

Sex differences in a population at familial high risk for psychosis

Analysis of neuroanatomical and symptom sexual dimorphism

Society for Neuroscience, 2016

Elisa Guma

Gabriel A Devenyi, Jurgen Germann, M Mallar Chakravarty



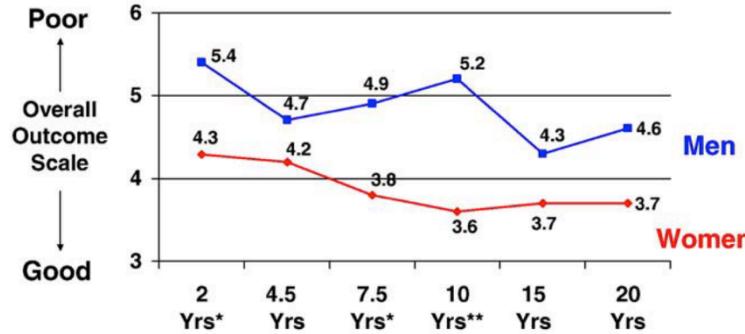
>CoBrALab
computational brain anatomy
<http://cobralab.ca>



McGill

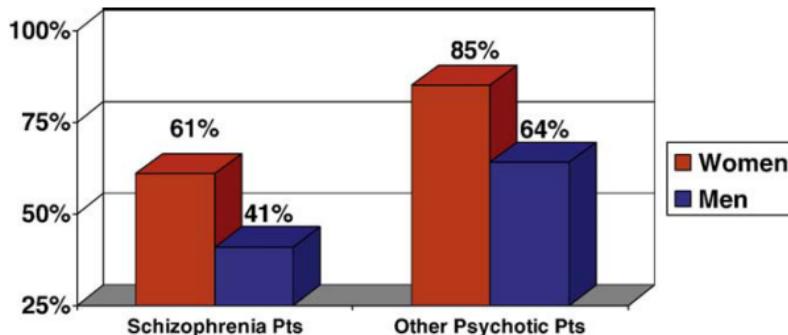
Douglas
INSTITUT
UNIVERSITAIRE EN
SANTÉ MENTALE
MENTAL HEALTH
UNIVERSITY
INSTITUTE

Sex differences in schizophrenia

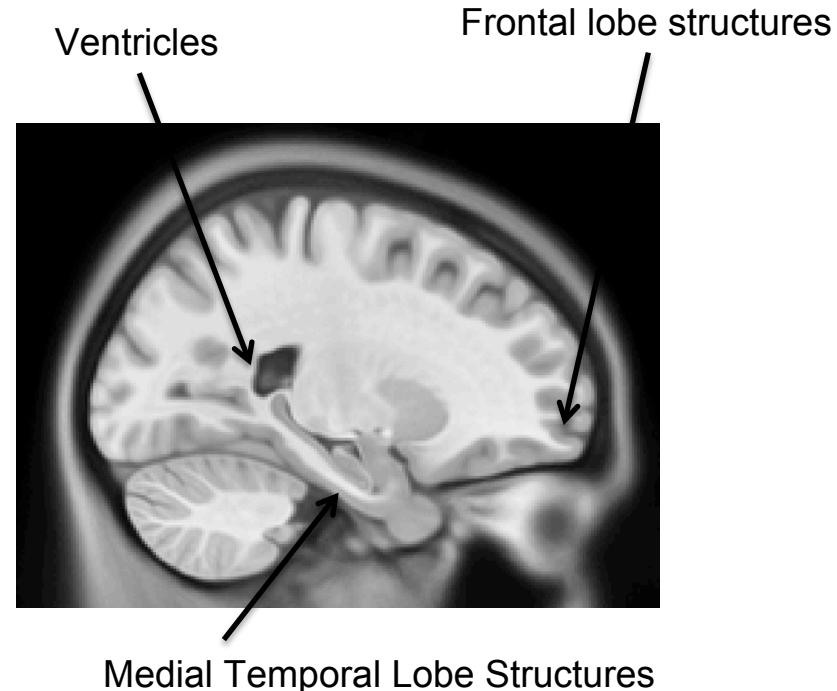


* $P < .05$

** $P < .01$ ¹Higher scores represent poorer global outcome



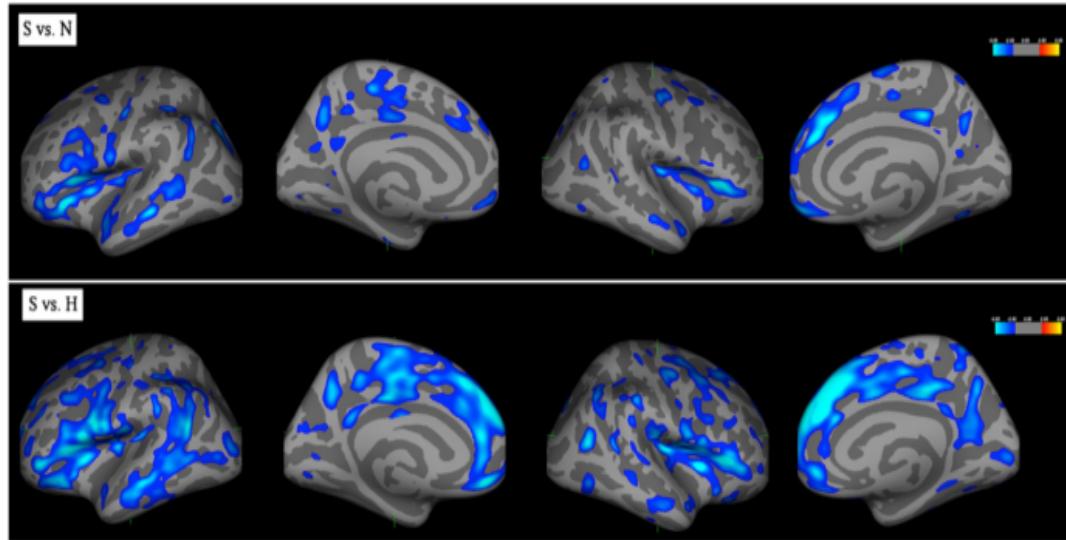
Grossman et al., 2008



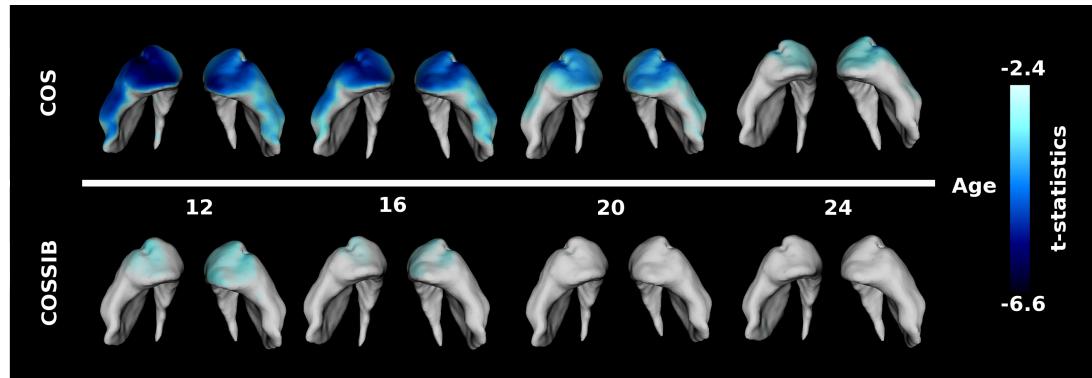
What about individuals at familial high risk?

Schizophrenia is
40-70% heritable

8-12% lifetime risk
of conversion



Li et al., 2012

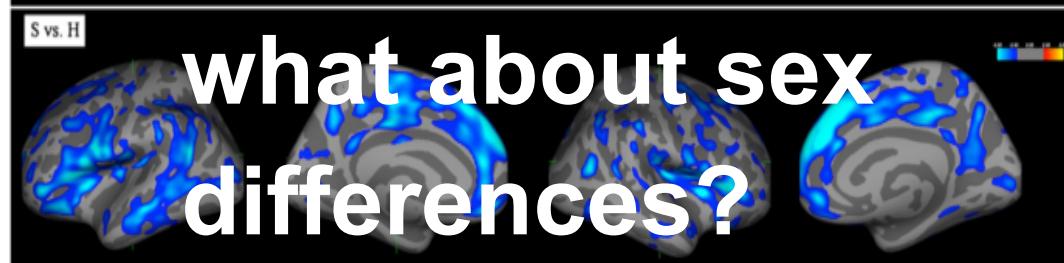
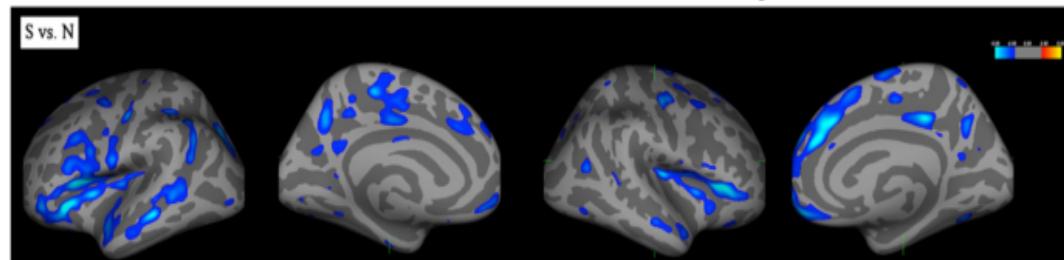


Chakravarty et al., 2015

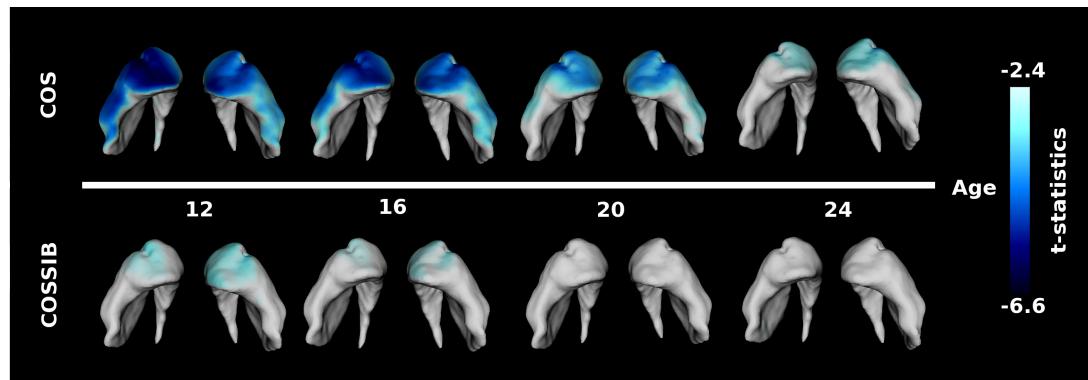
What about individuals at familial high risk?

Schizophrenia is
40-70% heritable

8-12% lifetime risk
of conversion



Li et al., 2012



Chakravarty et al., 2015

Northwestern University Schizophrenia Data and Software Tool (NUSDAST)

1mm³ isotropic structural MRI (MPRAGE, 1.5T)

Symptoms: SAPS/SANS

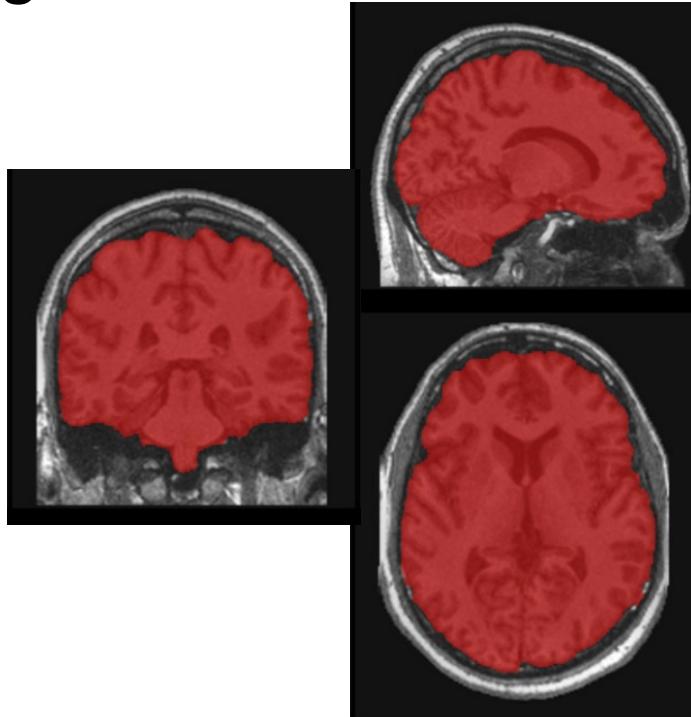
	Schizophrenia Subjects	Control Subjects	Schizophrenia Siblings
N	60	111	44
Gender (M/F)	45/15	60/51	21/23
Age range	17-30	14-30	14-29

Pre-processing of raw MRIs

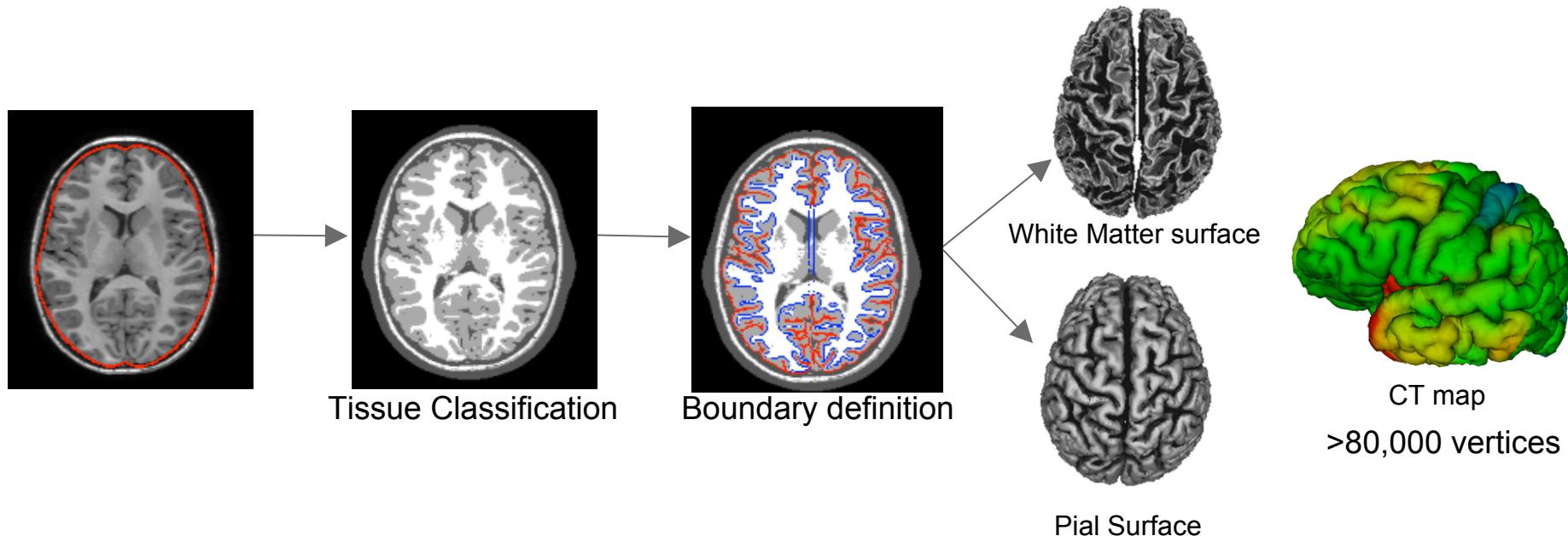
1. Average multiple MPRAGE scans

2. Using minc-bpipe-library:

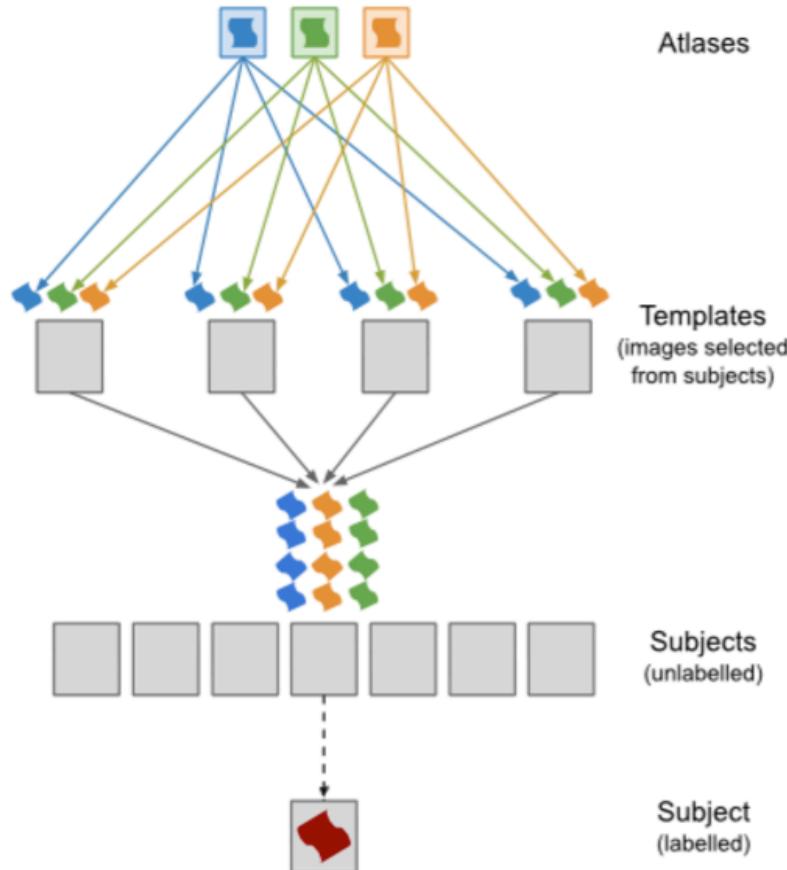
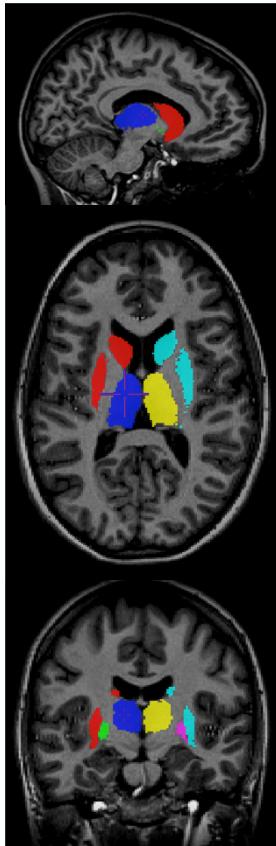
- Bias field Correction
- Application of head mask to remove excess data
- Brain mask generation with BeAST



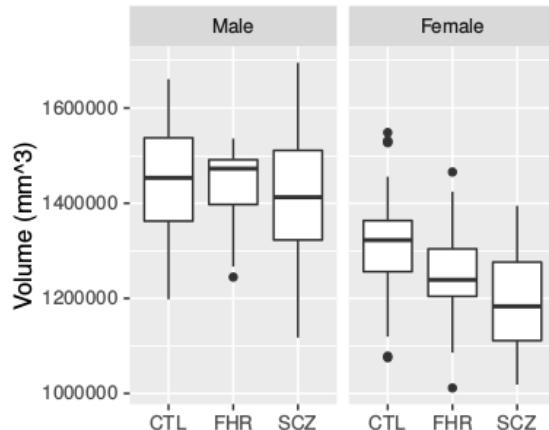
Cortical Thickness and Surface Area using CIVET



MAGeT Brain Segmentation

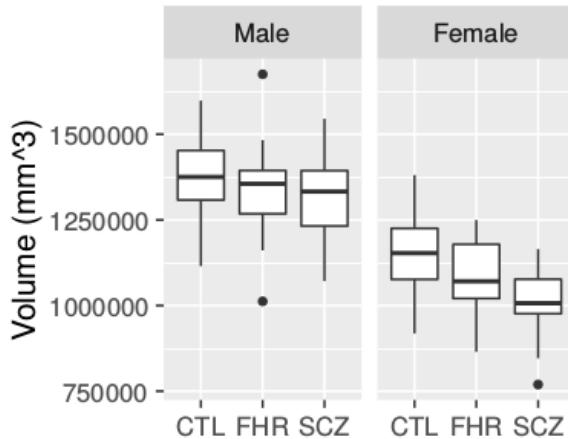


Total Brain Volume



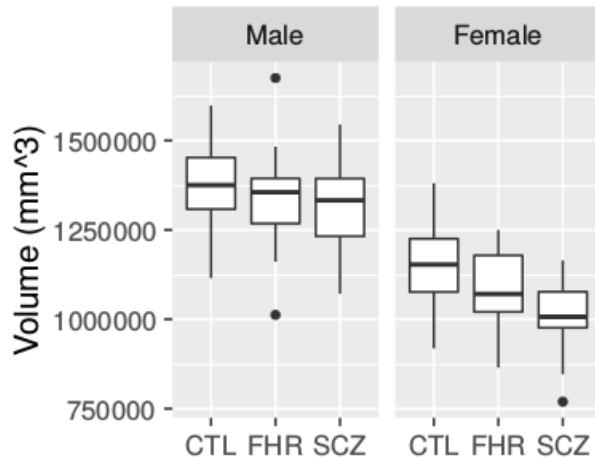
Sex*SCZ, $p=0.02$

Gray Matter Volume



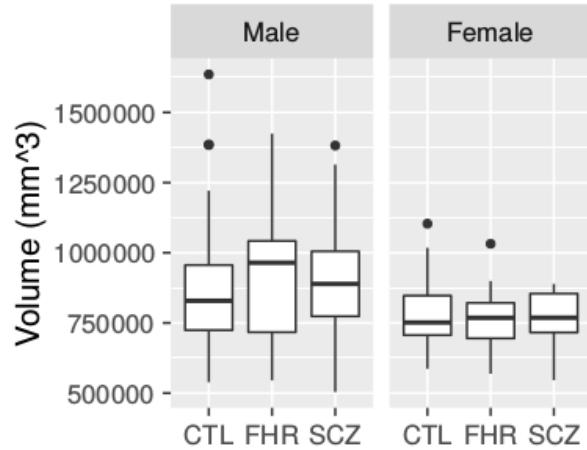
SCZ main effect, $p=0.03$ Sex main effect, $p<0.0001$

CSF Volume



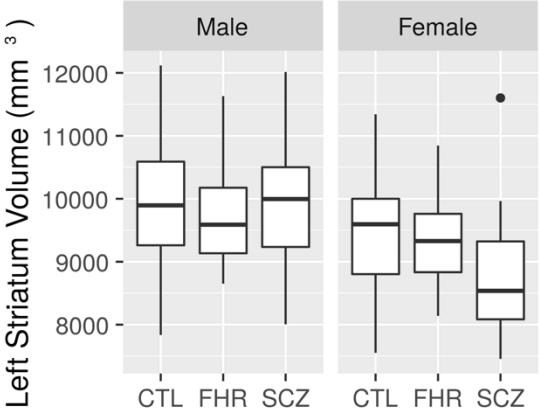
Sex main effect, $p=0.03$

White Matter Volume

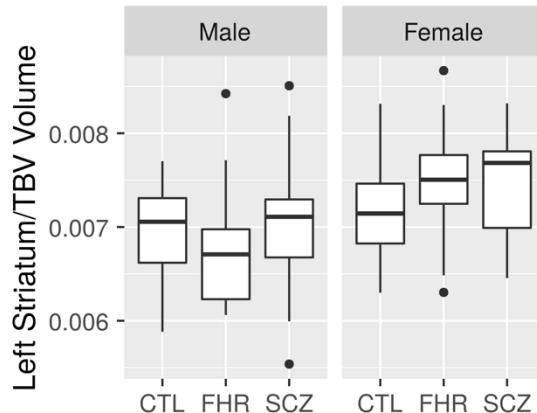


Sex main effect, $p=0.006$

Left Striatum

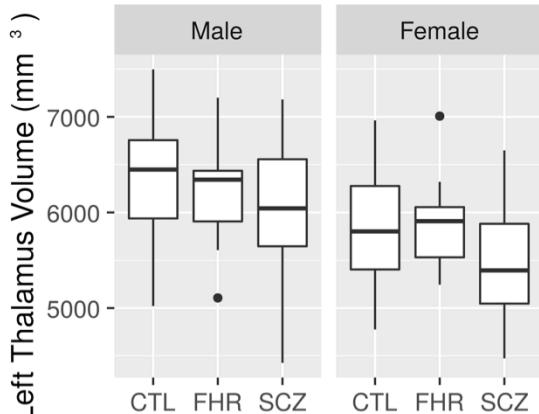


Left Striatum

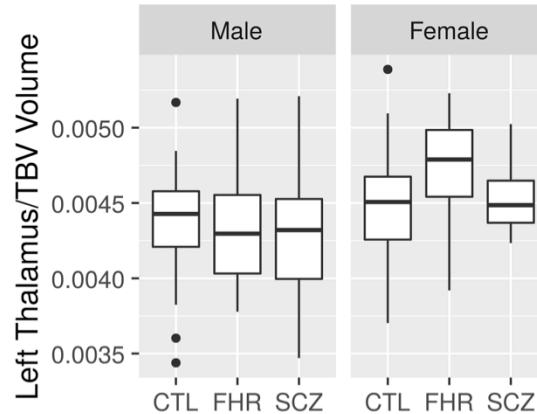


Sex*FHR, $p=0.02$

Left Thalamus

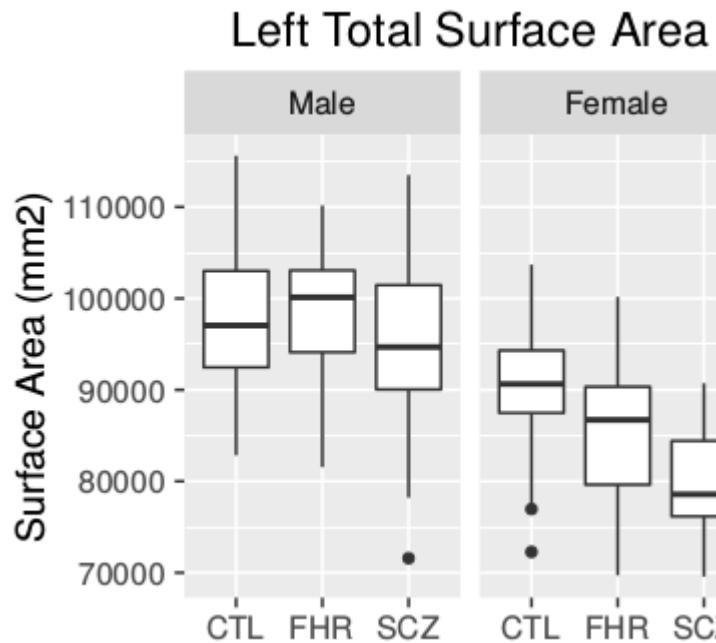


Left Thalamus

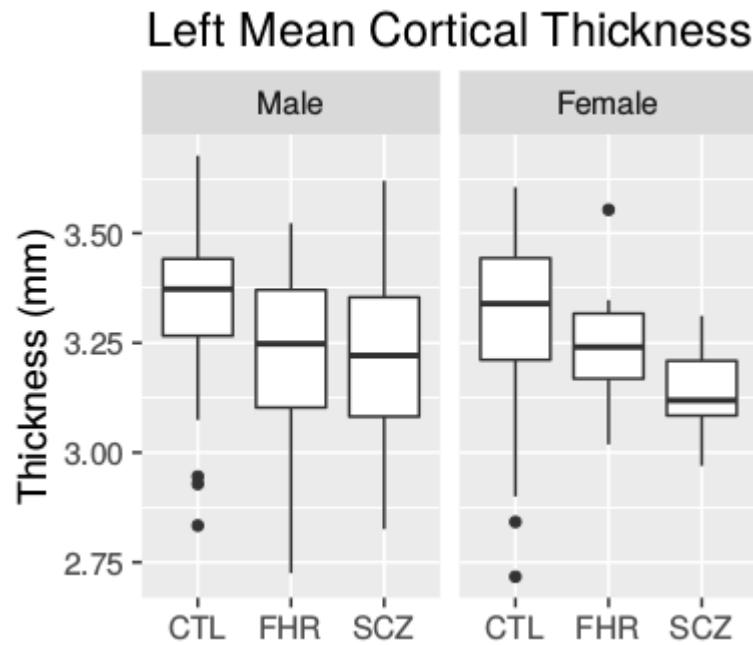


Sex*FHR, $p=0.02$

Sex*SCZ, $p=0.07$

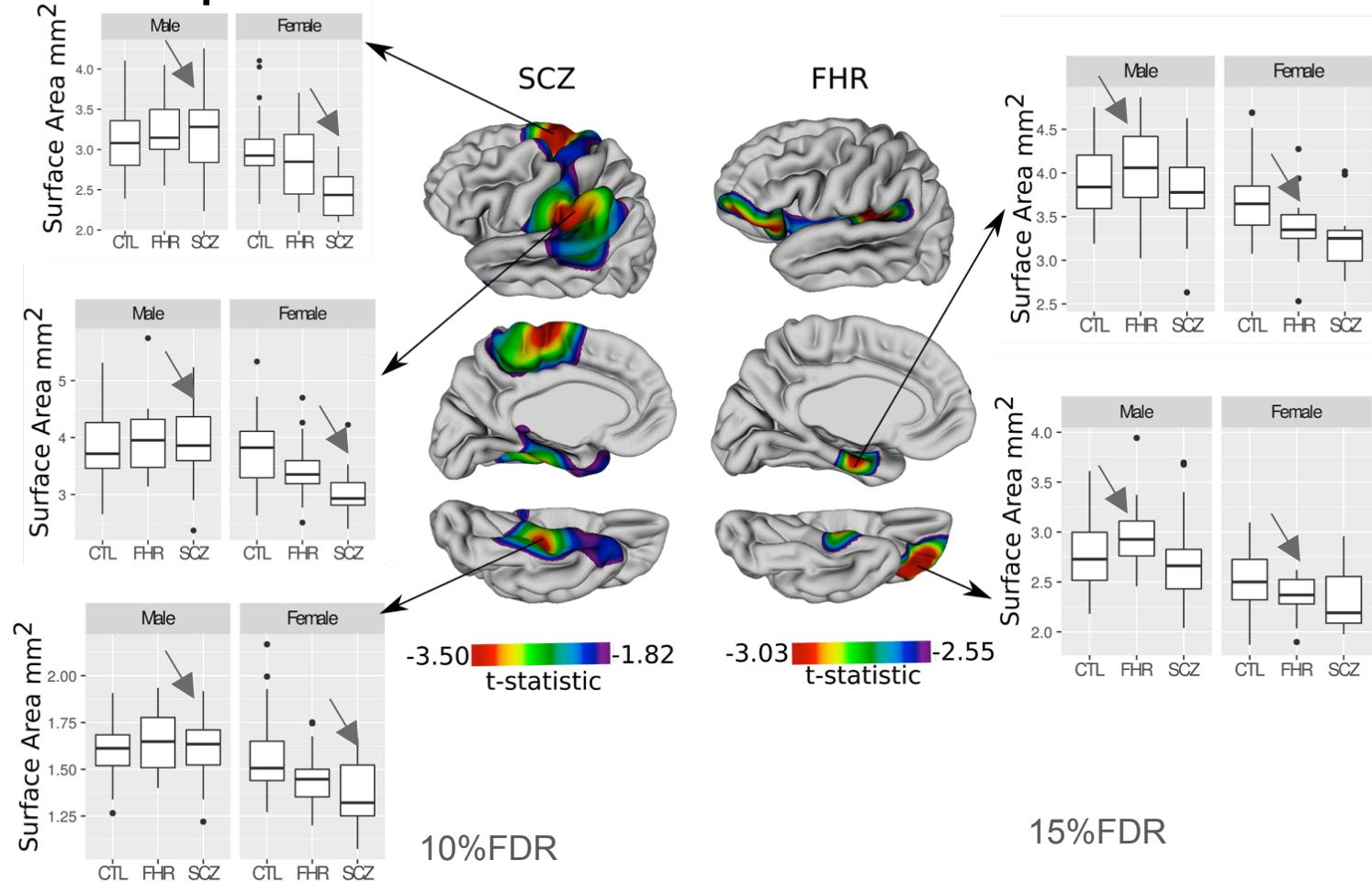


SCZ*Sex, p=0.01
FHR*Sex, p=0.08

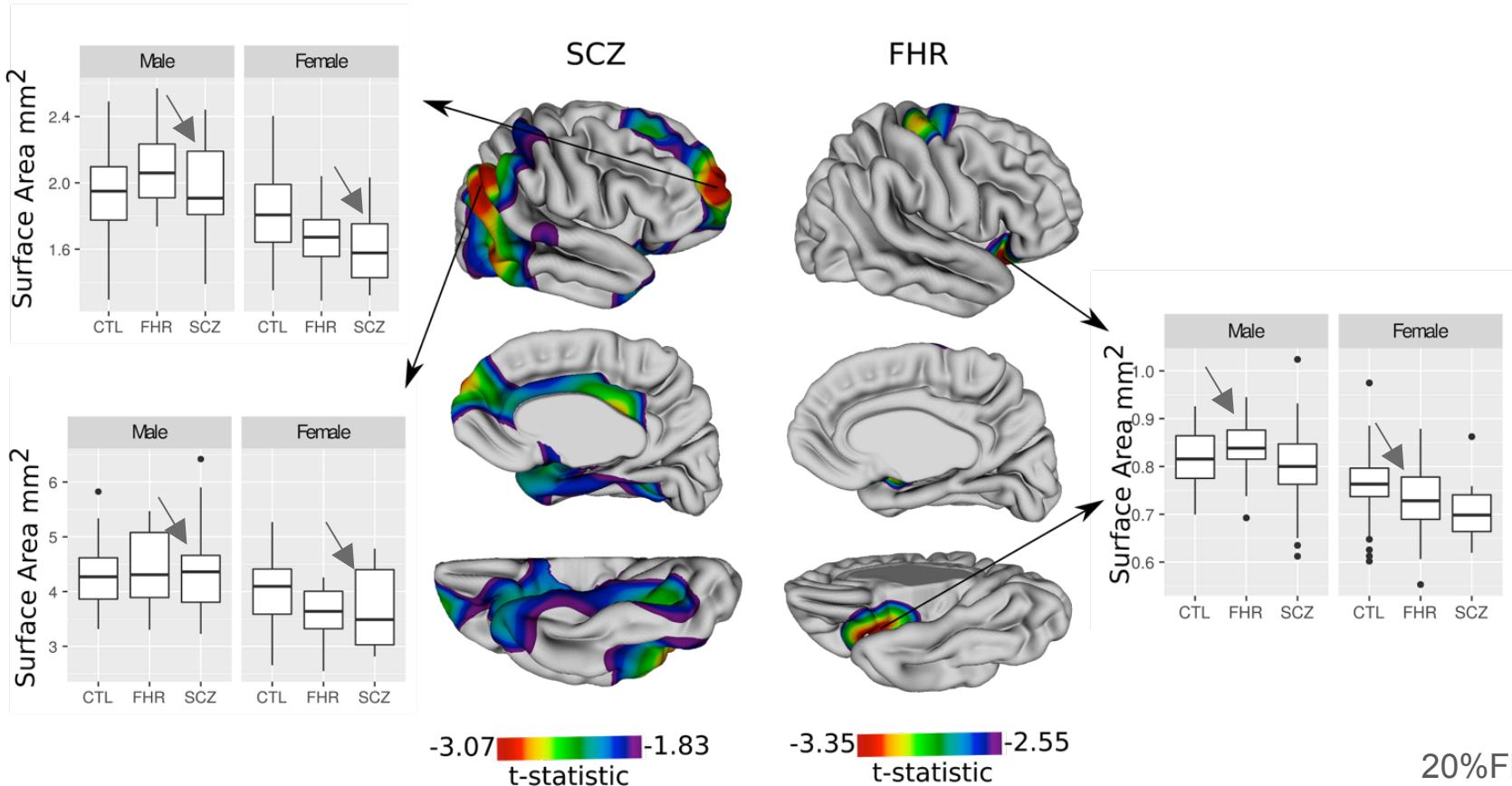


SCZ main effect, p=0.001
FHR main effect, p=0.01

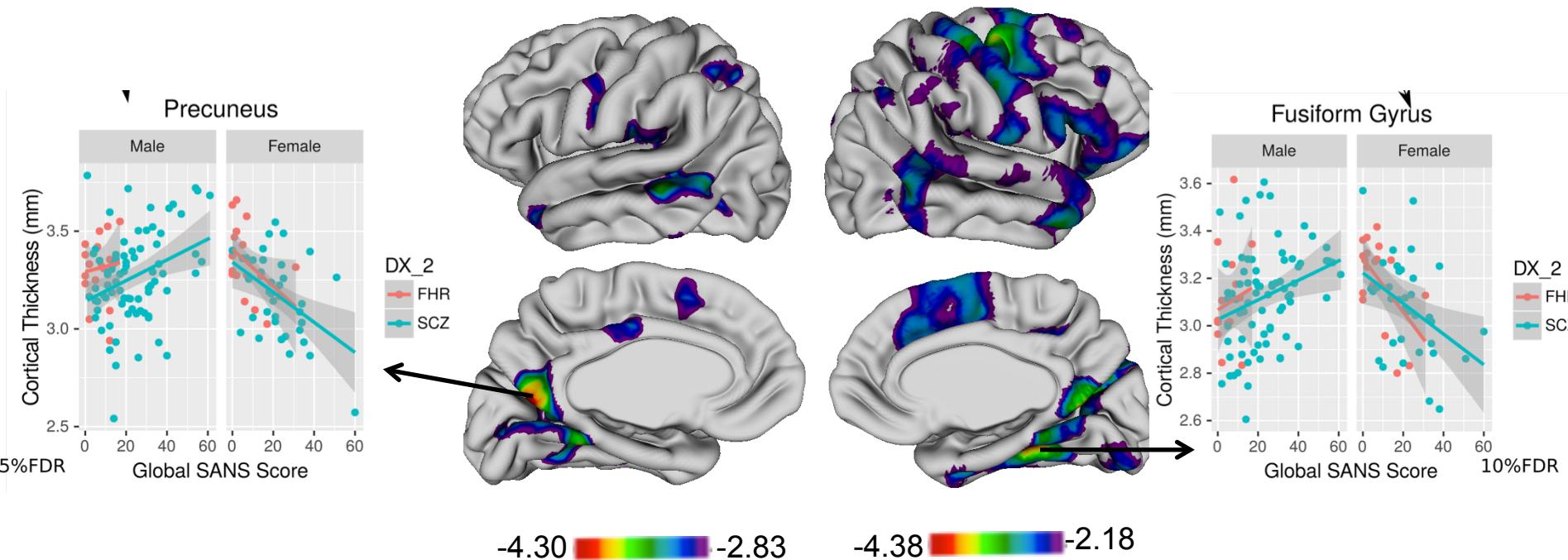
Left Hemisphere Surface Area



Right Hemisphere Surface Area



Interaction between cortical thickness and negative symptoms (Global SANS)

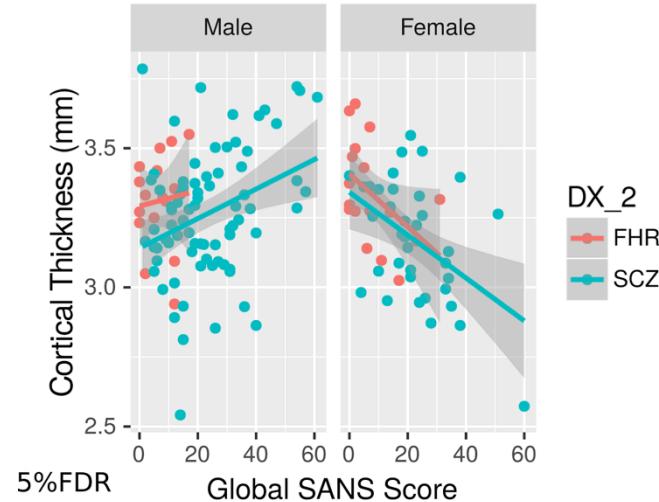
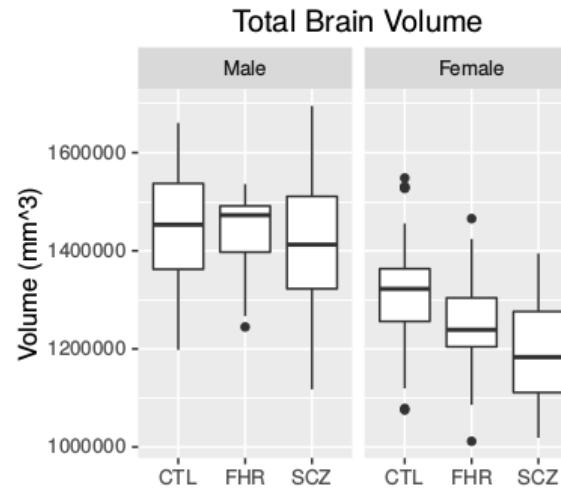


Summary of Key Findings

Females: stepwise decrease in all brain structures except white matter

Males: no group differences

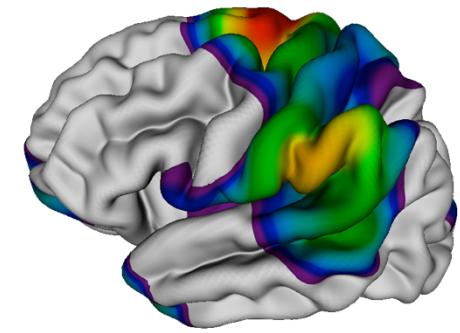
Relationship between symptoms and cortical thickness are opposite in males and females



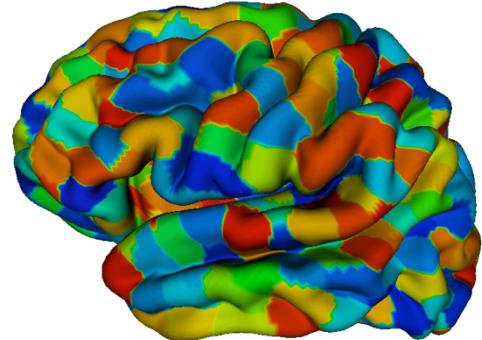
Future directions



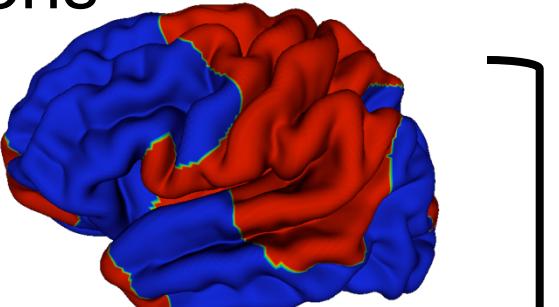
ALLEN INSTITUTE *for*
BRAIN SCIENCE



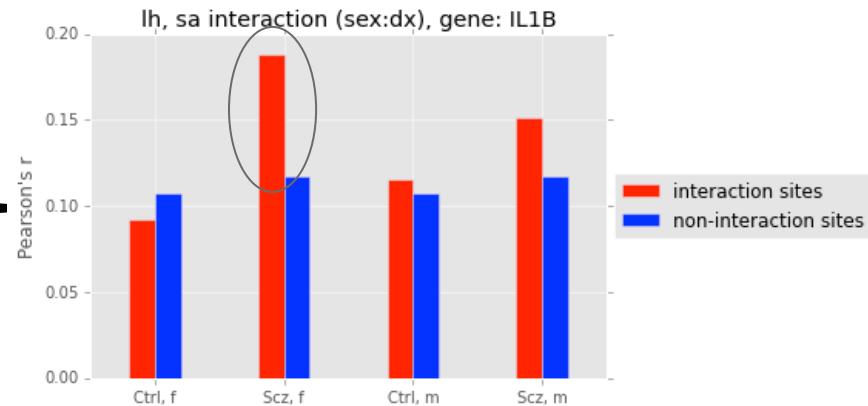
Statistical map



Average over 348 parcels



Thresholded statistical map



Dr. M Mallar Chakravarty
Dr. Gabriel A Devenyi
Jürgen Germann
Hanna Röhling
and the rest of the team

Dr. Lei Wang, NUSDAST



Douglas
INSTITUT
UNIVERSITAIRE EN
SANTÉ MENTALE

MENTAL HEALTH
UNIVERSITY
INSTITUTE



NSERC
CRSNG



WESTON
BRAIN INSTITUTE


CIHR **IRSC**
Canadian Institutes of
Health Research
Instituts de recherche
en santé du Canada



>CoBrALab <http://cobralab.ca/software/>