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In Reply:

Dr. Kopp raises an important point that Dr. Planel and I should have mentioned in our editorial.¹ There is no question that mitochondria, reactive oxygen species, and various neurodegeneration pathways, including tauopathy, are linked in some way. And there is also no question that we often treat patients (and animals and cells in our studies) with oxygen as if it is inert. It is most certainly not. However, there is a dearth of literature on the effect of inhaled oxygen on any of the neurodegenerative diseases, so it is not yet clear whether the hypothetical concern raised by Dr. Kopp is real and if so, of what magnitude? Until such data become available, it is important to take Dr. Kopp's advice and adequately control our studies with respect to oxygen.

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Other Factors to Consider When Deciding Whether or not to Infuse Volume Because of Arterial Blood Pressure Waveform Variation

To the Editor:

In their article, Biaï et al.¹ list several limitations to the usefulness of the dynamic index of fluid responsiveness. I would suggest that one or two more (waning neuromuscular blockade and perhaps obesity) be considered as additions to the list.

First, the arterial pressure waveform variation (APWV, *i.e.*, pulse pressure variation, stroke volume variation,

systolic pressure variation, or delta down) studies generally have not considered the effect of a change in chest wall compliance. In most studies, the patients seemed to have been deeply paralyzed, and that is the condition from which recommendations seemed to have arisen. Anecdotally, I have been in situations where there has been significant APWV with decreased blood pressure and/or cardiac output, which improved dramatically just with neuromuscular blockade (NMB) administration. Presumably the treatment of truncal rigidity resulted in decreased intrathoracic pressure during positive pressure ventilation resulting in improved venous return and subsequent hemodynamic improvement and reduced APWV.

Second, all other things being equal, obese patients would be expected to require larger peak inspiratory pressures, which may result in a larger APWV as their baseline. Are the authors aware of any data that take obesity into consideration when considering the amount of APWV that indicates fluid therapy?

Treatment of APWV should not be the endpoint of therapy; it is a guide to therapy. The endpoint of therapy should be an adequate cardiac output (*i.e.*, adequate oxygen delivery) and blood pressure. Just because the hemodynamic situation will “improve” (by virtue of decreasing APWV) by administering fluid in a patient with APWV does not always mean that you should if the hemodynamics are already satisfactory. One runs the risk of giving excessive fluid to a patient who does not need additional fluid, particularly if the “mechanical” problem can be treated by other means (*i.e.*, NMB).

Although I agree that in typical anesthetic practice volume administration is likely to be what is indicated most often when one sees APWV, one should consider the state of paralysis and perhaps the use of NMB. This may result in an improved hemodynamic state without excessive fluid administration. Administering NMB may result in a lower volume infusion requirement and/or a better hemodynamic outcome than can be achieved by volume infusion only. Another potential benefit of NMB is that oxygen consumption may decrease, thereby allowing the patient to more easily meet his/her oxygen delivery needs, particularly if the cardiac output is marginal.

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