Cortical Hubs and Alzheimer's Disease

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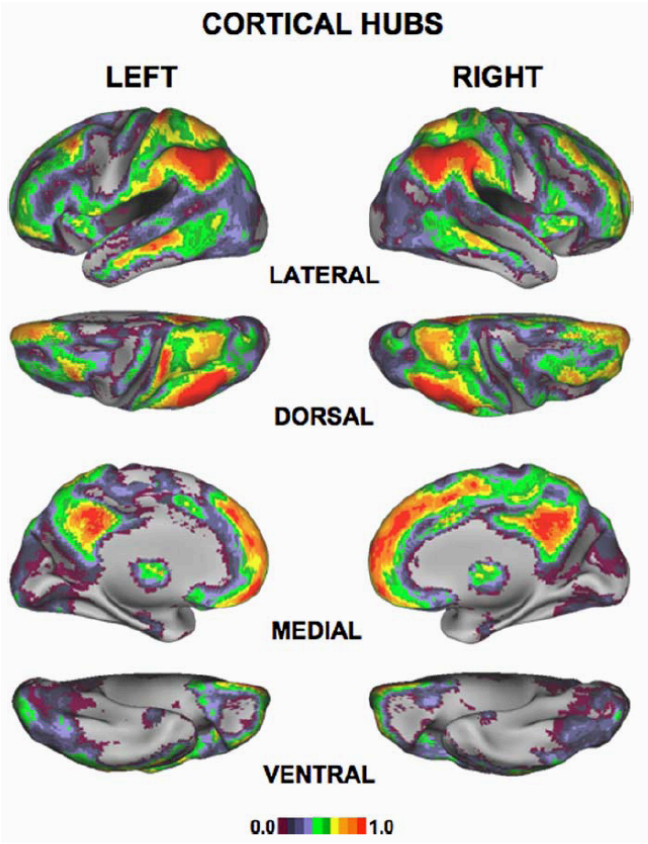
The link between Alzheimer's disease (AD) and the protein Amyloid beta (or Aβ) is a source of great interest for neurological researchers the world over. The protein and it's fragments tend to aggregate and form plaque in certain regions of the brain important to cognitive function. Recent publications propose that Aβ tends to aggregate around areas of specific areas of the cortical architecture known as cortical hubs[1].

Many, but not all, cortical hubs overlap the regions of the brain active during passive tasks, called the default network. However, it is important to note that cortical hubs are also classified by their constant activity and metabolic rate during both active and passive tasks. In fact, it was this property which made the cortical hubs easiest to identify. Multiple functional magnetic resonance images from 127 individuals confirmed the presence of specific activity in certain key areas of the brain. Moreover, these areas, or hubs, seemed to correspond to networks within the brain. The regions in which they were present relied heavily on the hubs as communication centers to the rest of the brain, including other hubs. The overlapping between hubs supports the communication as well.

The constant high baseline activity of the hubs, and/or their metabolic properties may contribute to the trend of high Aβ aggregation. Previous studies have conveyed that the accumulation of Aβ in extracellular spaces seems to increase with activity, which may explain the vulnerability of the so-called hubs.

The implications of this work are clear- a pinpointing of these cortical hubs will indicate areas of the brain which are vulnerable to Aβ aggregation, and are thus main contributors to



Alzheimer's disease. If this link can be confirmed conclusively and repeatedly, targeted treatment may become possible. Moreover, one of the major focuses of modern BME is the targeted treatment of disease. Therefore, this research may prove a stepping stone for biomedical engineers seeking a method of treating AD.

References:

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