

The authors' response to the Letter to the Editor:

Dr. Royall highlights the important issue of correlating cognitive and executive performance with brain structural injury in patients with cardiac disease. Patients with heart failure (HF) and executive dysfunction have a higher mortality risk (Rozzini, Sabatini & Trabucchi, 2004). Additionally, cerebral blood flow (CBF) is reduced by a third in HF patients over healthy subjects (Gruhn, et al., 2001) potentially contributing to cognitive and structural differences in these patients. Alves, et al. (2005) found significant reductions in both cognitive performance and regional cerebral blood flow (rCBF) in HF patients, with reduced flow occurring primarily in posterior and right-sided brain regions.

Dr. Royall correctly notes the lateralized roles of insular cortex function and describes the multiple affective and cognitive contributions from both left and right cortices. The lateralization assumes special importance with findings of enhanced right-sided insular injury in HF patients when examined with structural magnetic resonance imaging (MRI) procedures (Woo, et al., 2003). However, the autonomic ramifications of the lateralized insular injury may differ from what Dr. Royall suggests. The normal regulatory role of the right insula for sympathetic action may be one of varying degrees of inhibition of sympathetic output. Thus, right insular injury, by reducing regulation, may reduce inhibition, i.e. enhance sympathetic outflow, a possibility supported by the exaggerated sympathetic outflow in HF patients. It is of interest that functional challenges to the sympathetic system (cold pressor) recruit both left and right insulae in HF by functional MRI (Macey, et al., 2005). The Valsalva maneuver, with its sympathetic-parasympathetic sequence, also elicits responses on both sides, with a large area of the right anterior insula showing an inverted response from control subjects; the structures maintained this out-of-phase response with repeated maneuvers (Woo, et al., 2007). Unfortunately, no time-based cognitive testing was performed during these challenges.

The implications of Dr. Royall's suggestions for partitioning cognitive and executive performances are of very great interest. Heart failure offers a unique opportunity to evaluate those issues, because of the extensive right-sided insular injury in the condition.

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References:

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