to compliance is considerable and, in humans, increases with age-related aortic stiffening, thereby "blurring the distinction between large and small artery function."[4] As such, the described changes to compliance from the Windkessel model likely cannot be attributed to the aortic biomechanical properties alone. Second, we disagree with the contention that characteristic aortic impedance is "the resistance of the aorta itself." Although aortic impedance has the units of resistance, it exists only with pulsatile flow and pressure and is a function of the modulus of elasticity and radius.[3] Similar to compliance, there is no exact anatomical aortic correlate to aortic impedance, although it characterizes the vessel in close proximity to the measurement. Therefore, although we agree that left ventricular afterload can be modeled using the Windkessel, we believe that aortic biomechanics as defined by the authors is only partly responsible.

Aortic biomechanics, at the level of local aortic microstructure and mechanical behavior, has until now been limited to bench-top testing on excised tissue. With recent advancements in imaging technology, there are new opportunities to explore the aorta *in vivo* and hopefully gain new insights into local aortic biomechanical properties in the clinical anesthesia environment. As we assert in our review, this work has yet to be done.

Our understanding of cardiovascular physiology has greatly benefitted from the previous scientific work of Dr. Pagel and others who have published using similar arterial system models. They have put together much of the puzzle as it pertains to anesthesia and cardiovascular physiology. We believe that the additional perspectives on aortic biomechanics described in our review hold potential to add a piece to said puzzle, not replace it altogether.

Competing Interests

The authors declare no competing interests.

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References

1. Pagel PS, Crystal GJ, Hettrick DA: Aortic biomechanics: Comment. Anesthesiology 2023; 138:570–1
2. Gregory AJ, Di Martino ES, Fedak PWM, Dobson GM: Aortic biomechanics and clinical applications. Anesthesiology 2022; 137:351–63
3. Westerhof N, Lankhaar JW, Westerhof BE: The arterial Windkessel. Med Biol Eng Comput 2009; 47:131–41
4. Mitchell GF: Clinical achievements of impedance analysis. Med Biol Eng Comput 2009; 47:153–63

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A Picture Is Worth a Thousand Words: Infographics in the New Era of Medical Education

To the Editor:

As first-year resident physicians, we are still at the beginning of our journey to becoming conscientious consumers of research and data. This, combined with our appropriately basic knowledge and context for anesthesiology topics at this stage of training, makes it somewhat difficult to envision how to apply concepts from today's research to our future practices. One page of Anesthesiology that we can turn to in this early stage of training is the "Infographics in Anesthesiology" section.

Infographics can distill complex concepts or large amounts of data into easily understood and easily remembered visual representations.[1] The recall ability of visually presented information is often explained by the picture superiority effect. The picture superiority effect suggests that 6.5 times more information is retained after 3 days when presented with a relevant picture compared with text alone.[2]

Medical students and medical educational companies today have harnessed the power of the picture superiority effect. The most popular resources are picture-based and video-based programs aimed at increasing retention. Anecdotally, many medical students find these visual learning tools to be far more effective than reading traditional textbooks. Trainees are now entering residency from the highly visual-based learning environment of medical school. As with all resources, caution must be practiced when interpreting infographics, as a recent cross-sectional study demonstrated that the majority of infographics do not sufficiently report study findings.[3]

Integrating infographics from trusted sources of information as Anesthesiology has done is a great way to meet our new generation of trainees in the way that they have learned. As a new resident myself, I find the infographics

efficient and memorable. As our generation works toward becoming fully fledged anesthesiologists, I look forward to the ways in which we will incorporate our propensity for visual learning into residency and beyond.

Competing Interests

Dr. Peters is a stockholder for Navidea Biopharmaceuticals, Inc. (Dublin, Ohio). Dr. Nordness declares no competing interests.

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References

1. Balkac M, Ergun E: Role of infographics in healthcare. Chin Med J (Engl) 2018; 131:2514–7
2. Krum R: Cool infographics: Effective communication with data visualization and design. Indianapolis, Wiley, 2014
3. Ferreira GE, Elkins MR, Jones C, O'Keeffe M, Cashin AG, Becerra RE, Gamble AR, Zadro JR: Reporting characteristics of journal infographics: A cross-sectional study. BMC Med Educ 2022; 22:326

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