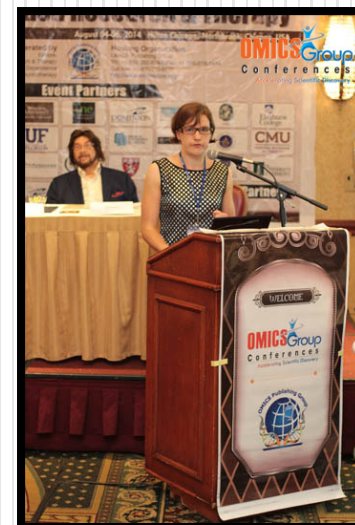


Addiction Therapy-2014

Chicago, USA

August 4 - 6, 2014



Sarah Herremans



The effect of HF-rTMS in alcohol-dependent patients: Results from an fMRI study

Sarah Herremans, MD



Universitair Ziekenhuis Brussel



Vrije Universiteit Brussel

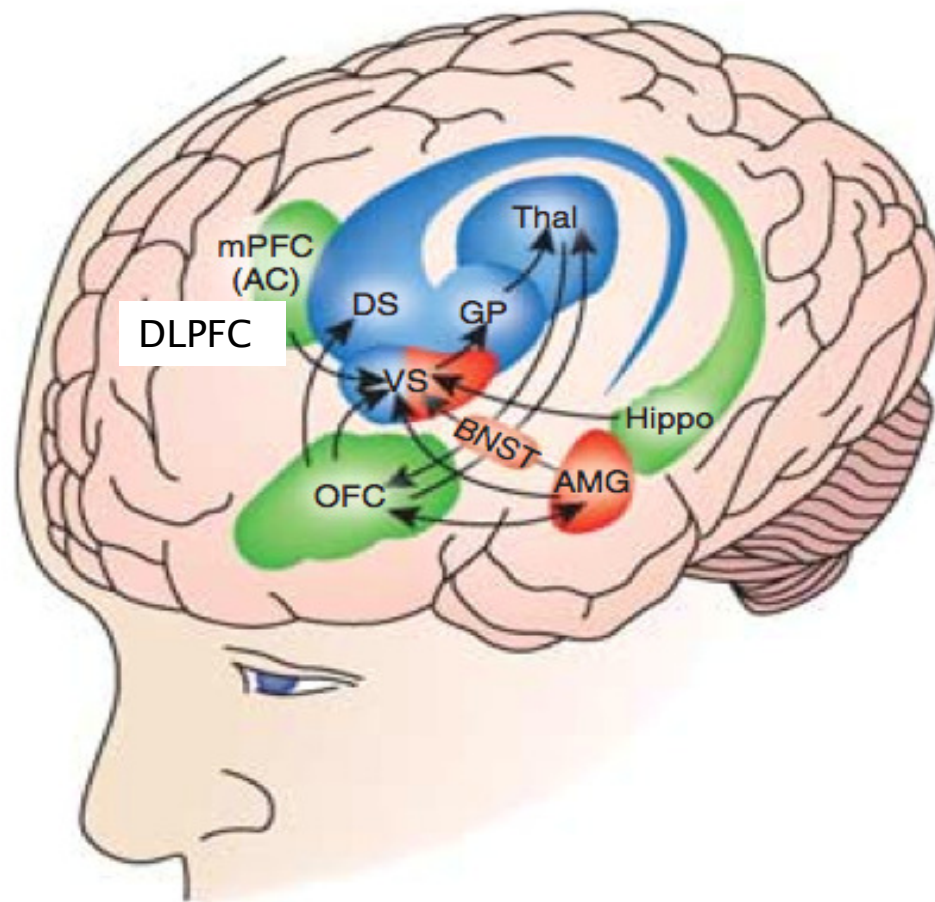


- Introduction

- Study design & results

- Conclusions

Key structures in addiction



Koob & Volkow, 2010

rTMS & alcohol craving in detoxified alcoholic patients

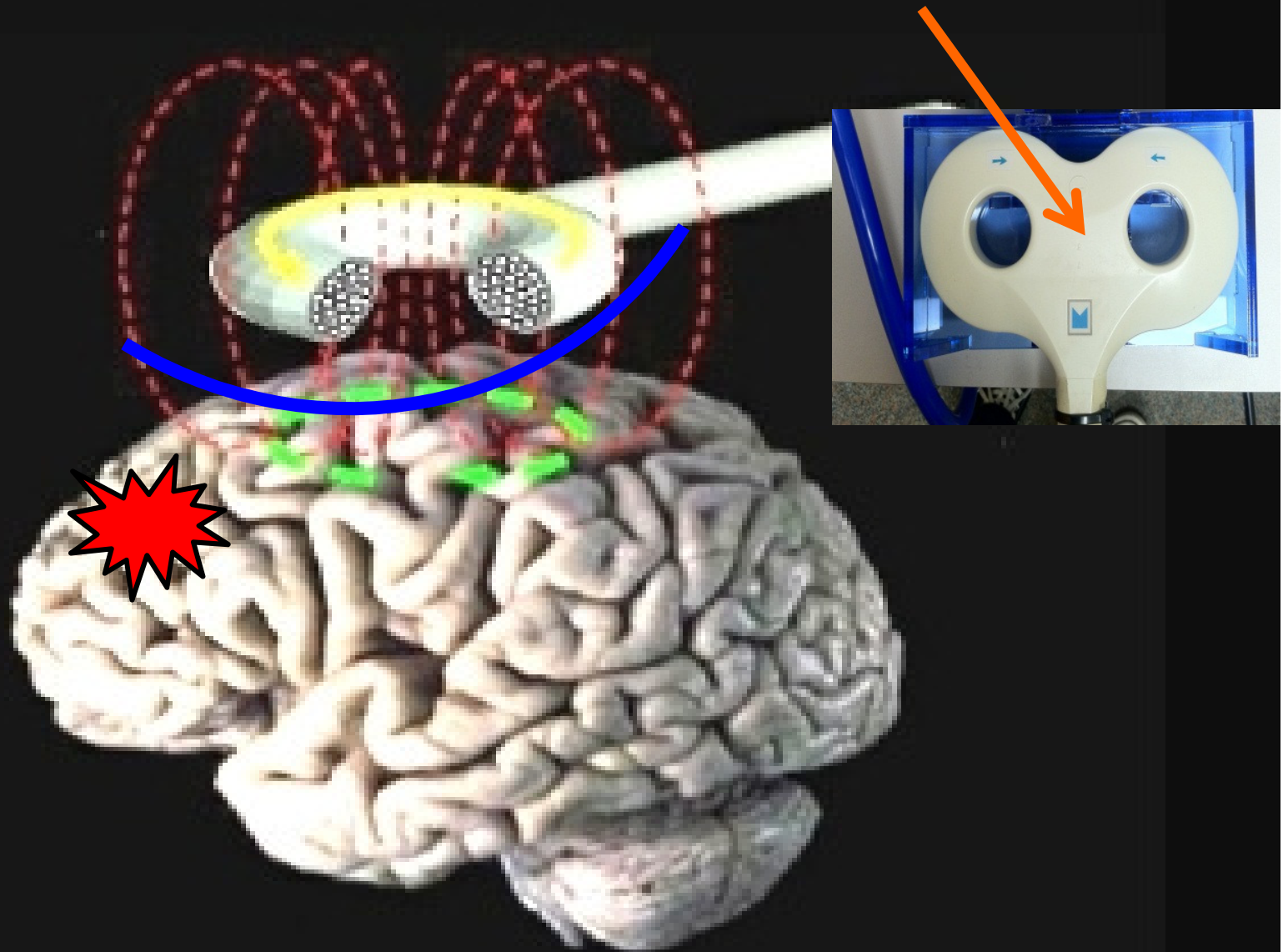
- Mishra et al., 2010:
 - > 10 daily sessions, HF-rTMS (10 Hz) right DLPFC, 1000 pulses per day, SHAM-controlled
 - => ↓ subjective craving, ↓ relapse rate

- Herremans et al., 2012:
 - > 1 session, HF-rTMS (20 Hz) right DLPFC, 1560 pulses, sham (=PLACEBO)-controlled
 - ⇒ **No effect on** subjective craving
 - ⇒ Increase of attentional control during Go-NoGo task

Repetitive transcranial magnetic stimulation (rTMS)



transcranial magnetic stimulations (rTMS)



Can **one** and **fifteen** HF-rTMS sessions influence **the craving neurocircuitry** in detoxified alcohol dependent patients during a **cue-exposure**?



Universitair Ziekenhuis Brussel



Vrije Universiteit Brussel

- Introduction

- Study design & results

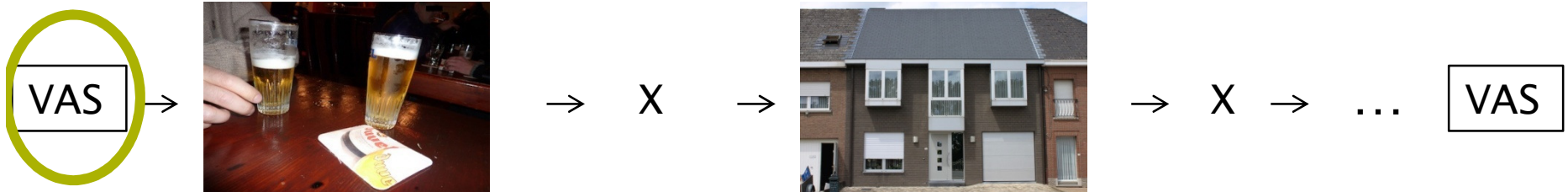
- Conclusions

Demographic data

- 20 alcohol-dependent patients
- Detoxified < CIWA-AR
- 11 males / 9 females
- Age: 46,5 y (SD: 10,0)
- Duration alcohol problem: 13.0 y (SD:9.9)

Study design – evaluation of 1 HF-rTMS session

fMRI Event Related design

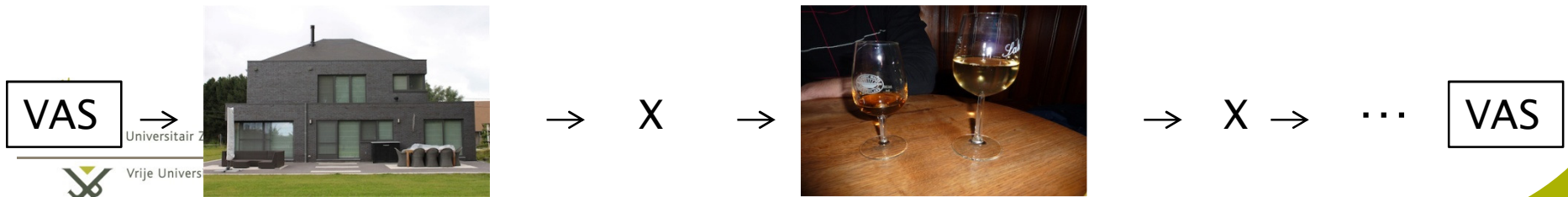


one sha
12 pts
8 pts

“How much do you crave for an alcoholic beverage right now on a scale from 0 to 10?”

ssion
FC

fMRI Event Related design



Study design – **ACCELERATED** evaluation of 15 HF-rTMS sessions

fMRI Event Related design



→ X →

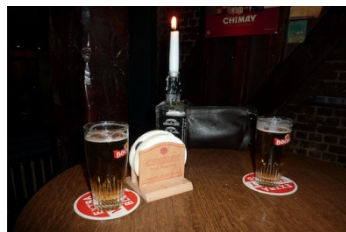


→ X → ...

HF-rTMS: 20Hz
1560 p/session
110% MT
Right DLPFC

15 active HF-rTMS sessions
20 patients -> 2 drop-outs

fMRI Event Related design



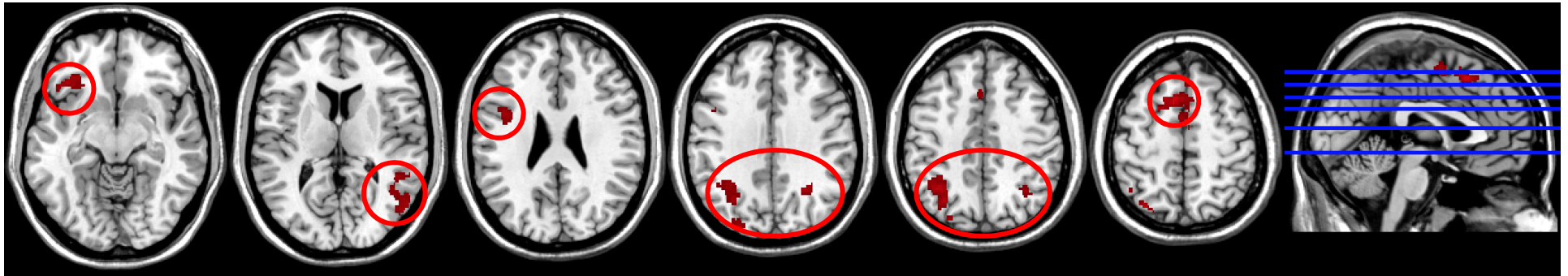
→ X →



→ X → ...

Results: Baseline

Baseline Alcohol cue > Neutral cue



$P < 0.001$;
AlphaSim corrected voxel: 176

Inferior frontal gyrus (BA47) left
Inferior temporal gyrus (BA37) right
Medial Frontal gyrus (BA6) left
Superior parietal lobule (BA7) left/right

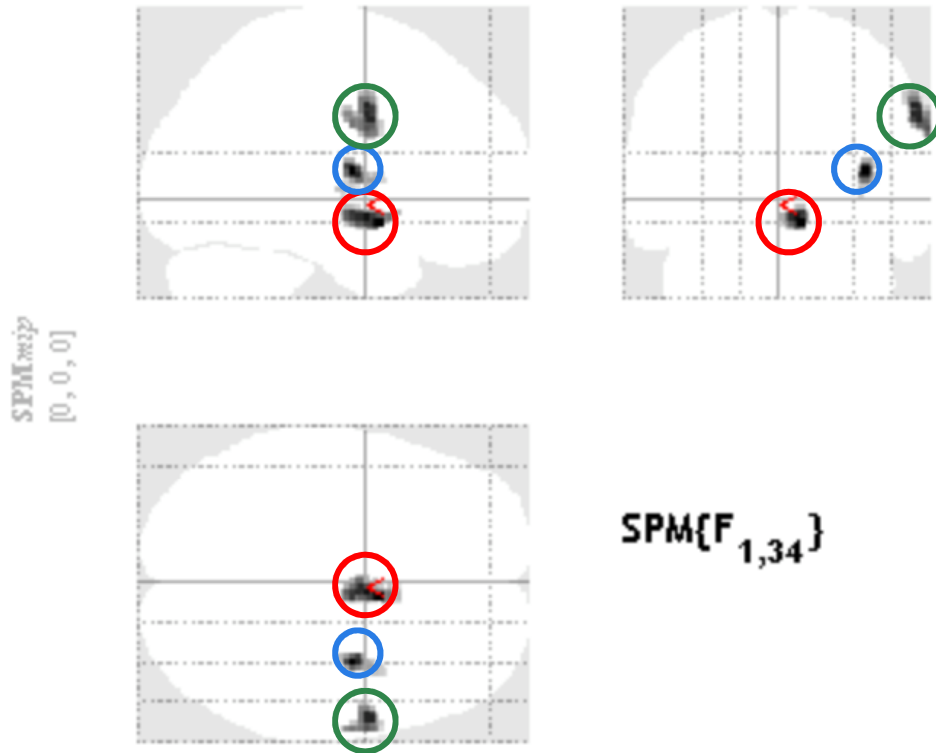
No increase in craving

Results: one sham-controlled HF-rTMS session

Demographic data

	Real stimulation (12)	Sham stimulation (8)
Age	M=48.0 SD=9.9	M=44.4 SD=8.7
Gender (M/F)	8/4	4/4
Benzodiazepine free days before stimulation	M=15.1 SD=5.2	M=12.5 SD=2.7
% MT	M=57.6 SD=10.6	M=64.1 SD=6.4
VAS before cue-exposure (0=>10)	M=2.3 SD=2.7	M=2.6 SD=3.4
VAS after cue-exposure (0=>10)	M=2.5 SD=3.0	M=2.8 SD=3.5

Results: 1 sham controlled session



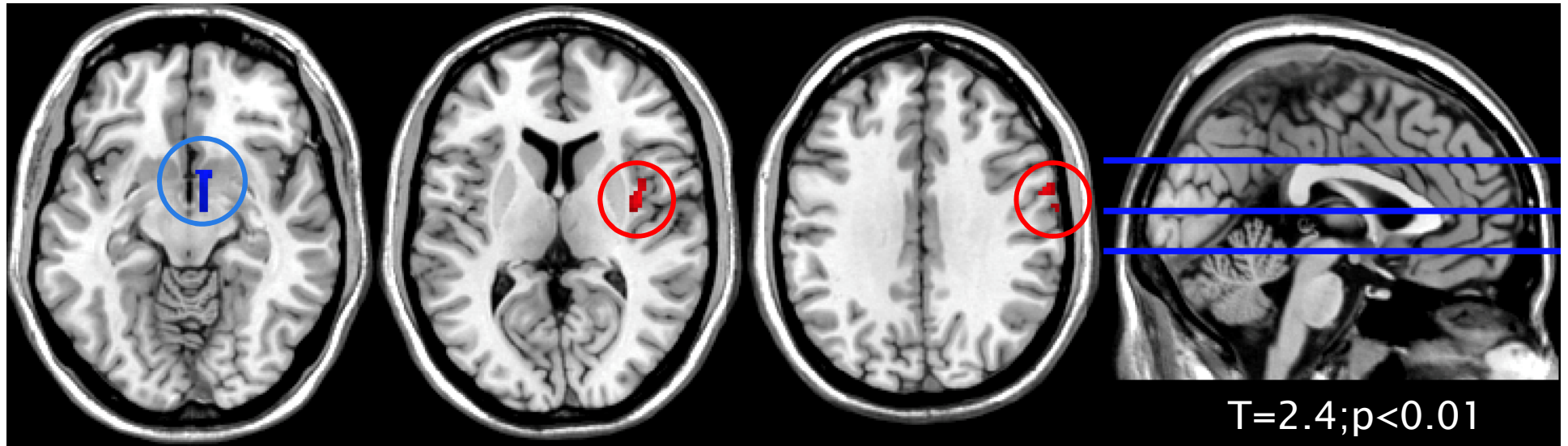
INTERACTION:
Pre_Post x Sham_Real

F=7.4; $p < 0.01$;
AlphaSim corrected voxel: 71

Nucleus Accumbens
Insula
BA6

SPMresults: ./full_factorial_1sessie_ER_age_gender
Height threshold F = 7.444136 {p < 0.01 (unc.)}
Extent threshold k = 71 voxels

Results: 1 REAL stimulation



↓ Nucleus Accumbens

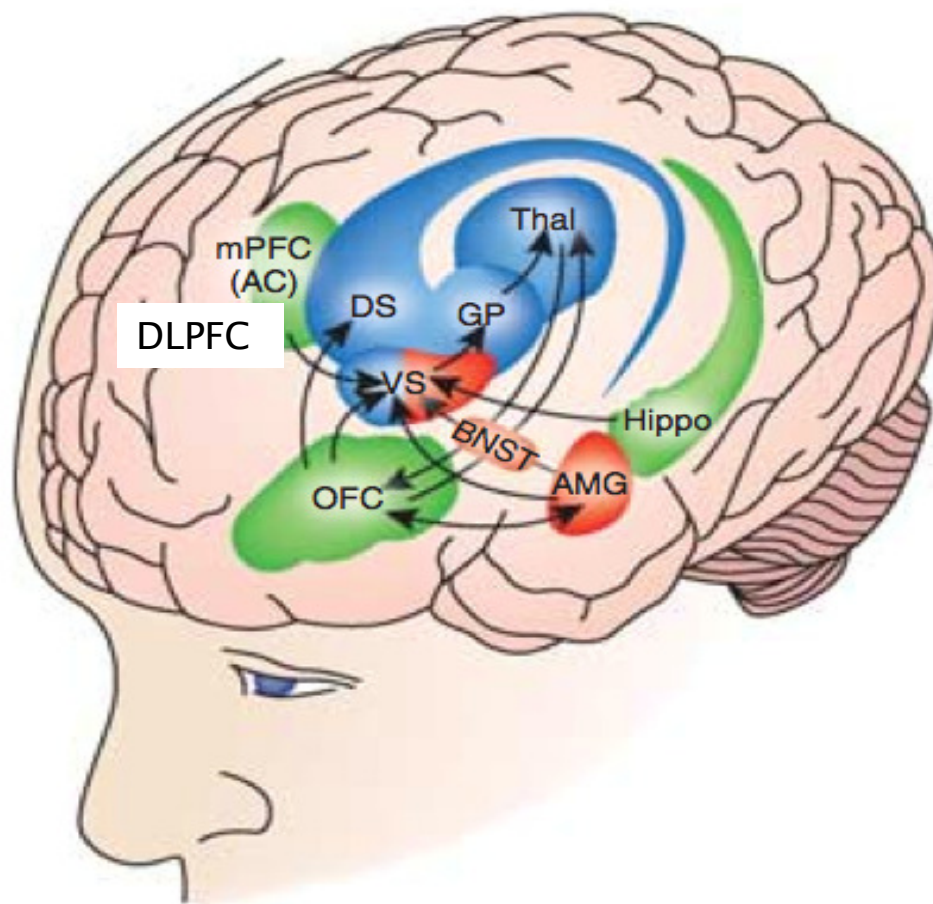
↑ Insula

↑ Precentral gyrus (BA 6)

No effect of sham stimulation

No effect on VAS-craving
(deltaVAS)

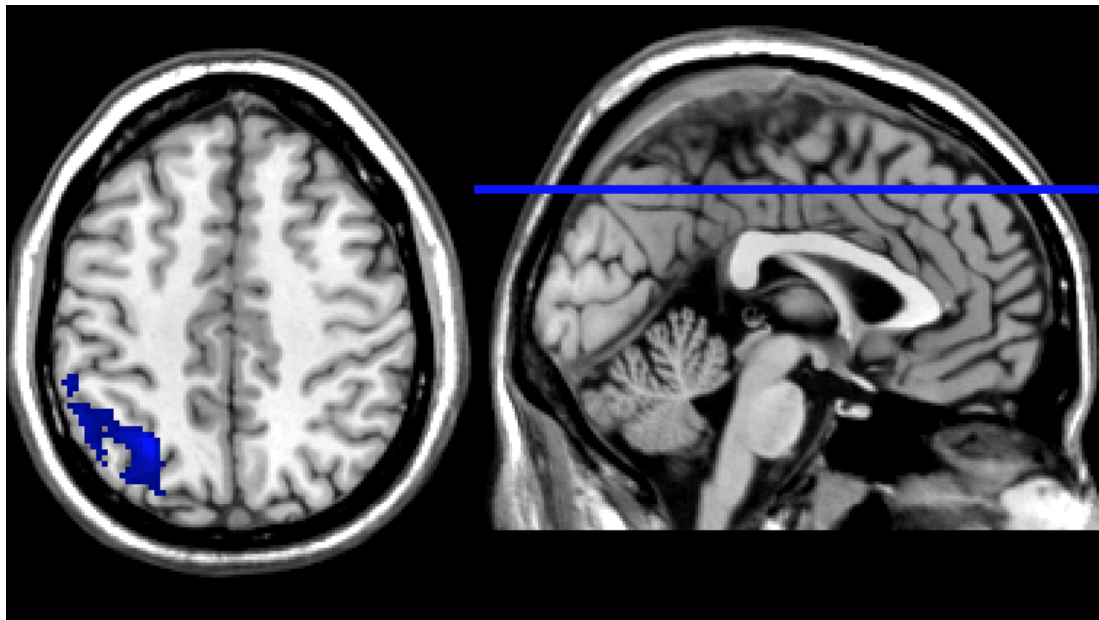
Key structures in addiction



Koob & Volkow, 2010

Results: 15 active HF-rTMS sessions
in an **accelerated** paradigm

Treatment effect of 15 active rTMS sessions



2 drop-outs

$T=2.6$; $p<0.01$

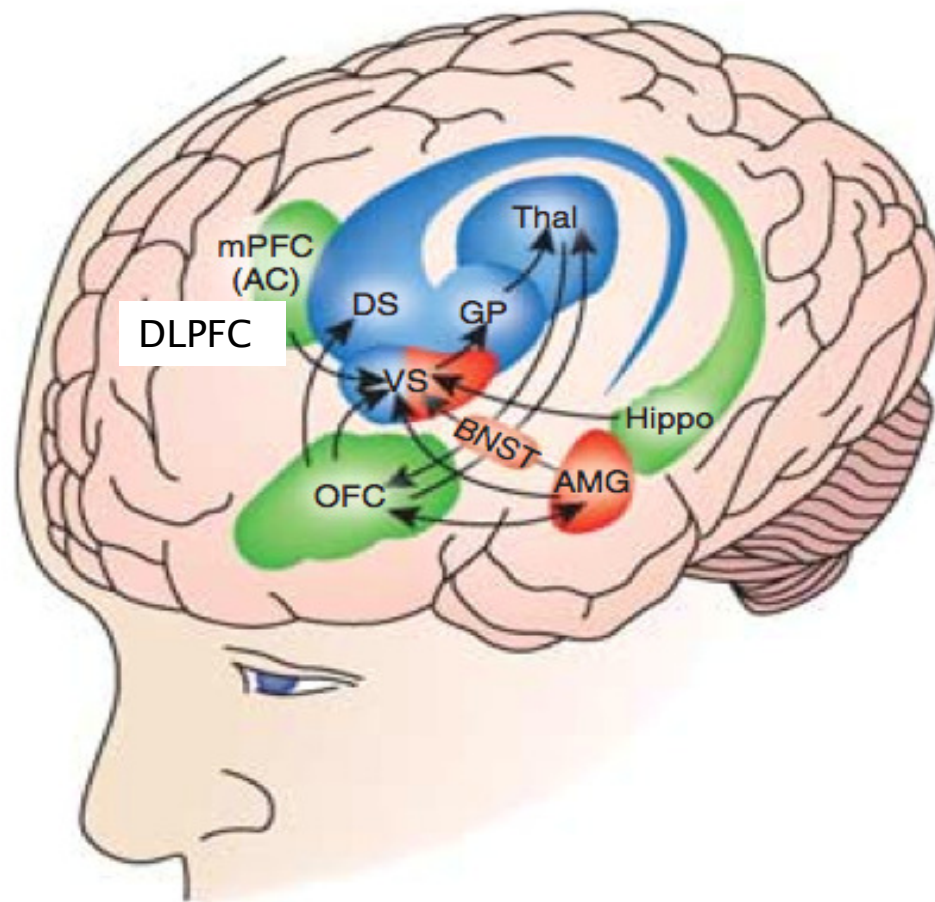
alphaSim voxel corrected: 482

↓ Superior Parietal lobule (BA7)

~~deltaVAS during fMRI~~

↓ **craving** (AUQ, OCDS): $p<0.05$

Key structures in addiction



Koob & Volkow, 2010

- Introduction
- Study design & results
- Conclusions

1 active HF-rTMS session

- Placebo - controlled design
- No effect on cue-induced craving
- ↓ Nucleus Accumbens
- ↑ Insula
- ↑ BA 6



Universitair Ziekenhuis Brussel



Vrije Universiteit Brussel

No effect of **sham** stimulation

15 active HF-rTMS sessions

- Accelerated HF-rTMS protocol
- Open study: ↓ craving outside fMRI
- No effect on cue-induced craving
- ↓ superior parietal lobule

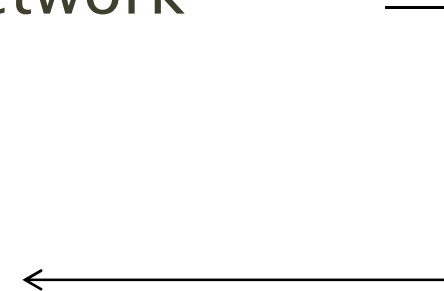
General conclusions

- HF-rTMS ~~⇒~~ cue-induced craving
- HF-rTMS ~~⇒~~ craving neurocircuit (Koob & Volkow, 2010)

But:

- HF-rTMS ⇒ salience and attention network
- HF-rTMS ⇒ subjective craving ↓

salience attribution to &
attention at alcoholic stimuli ↓



Universitair Ziekenhuis Brussel



Vrije Universiteit Brussel

Limitations

- Relatively small sample
- No control group for the treatment part
- Hospitalized patients seldom report craving when confronted with alcoholic stimuli (Wilson et al., 2004)

Thank you for your attention!

QUESTIONS?

Collaborators:

Chris Baeken, MD, PhD

Peter Van Schuerbeek, Msc

Marie-Anne Vanderhasselt, PhD

Frieda Matthys, MD

Rudi De Raedt, PhD





Meet the eminent gathering once again at

Addiction Therapy-2015

Florida, USA

August 3 - 5, 2015

Addiction Therapy – 2015 Website:

addictiontherapy.conferenceseries.com