

Review of: "Immediate Impact of Yogic Breathing on Pulsatile Cerebrospinal Fluid Dynamics"

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In this manuscript, the authors investigated the pre-intervention baseline data from their ongoing randomized controlled trial, and examined whether yogic breathing immediately impacts pulsatile CSF dynamics compared to spontaneous breathing. They utilized noninvasive real-time phase contrast magnetic resonance imaging (RT-PCMRI) approach using a 3T MRI instrument, and computed and rigorously tested differences in CSF velocities (instantaneous, respiratory, cardiac 1st and 2nd harmonics) at the level of foramen magnum during spontaneous versus four yogic breathing patterns. In examinations of 18 healthy participants, they discovered immediate increase in cranially directed velocities of instantaneous CSF and respiratory during yogic versus spontaneous breathing, with most statistically significant changes during deep abdominal breathing. Further, cardiac pulsation was the primary source of pulsatile CSF during all breathing conditions except during deep abdominal breathing, when there was a comparable contribution of respiratory and cardiac 1st harmonic power, demonstrating respiration can be the primary regulator of CSF depending on individual differences in breath depth and location. The experiment seems to be well organized and their results seems to be reasonable. There are several points to be considered.

#1 In the current study, They only observed cardiac and respiratory motion. However, it is known that there are more slow movement by autonomic activity called low frequency (LF: 0.04–0.15 Hz) or very low frequency (VLF: 0.0033–0.04 Hz). Please mention about these low frequency factor in the discussion and I expect further study focusing these autonomic factors.

#2 The ROI for the velocity measurement was only placed in the foramen magnum. Please indicate the reason for this ROI placement in the discussion. It is said that the ventral part and dorsal part of the foramen magnum shows different CSF dynamics. In that point, I am afraid that the waveform in the foramen magnum may be suffer from contamination of different waveform.

I am also curious about the different ROI such as aqueduct, foramen of Monroe or Sylvian fissure.

#3 In 2.3. Data Acquisition

Please specify the total approximate scanning time for RT-PCMRI.

