Abstract

We outline the methodology and preliminary results of **dynamic fallypride PET** and **3-Tesla MRI** studies that investigate an increase in dopamine levels for memory encoding and consolidation in human.

Our functional MRI data show that ***dopaminergic SN/VTA and noradrenergic Locus Coeruleus are engaged during memory encoding of reward-related stimuli***. Our modelling results from dynamic PET data suggest that dynamic PET indicators of ***endogenous dopamine release are measurable in basal ganglia*** during ***reward-related memory encoding***.

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Simultaneous MR-PET scanner

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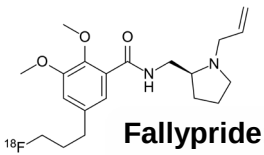
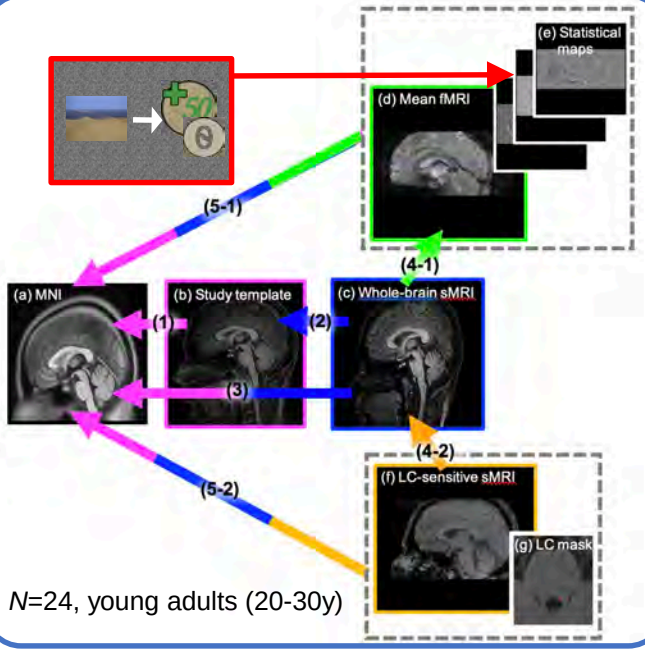


Fallypride: D2/D3 receptor antagonist

Methods

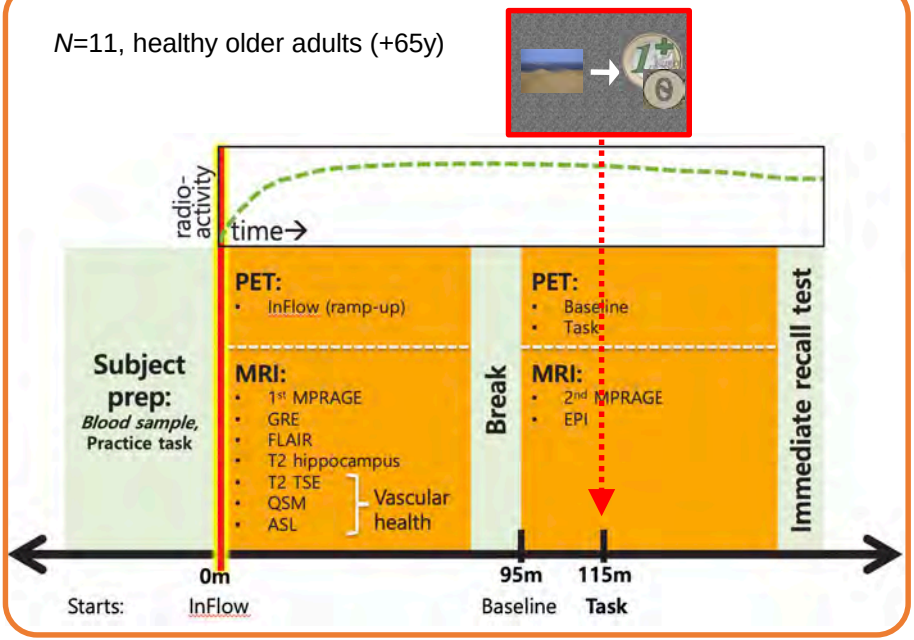
3T-MRI



N=24, young adults (20-30y)

Concurrent MR-PET

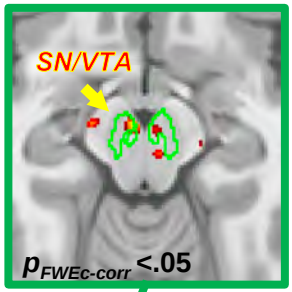
N=11, healthy older adults (+65y)



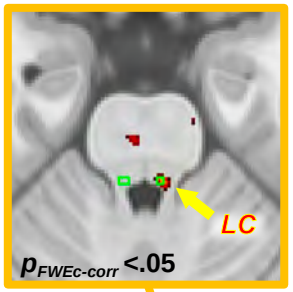
Results

3T-MRI

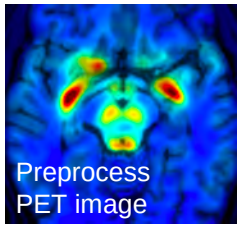
Stimulus screen:
Reward > Neutral

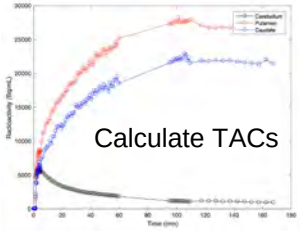


Feedback screen:
Reward > Neutral



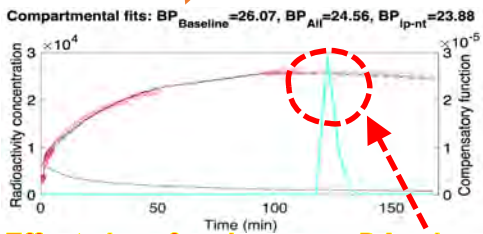
Concurrent MR-PET



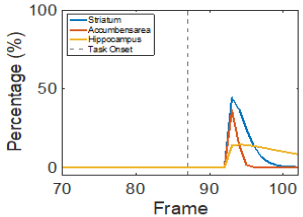


Lpnt-PET modelling

$$C_T = R_1 C_R(t) + k_2 \int_0^t C_R(u)du - k_{2a} \int_0^t C_T(u)du - \gamma \int_0^t \mathbf{C_T(u)h_i(u)du}$$



Effect size of endogenous DA release



Receptor occupancy

Conclusion

- Dopaminergic- and noradrenergic neuromodulatory systems are differentially involved in reward-related memory encoding.
- Dynamic Fallypride PET allows us to model task-related endogenous dopamine during memory encoding
- Outlook: By increasing the current sample size, we expect to see more robust DA-related activities in hippocampus and midbrain areas.