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The Control of Vascular Tone

Introductory Comments

IN October 1992, a symposium on The Control of Vascular Tone was held at the annual meeting of the American Society of Anesthesiology. The following articles summarize the four lectures presented at that symposium.

Anesthesiologists are appropriately concerned with blood flow, maintaining the circulation to sustain tissue viability and function. The homeostatic mechanisms for regulating distribution of the circulation are intimately involved with the control of vascular tone. Ultimately, this is translated to the contractile state of vascular smooth muscle. The determinants of that interaction range from the immediate agency of intracellular calcium, protein phosphorylation, and myofilament composition, through the actions of other, indirectly acting cytosolic messenger and transmembrane channels and pumps, to the effects of locally released neurotransmitters and globally acting modulators.

The four articles presented here approach the subject at different hierarchical levels. Professor Burnstock provides an overview of anatomy and physiology at the level of neuronal contact and control, and discusses various age- and disease-induced changes. Dr. Johns uses the example of nitric oxide as an essential local modulator and effector of vascular tone and, importantly for us, reviews the overall effects of, and likely mechanisms for, anesthetic agents on vascular tone in general and nitric oxide in particular. Professor Bosnjak describes the role of transmembrane ion channels and pumps in controlling intracellular Ca^{2+} in vascular smooth muscle, and the actions of anesthetic agents on these membrane targets. Finally, Dr. Shoukas provides an integrative view from the systems viewpoint, showing how changes in systemic blood pressure are translated into a controlling signal for vascular tone. The total effect, we hope, is one that is accessible to anesthesiologists at the level of clinical practice, informed by everyday parameters of pressure and flow, and extends their knowledge and curiosity to underlying cellular and subcellular phenomena that, ultimately, must be relevant to clinical practice. Our ability to inform and stimulate you on this topic, which is relevant to so much of anesthesia, will be the measure of our success.

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