

EDITORIAL VIEWS

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Redefining Anesthetic Management

Goals for the Anesthesiologist

In this issue of the Journal, Zbinden *et al.*^{1,2} define the dose of isoflurane required to block the somatic response to various stimuli as well as the hemodynamic response to the stimuli at the doses blocking the somatic response. These articles remind us that anesthesiologists may do more than ensure the immobility of patients. These articles also raise the question of whether anesthesia provided by a single agent is better than that provided by a mixture of agents used to achieve different endpoints.

The search for a reliable endpoint for anesthetic depth may seem simple to those schooled in the concept of minimum alveolar concentration (MAC) of an inhalational anesthetic or minimum arterial concentration of an intravenous anesthetic. The classic endpoint of anesthesia for surgery has been lack of movement by the patient during the procedure so that complex surgery could be readily performed. The introduction of the concept of MAC³ in 1965 revolutionized our ability to compare the effects of anesthetics at the same pharmacodynamic endpoint. After MAC came its derivatives: MAC for intubation^{4,5} and MAC_{awake},⁶ and MAC for blocking autonomic responses.⁷

These studies defining MAC and its derivatives, however, showed that anesthetics might blunt motor responses without blunting autonomic responses. Alone, isoflurane and fentanyl are not perfect at providing concomitant hemodynamic and motor stability, no matter how large the dose. But together, they enable control of both the hemodynamic and motor responses⁸; thus, we are left with the questions: how clinically useful is MAC, and does the anesthesiologist do something more useful than just block the motor responses to surgery?

The articles by Zbinden *et al.*^{1,2} and others^{3,9} enable us to modify our methods for measuring anesthetic depth. In this regard, Zbinden *et al.* suggest what clinicians have long known: The amount of anesthesia required depends on the stimulation that results from

surgery and, more importantly, lack of movement does not ensure lack of hemodynamic response to surgery.

To most nonanesthesiologists, rendering the patient unconscious and providing pain relief with drugs represents the major part of the anesthesiologist's work. But when an anesthesiologist in effect disconnects or modifies the actions of a patient's regulating "computer" from its control of the body's function, maintaining hemodynamic equilibrium in the patient also becomes important and, at times, difficult. Other systems may function in an exaggerated or dampened fashion. The responsibility for monitoring these partially unregulated functions and for taking the necessary corrective measures falls to the anesthesiologist. Regulation of breathing, heart rate, blood pressure, hormone release, neurotransmitter levels, and ion balances becomes our domain. Thus, more than providing unconsciousness and analgesia, anesthesiologists are called upon to maintain hemodynamic stability and to promote better perioperative outcome.^{10,11}

The anesthesiologist also has learned that sympathectomy perioperatively may improve outcome.¹⁰⁻¹² α_2 -Adrenergic agents and even nitric oxide may play important roles in consciousness and the response to painful stimuli.¹³⁻¹⁵ Will future research help us to understand consciousness better and to define the neural networks that are responsible for responses to pain? Will it identify the patients for whom blockade of movement is sufficient from those who require more complete pharmacologic management.

In this regard, the ultimate promise of the interrelationship between clinical care and basic science is a better understanding of how interfering with the mechanisms controlling consciousness can be best utilized to enhance patient outcome.

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