The Role of Central Amygdala Projections to the Parabrachial Nucleus on Ingestive Behavior in Rats

Isaiah Addison, Rebekah Bowie, Taylor Hall, and Bailey King

GABA / Benzodiazepines

- GABA modification alters taste-guided behaviors of the parabrachial nucleus (PBN)
- Benzodiazepine agonists can lead to GABAA receptor hyperpolarization
  - Chlordiazepoxide (CDP)
  - Hyperphagia

Taste Pathway

Previous Study

- Evaluated the effects of the lateral hypothalamus
- No attenuation of benzodiazepine’s effect
  - No change in motivation
- Analysis of different brain areas

Designer Receptor Exclusively Activated by Designer Drugs (DREADDs)

- Viral technique
- Selectively activates or inhibits neurons when a specific ligand binds
- Receptors activated by clozapine N-oxide (CNO)
- Allows for the identification of pathways and their functions

What Do We Expect To Find?

- Selectively inactivating the CeA using DREADD technique will attenuate the effects of the benzodiazepine agonist
- No significant differences between conditions:
  - Saline + aCSF (control)
  - CDP + CNO (experimental)
DREADD TECHNIQUE
Site specific application & "activation" of DREADD

Wait 21 days for the DREADD virus to be expressed down the axon to the terminals of the axons in the PBN

During behavioral testing we can "TURN OFF" or silence the projection specifically in the PBN with CNO

Long Term Testing
- CDP or saline IP injections on alternating days
- Microinjections of either CNO or aCSF
- Unrestricted access to sucrose or NaCl solutions
- AC-108 Lickometer

Histological Verifications
- Sectioning
- Staining
  - Crystal violet
  - Immunocytochemistry/fluorescence
- Verification
Long Term Testing (1h) AC-108
Lick Pattern Analysis

- **Meals**: group of licks defined by 10 minute breaks
- **Burst**: group of licks defined by 2 second pauses
- **ILI less than 250 ms**: pause that is less than 250 ms
- **First minute licks**: the number of licks in the first minute of the session
- **Percent ILI above 250 ms**: pauses that fall between 250 and 1000 ms

**Sodium Chloride**

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<th>Meal Licks</th>
<th>Meal Duration</th>
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- Graphs showing differences in meal licks and meal duration between control and experimental conditions.
Discussion
Goal of current study:
• Examine the role of the CeA through the selective inactivation of the CeA, in regards to taste and motivation

Summary
Summary of current study:
• Saline compared with CDP when not activating CeA replicate previous findings
• Inactivation of the CeA had no major effects on the lick variables, but other areas may compensate when it is inactivated to continue allowing the rats to lick

Conclusions
• CeA not the only GABAergic projection to the PBN and inactivation did not produce significant change on licking behavior, but showed some signs that it is involved in palatability
• Currently verifying histology of PBN/CeA

Future Studies
1. Inactivate multiple/all GABAergic projections to PBN
2. Selectively re-activate certain pathways
3. Use the DREADD that excites neurons to activate them in the absence of CDP

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