

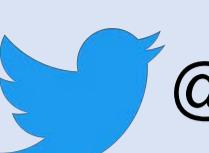
Network localization of tics: Evidence from coordinate and lesion network mapping

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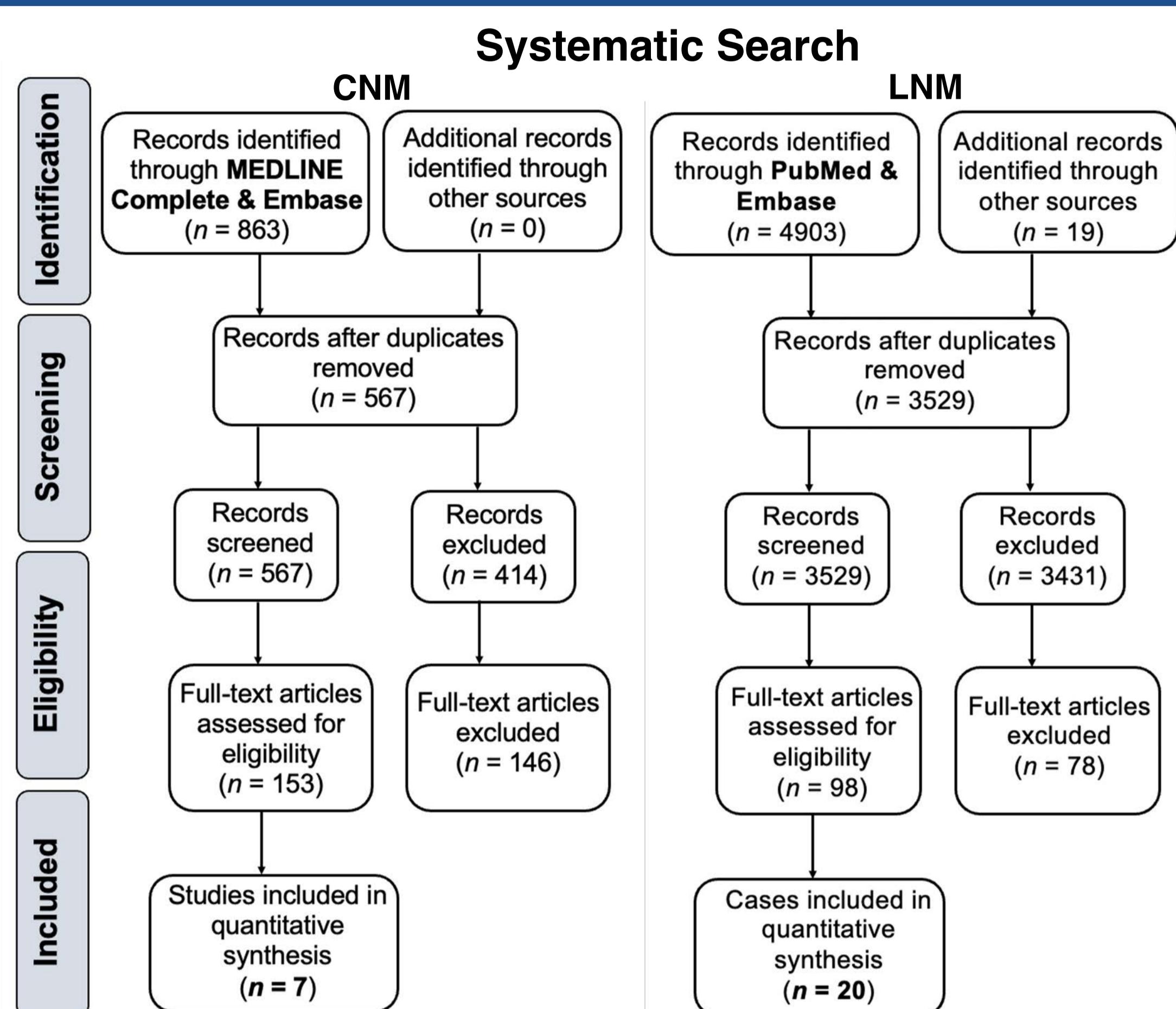
INTRODUCTION

- Tics can be idiopathic, presenting as focal symptoms of Tourette Syndrome (TS), or secondary to neural pathologies e.g., focal brain lesions¹
- Neuroimaging studies implicate widespread cortical and subcortical abnormalities in TS. However, due to neuroanatomical heterogeneity, it remains unclear which brain regions are **key** to TS symptomatology
- Likewise, tic-inducing lesions can occur throughout the brain, suggesting that tic symptoms may better localize to a neural network rather than a single brain region
- 'Coordinate network mapping' (CNM) and 'lesion network mapping' (LNM) can be used to localize neuroimaging findings and symptom inducing brain lesions to a common brain network, respectively

AIMS

- To localize heterogeneous structural neuroimaging findings in TS to a network of brain regions
- Identify a common network for tics based on idiopathic and secondary tic symptoms

COORDINATE & CASE SELECTION



INCLUSION CRITERIA

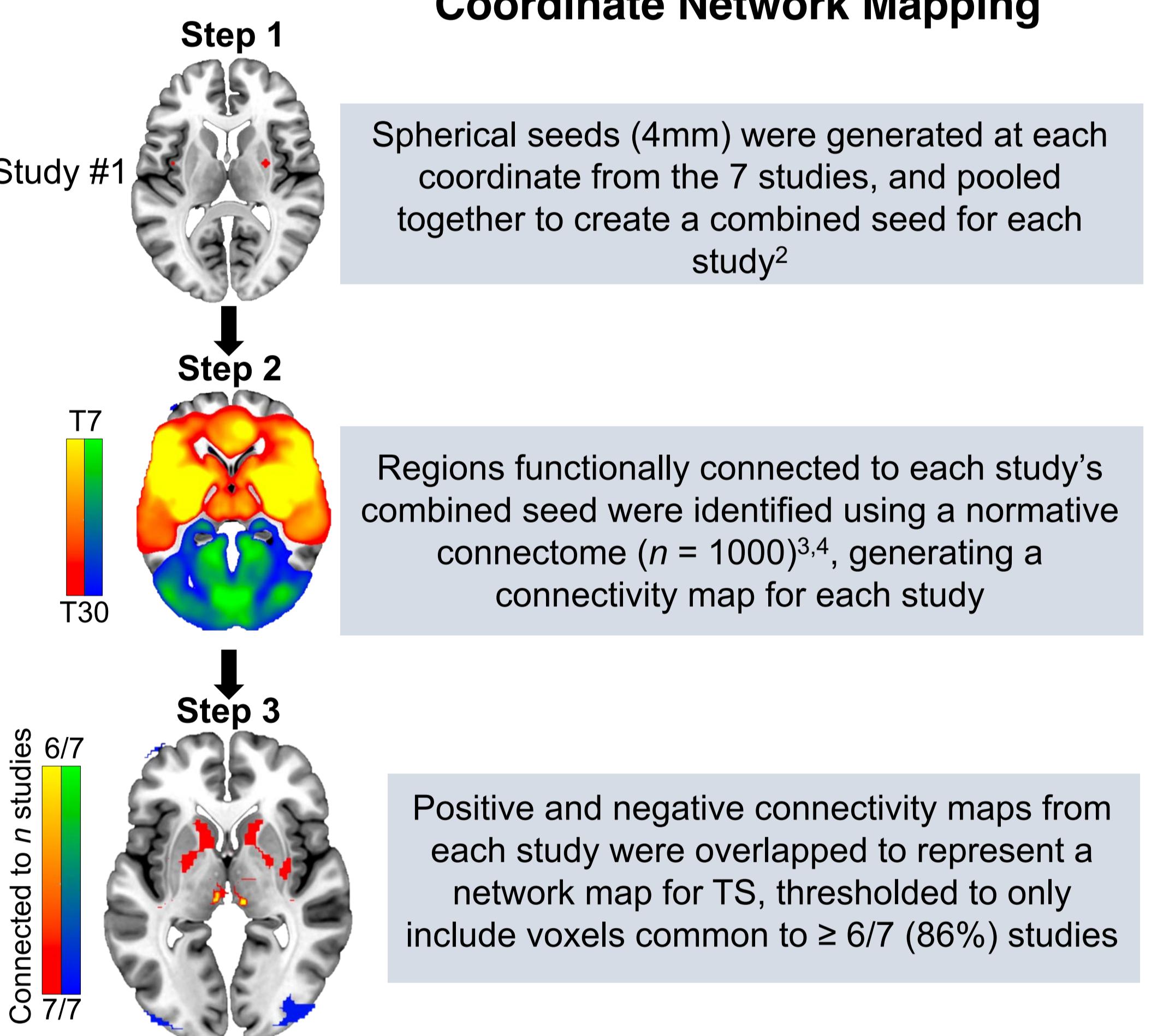
- Coordinates of neuroimaging abnormalities (PET, SPECT, MRI) i.e., TS vs. HC
- Cases documenting tic-inducing brain lesions

DATA EXTRACTION

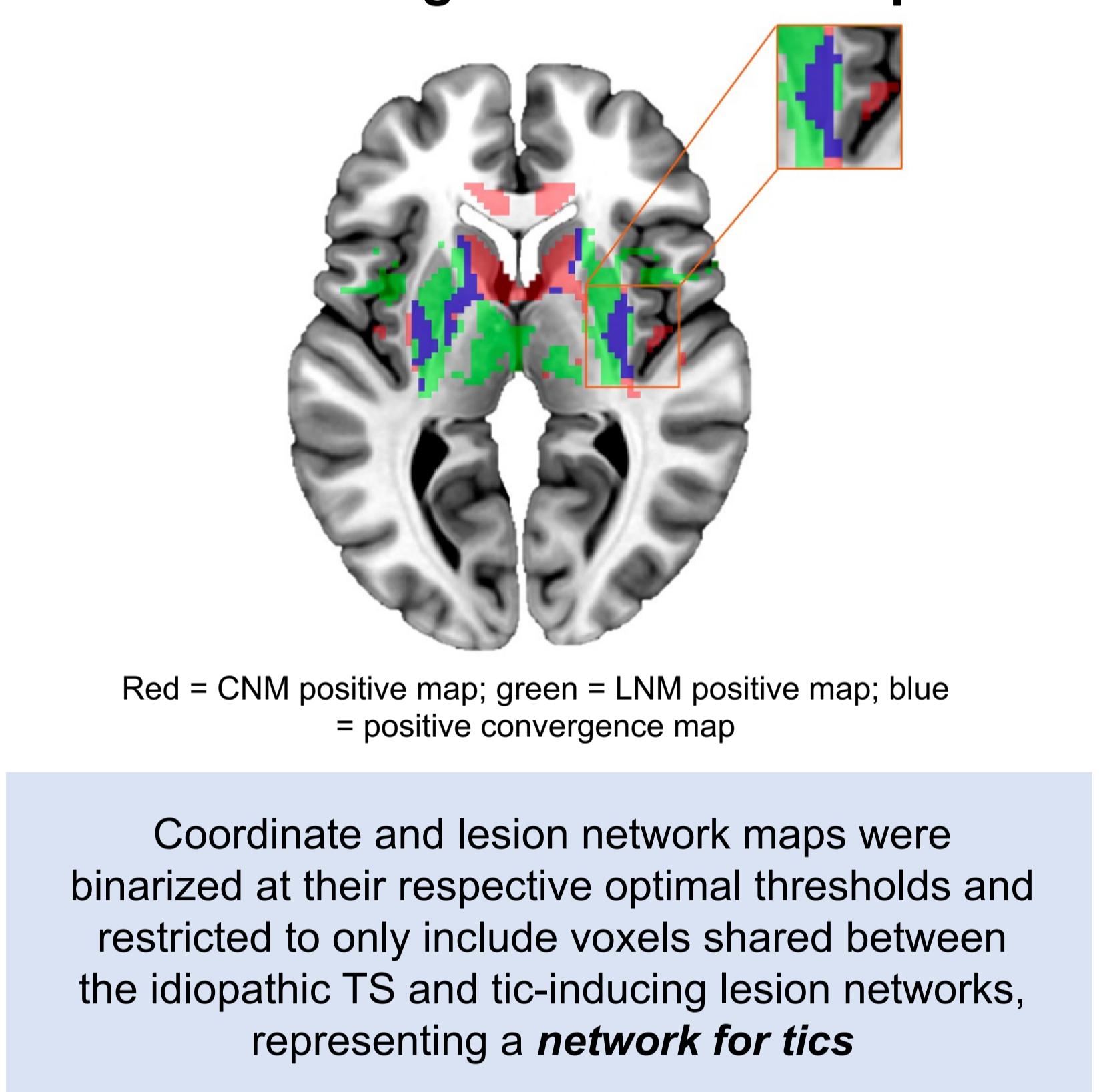
- MNI coordinates were extracted from the studies (n = 7)
- Lesion images, etiology and clinical characteristics were extracted from the case reports (n = 20)

NETWORK MAPPING TECHNIQUES

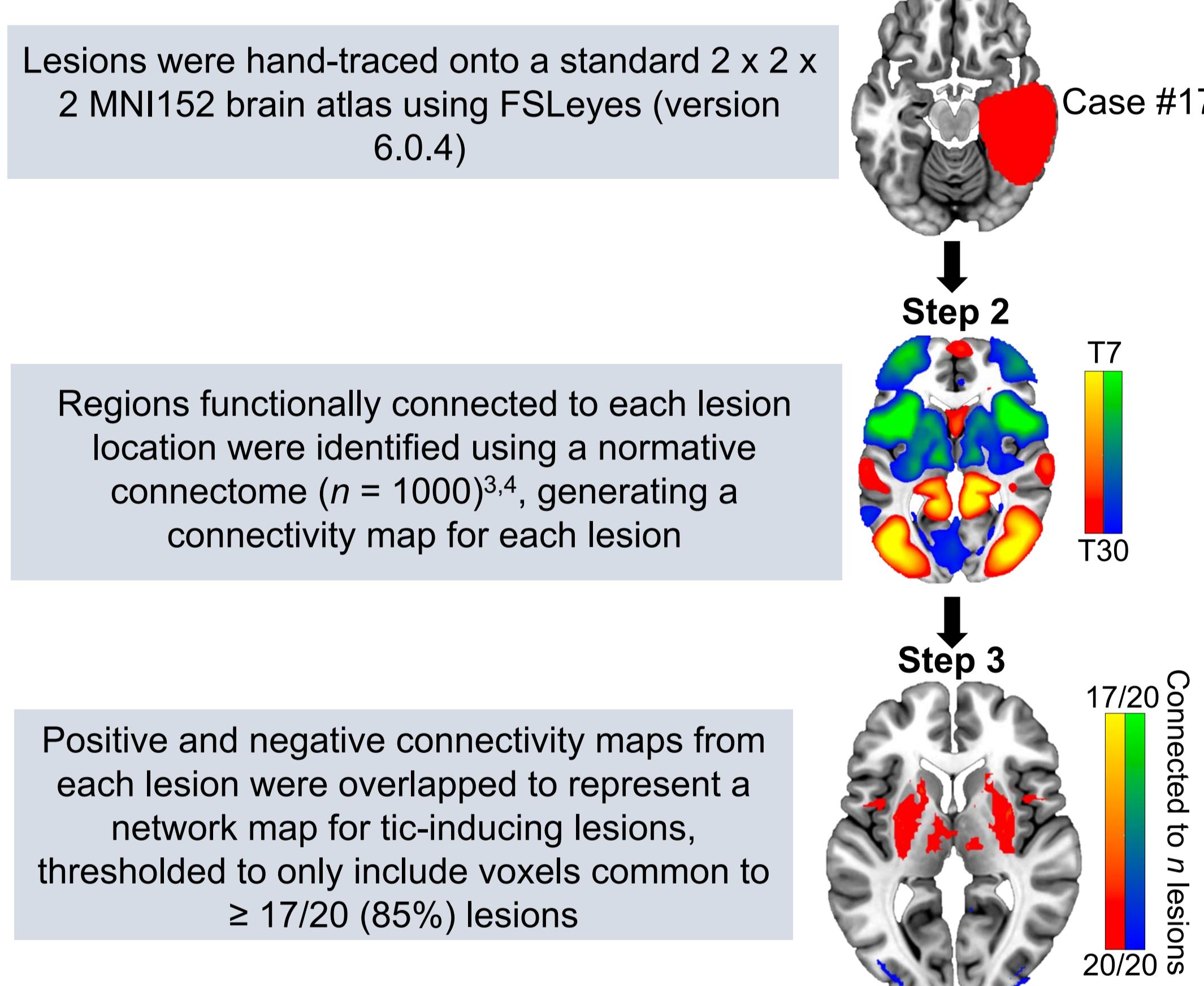
Coordinate Network Mapping



Convergence Network Map



Lesion Network Mapping



RESULTS

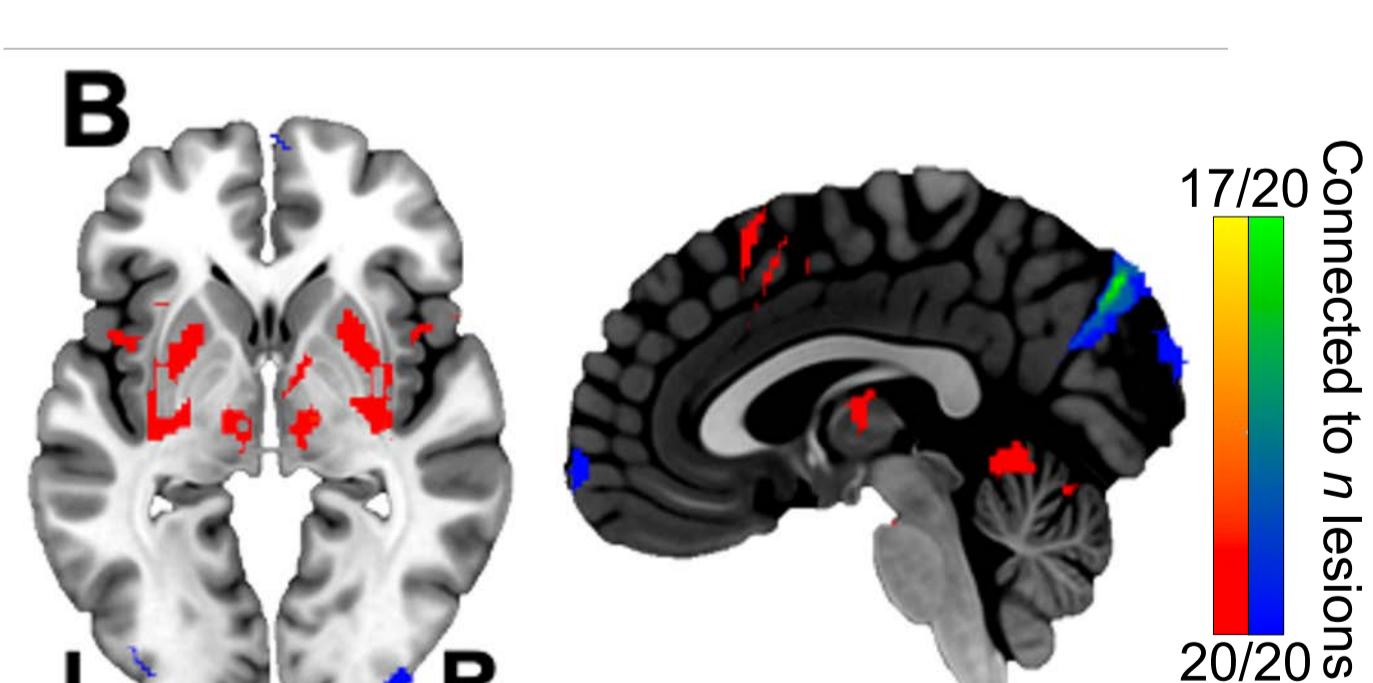
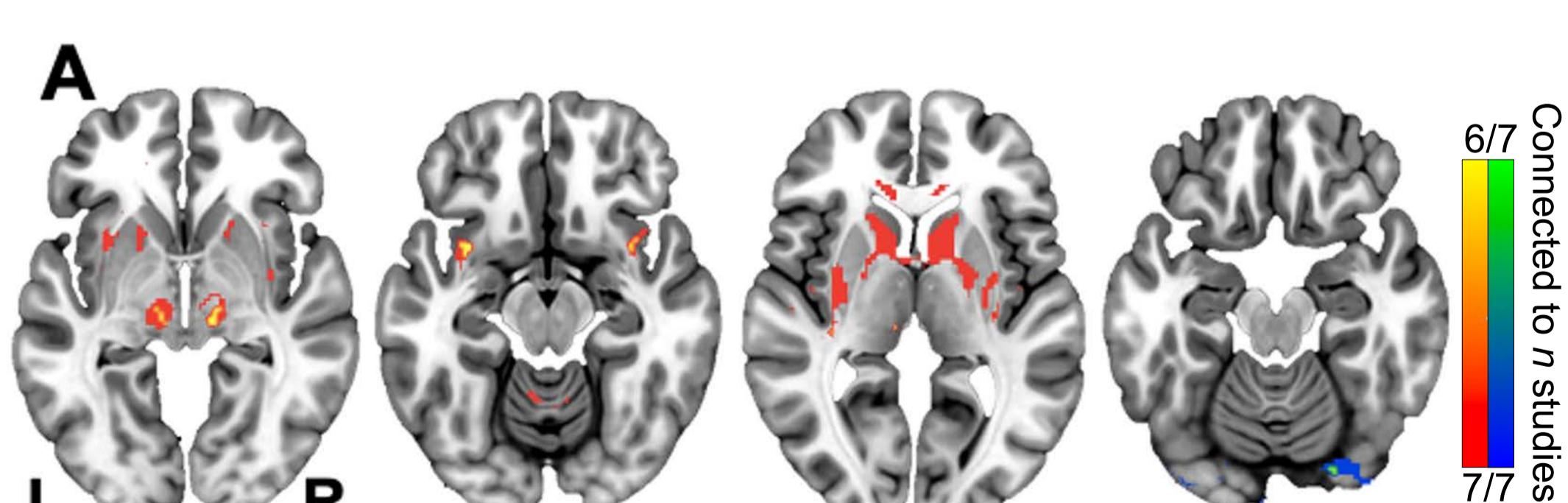
Coordinate & Lesion Network Mapping

CNM

- Heterogeneous neuroimaging findings in patients with TS localized to a common network, involving structures within the cortico-basal-ganglia-thalamo-cortical circuit (see figure A)

LNM

- Tic-inducing lesions were reported in heterogeneous locations, however, mapped to a common network (see figure B). Our findings are largely consistent with those previously published by Ganos and colleagues⁵



CONCLUSIONS & FUTURE DIRECTIONS

- Seemingly inconsistent structural neuroimaging findings in patients with TS map to a common network involving regions previously associated with tic onset and premonitory urge⁶
- This network identified in TS and a network for tic-inducing lesions converge in the thalamus, caudate, putamen, GPe and occipital lobe, revealing a sub-network which may mediate tics as shared symptoms between idiopathic and acquired tics
- Brain regions involved in this sub-network are consistent with common neuromodulation targets for tics⁷

NEXT STEPS

- Further examination of the relationship between intrinsic functional connectivity patterns in this network and tic symptoms severity

REFERENCES

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Convergence Network Map

