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Research article

Assessing the heritability of attentional networks

Jin Fan*[1], Yanhong W [2], John A Fossella[1] and Michael I Posner[1]

Address: [1]Sackler Institute, Weill Medical College, Cornell University, New York, USA and [2]Department of Psychology, Peking University, Beijing, China

E-mail: Jin Fan* - jif2004@med.cornell.edu; Yanhong Wu - wuyh@pku.edu.cn; John A Fossella - johnfossella@hotmail.com; Michael I Posner - mip2003@med.cornell.edu

*Corresponding author

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Abstract

Background: Current efforts to study the genetics of higher functions have been lacking appropriate phenotypes to describe cognition. One of the problems is that many cognitive concepts for which there is a single word (e.g. attention) have been shown to be related to several anatomical networks. Recently we have developed an Attention Network Test (ANT) that provides a separate measure for each of three anatomically defined attention networks. In this small scale study, we ran 26 pairs of MZ and DZ twins in an effort to determine if any of these networks show sufficient evidence of heritability to warrant further exploration of their genetic basis.

Results: The efficiency of the executive attention network, that mediates stimulus and response conflict, shows sufficient heritability to warrant further study. Alerting and overall reaction time show some evidence for heritability and in our study the orienting network shows no evidence of heritability.

Conclusions: These results suggest that genetic variation contributes to normal individual differences in higher order executive attention involving dopamine rich frontal areas including the anterior cingulate. At least the executive portion of the ANT may serve as a valid endophenotype for larger twin studies and subsequent molecular genetic analysis in normal subject populations.

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