

Mapping the Brain-Heart Connection Using Brain Lesions

Authors: Kyuree Kim*, Frederic L.W.V.J. Schaper*, Martin A. Samuels, Michael D. Fox

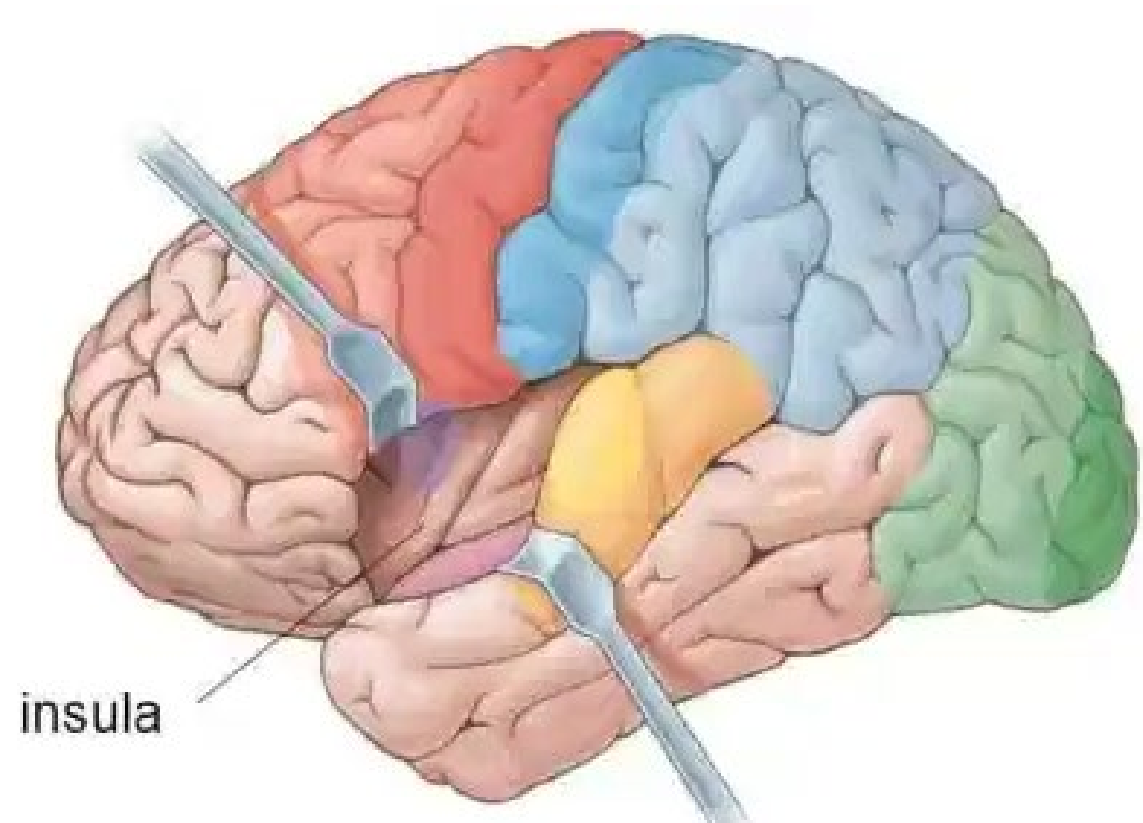
Affiliations: Center for Brain Circuit Therapeutics, Departments of Neurology, Psychiatry and Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA

Background

Do lesions causing cardiac disease map to a common brain network?

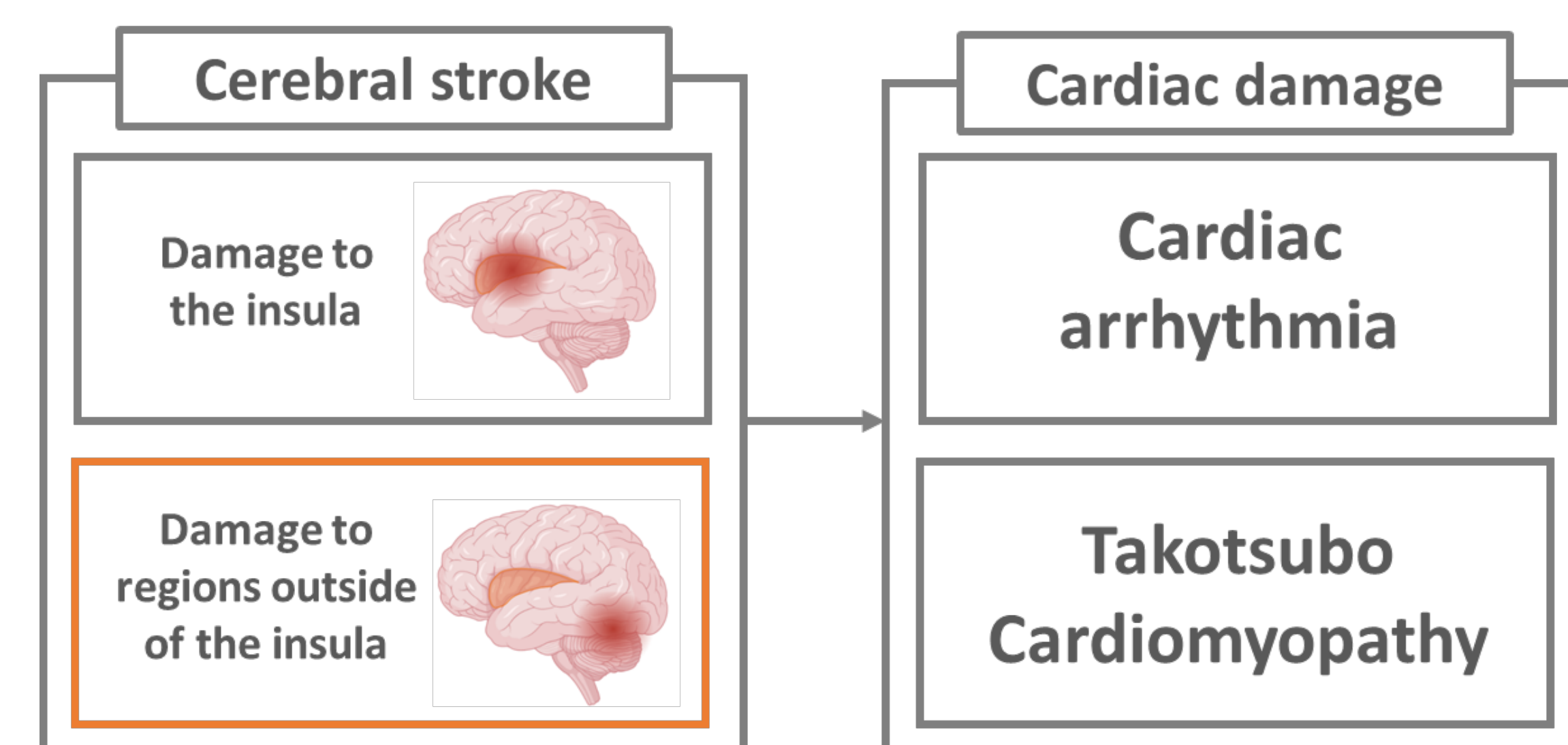
The Brain-Heart Connection: cerebral strokes can cause neurogenic damage to the heart

Insular Cortex:



Heavily involved in the regulation of cardiovascular function

Problem: Unknown why lesions outside the insular cortex cause cardiac arrhythmia and Takotsubo cardiomyopathy



Method

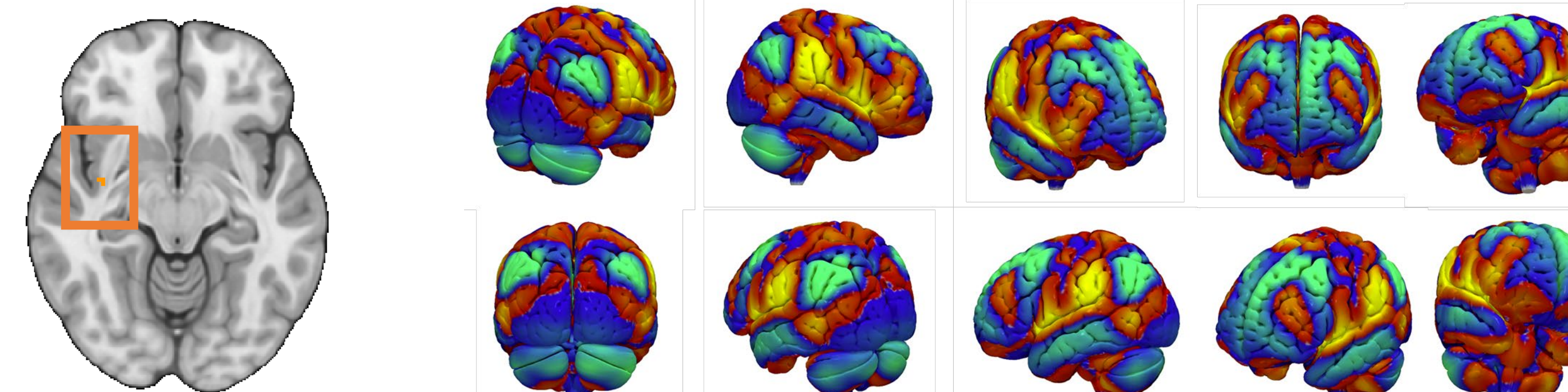
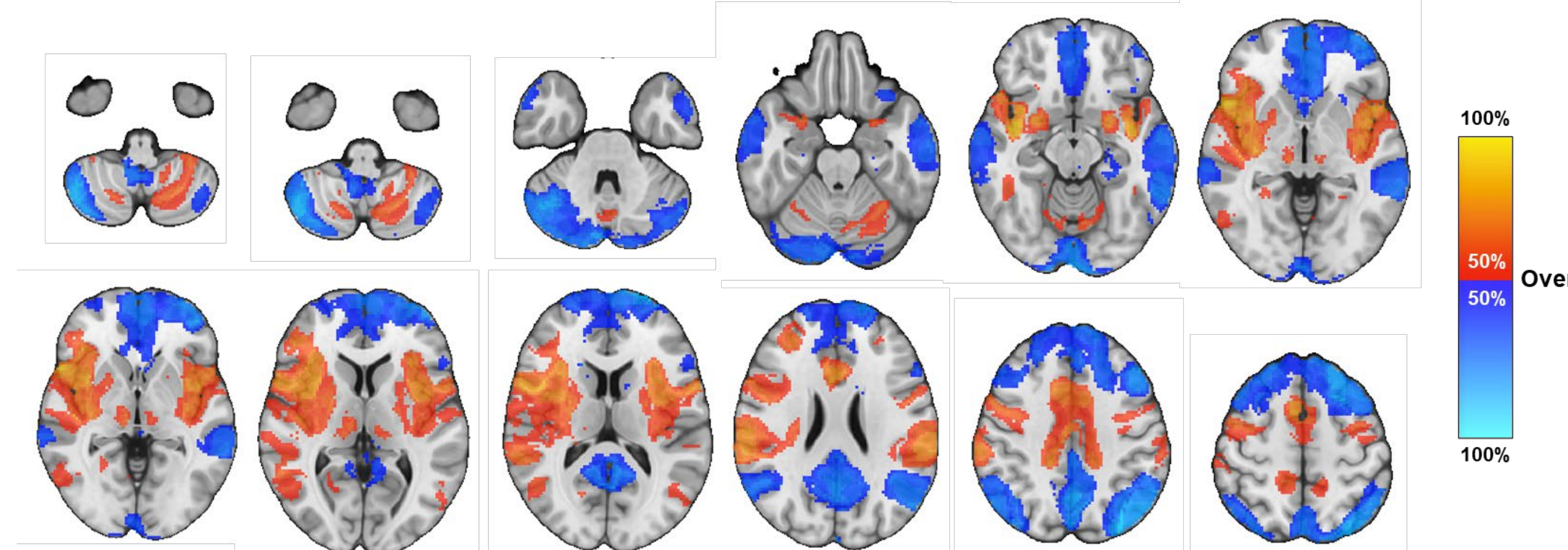
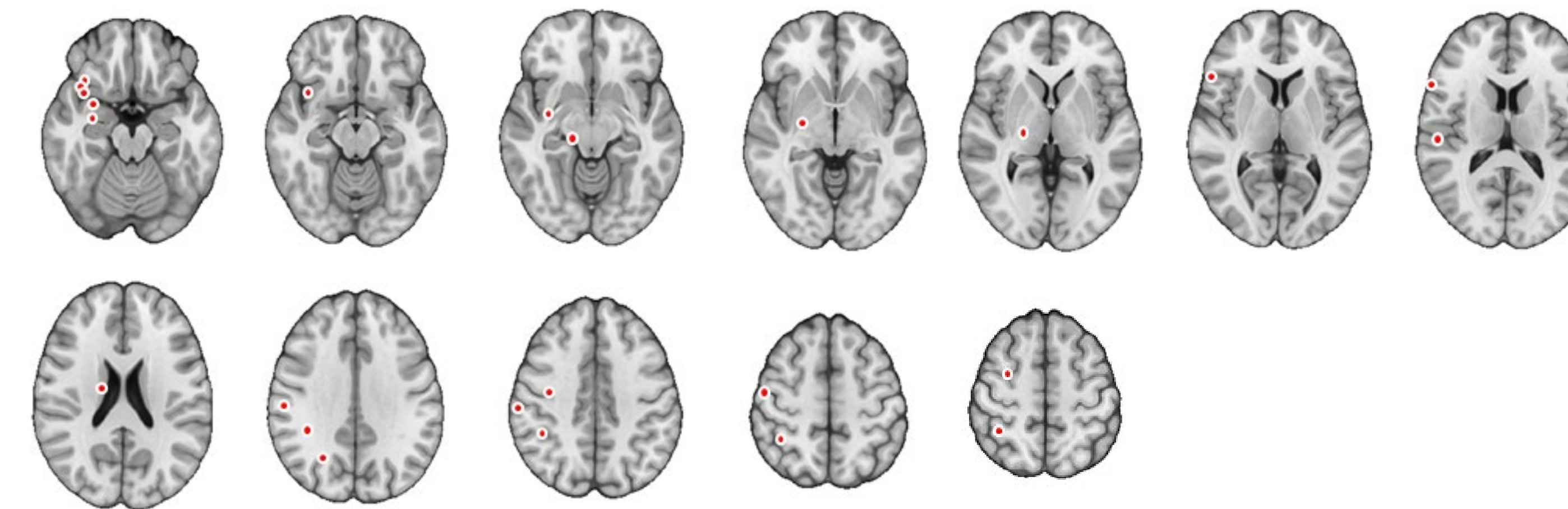
1. Identified 19 published coordinates (Seifert et al., 2015) of different brain regions that, when damaged, cause new-onset cardiac arrhythmia after stroke

2. Computed the functional connections of each coordinate using normative human connectome data (n=1000)

3. Identified a key hub, a region connected to all coordinates, and defined a brain-heart network

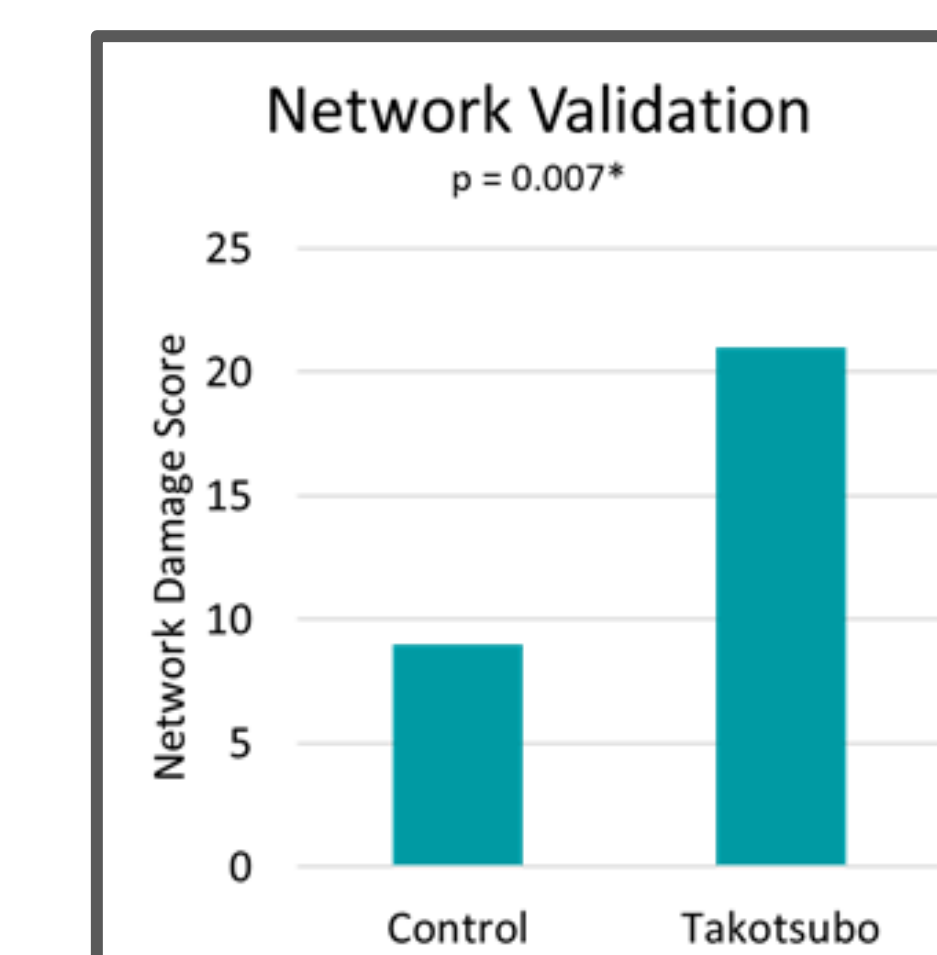
4. Tested whether ischemic strokes causing cardiomyopathy (n=24) damaged this network more than control lesions (n=625)

Result



Key hub = Right insula

Lesions causing cardiomyopathy damaged this network more than control lesions (p=0.007)



Conclusion

Brain lesions causing cardiac arrhythmia and Takotsubo cardiomyopathy map to a common brain network functionally connected to the insula

Significance:

- A network framework is important for understanding the brain-heart connection
- Clinical importance: improve identification of patients at high risk of neurogenic cardiac diseases

Information

Presenter: Kyuree Kim



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