Subdivisions of the Central Amygdala. This image shows a coronal section illustrating the approximate demarcation of the medial and lateral subdivisions of the central amygdala (CeA). The basolateral amygdala (BLA) is also indicated for anatomical reference.
- (B) This Heat map showing approximate density of TH terminals in CeA of adult male (red) and female (purple) rats
- (C) Fluorescence intensity in Medial and Lateral CeA across age and sex. This graph displays the mean fluorescence intensity in the medial and lateral subdivisions of the central amygdala (CeA) for male and female, adolescent and adult subjects. Individual data points are shown, and bars represent group means with standard error.

Methods



- Male and female Wistar rats were assigned to one of four groups based on age and sex: adolescent males (postnatal day 30; P30), adolescent females (P30), adult males (P70), and adult females (P70), with n = 3 per group.
- RNAScope: To evaluate gene expression we used RNAScope to look at Cart, Drd1, and Drd2 expression in the CeA
- IHC: To evaluate gene TH innervation, we used IHC to look at the fluorescent intensity in the CeA.

Results

- Preliminary analysis revealed age-dependent differences in dopaminergic markers within the central amygdala (CeA).
- Variations were observed in tyrosine hydroxylase (TH) fiber density, indicative of dopaminergic innervation, in the CeA.
- Differences were detected in the gene expression levels of dopamine receptors *Drd1* and *Drd2*, as well as *Cart* (Cocaine- and amphetamine-regulated transcript), within the CeA.
- These differences were examined across adolescent (P30) and adult (P70) male and female Wistar rats.

Conclusion

- Replication with larger cohorts to confirm findings.
- Incorporate functional studies
 (electrophysiology, optogenetics,
 chemogenetics) to assess direct
 consequences of developmental changes.
- Correlate neurobiological findings with behavioral measures of anxiety for comprehensive understanding.
- Aims to inform age- and sex-specific therapeutic interventions for anxiety disorders.

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