

Prefrontal Function in Gulf War Veterans Task Order 4-12

- ◆ Commonly reported symptoms in GW illness:
 - Impaired concentration
 - Impaired executive Working Memory (WM) functions
- ◆ These symptoms may be due to:
 - Cholinergic system damage
 - ◆ Disproportionately affects the frontoparietal circuit, which is known to mediate working memory.

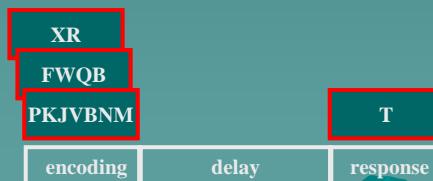
Tasks Depending on the Frontoparietal Circuit (Mediating WM)

“Digit-Symbol Verification Task” (An Efficiency measure)

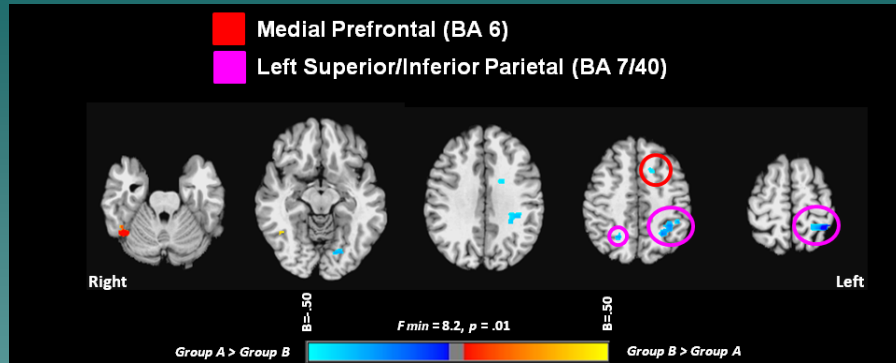
□	◦	┌	┐	└	┘	+	□	◦
1	2	3	4	5	6	7	8	9

□
1

“Working Memory Task” (A Working Memory measure)

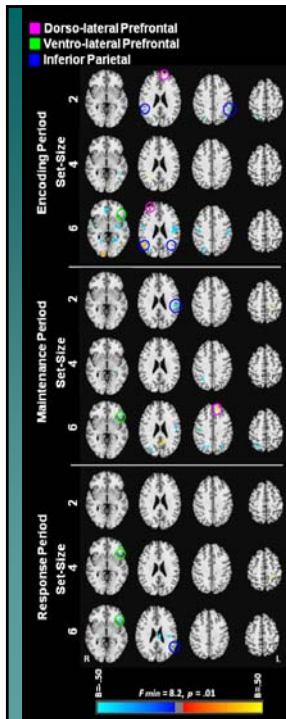


DSVT Results



- ◆ *Group A showed greater fMRI activity during DSVT performance than Group B, but with equivalent performance*
- ◆ *Indicates reduced neural efficiency in Group A (having to work harder to produce the same performance).*

Working Memory Results



Encoding Phase:

- ◆ *Group B utilizes the frontoparietal circuit*
- ◆ *Group A does not utilize the frontoparietal circuit*

Maintenance and Response Phases:

<u>Brain Region</u>	<u>Function</u>	<u>Group Difference</u>
Ventral PFC	Storage/Maintenance	A > B
Parietal	Storage/Maintenance	A > B
Dorsal PFC	Executive/Manipulation	A < B

- ◆ *Group A emphasizes WM maintenance functions*
- ◆ *Group B emphasizes WM manipulation functions*

Importance of Results

- ◆ Assuming Group A is the ill group, their disease has led to:
 - Inefficient memory processing (from DSVT)
 - Lack of engagement of the frontoparietal circuit (the area usually involved in WM)
 - More reliance on Ventral Prefrontal Cortex (PFC) and Parietal areas (storage/maintenance processes)
 - Instead of Dorsal PFC (executive processes)
- ◆ Overall, the frontoparietal circuit that allows for efficient and effective WM processes is compromised, leading to engagement of compensatory processes.