Glymphatic System

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Gymphatic system is waste clearance of brain which has been discovered recently. It has three regions periarterial and perivascular space ,interposed brain parenchyma. Gymphatic pathway function in distribution of cerebrospinal fluid to whole brain and it also function in removal of externally injected and internal metabolite. Mainly functional during sleep. Cerebrospinal fluid is passed from subarachnoid space to the periaterial space, from there it passes to interstitial space which is done by aquaporin 4, now the cerebrospinal fluid-interstitial fluid along with waste from interstitial space is transported to perivenous space and then it exits into systemic circulation. The correlation between formation of plaque and glymphatic function hint that Aβ can lead to reduced cerebrospinal fluid in human. Apparently reduced glymphatic function leads to reduced clearance of Aβ, and that Aβ can directly or indirectly affect flow in the glymphatic pathway. The decreased activity of the glymphatic system can be an important risk factor for development of neurodegenerative problems. The deletion of aquaporin 4 does not alter the presentation of proteins involved in synthesis or degradation of Aβ, explaining that reduction of aquaporin 4 results in reduced parenchymal clearance of Aβ. Vascular polarization of astrocytic aquaporin 4 is probably lost in reactive astrocytes in older people. Explaining decline in glymphatic function in older people might be in part due to irregularity of astroglial water transport. Other factors perhaps contributing to the reduction of glymphatic activity with aging are the decline in cerebrospinal fluid production by 66% and cerebrospinal fluid pressure by almost 27%. Sleep was always considered the most important factor for the survival of any living being but was not never fully understood the logic behind it but as the studies were conducted it was the functioning of glymphatic system behind the reason as our body is so finely constructed that while we are awake the body keeps the function of glymphatic system at rest which can be because of norepinephrine during the arousal state. It provides resistance towards convective exchange of cerebrospinal fluid and interstitial fluid through the help of astrocyte end feets which relaxes during awake phase and disrupt the convective flow. As the individual ages the periarterial spaces stiffens and the exchange is compromised.

Keywords: sleep, cerebrospinal fluid, glymphatic system aquaporin 4, neurodegenerative diseases, beta amyloid, aging.

Abbreviations: Aβ - Amyloid beta.