Reviewer's report

Title: The Effect of Ventricular Assist Devices on Cerebral Autoregulation: an Observational Study

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Reviewer: Rong Zhang

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This is an interesting study of dynamic pressure-flow relation in patients with and without ventricular assist device (VAD). With transfer function analysis, the authors concluded that cerebral autoregulation was impaired in patients with VAD when compared to those without VAD. This conclusion was based on a finding that coherence at low frequencies was increased in patients with VAD. This reviewer has two major concerns.

1. Fig 1 showed blood pressure (BP) as well as CBFV fluctuations in patients with VAD. However, spectral power was not calculated in each of specific frequency ranges. Also, BP and CBFV variability were not presented in patients without VAD. These data are important for this study and should be presented.

2. The authors should appreciate that with the presence of nonlinearity of the cerebral circulation, estimation of coherence may be sensitive to the power of the input signal and may not be related to any change in cerebral autoregulation. This is the case especially when transfer function gain and phase remained unchanged as showed in this study.

Specific comments:

Page 3, line 6 - The only significant change in coherence was at low frequencies, not in the very low frequency range.

Page 9, line 10 - typo “though” should be “through”.

Page 10, line 11 - “the relation between two signals is either inverse or non-linear”, why should an “inverse” relation change coherence?

Page 11, line 3-4 - “Sxy(f), was computed as the product of Sxx*(f) and Syy(f)” please make it clear whether Sxx and Syy represent Fourier transform of the time series or are the estimates of power spectral density of the time series?

Page 14, line 11-13 - “In addition, it is also documented…on CBF”. This is a very confusing sentence.

Page 15, line 1 – “small” should be “low”.

Page 15, whole second paragraph – The discussion of “negative value among controls throughout all frequency ranges” needs to be carefully reconsidered.
Table 3 showed that at very low frequencies, 3 out of 5 controls had positive phase (the mean negative value is likely due to one patient with -1.71). Phase was positive at low frequencies. Finally, phase at high frequencies is likely to be no significantly different from zero. Most studies the authors cited in this work showed a positive phase between changes in BP and CBF velocity which has been well accepted if a correct algorithm for cross-spectral estimation is used.

Page 22 – References 21 and 22 are the same?

Page 24, Fig Legends. “TFA average” what does the term “average” mean herein?

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.