Control Data for Animal Experiments

To the Editor.—Dr. Theye has made some assumptions in his recent publication (ANESTHESIOLOGY 37:367–72, 1972) which I feel deserve some comment. The problem of “control” data for experiments in anesthetized animals has plagued all investigators. Ideally, the trained, nonmedicated resting animal must be the control. Such conditions are difficult to achieve unless one has almost unlimited funds. Dr. Theye has managed to stabilize many variables, including blood gases, body temperature, and even skeletal muscle activity, with massive doses (for the dog) of succinylcholine. In spite of his contention that the lack of change in heart rate from his “awake” animals to the deeply anesthetized indicates no “unusual degree of excitement or distress,” it is inconceivable that the paralyzed, catheterized, intubated, normocarbic normothermic dog is really a good control. Several investigators have indicated that heart rate and vascular pressures in the resting dog are similar to those in resting man.1–4 A mean arterial pressure of 134 torr and heart rate of 111 beats/min deviate significantly from this. Consequently, it is probable that the changes in oxygen consumption and hemodynamics reported by Dr. Theye are changes from a hypermetabolic state rather than a resting state.

As he correctly pointed out, there is no agreement among cardiac physiologists as to a method for precisely estimating myocardial oxygen consumption short of actual measurement. For example, Bergamaschi demonstrated that the cardiac response to emotional stress in dogs was decreased external ventricular work and increased ventricular oxygen consumption.5 Dr. Theye’s measurements in his previous work (ANESTHESIOLOGY 28:1042–7, 1967) were under conditions very different from those in his current study. In the first place, they were made with only one halothane concentration, 0.85 per cent end-tidal, or about 1 MAC. I believe that the current controversy about the significance of MAC multiples6–8 would make extrapolation of these data suspect even if the experimental conditions were the same. They were not the same, however. In his 1967 paper, Dr. Theye’s dogs were open-chested on right-heart bypass. Most were under the influence of continuous spinal anesthesia, and were vagotomized. It is difficult for me to accept calculations based on data from animals in conditions so different from those in the more recent investigation.

ROBERT G. MERIN, M.D.
Department of Anesthesiology
The University of Rochester
School of Medicine and Dentistry
Rochester, New York 14620

REFERENCES


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To the Editor.—Dr. Merin states that “it is probable that the changes in oxygen consumption and hemodynamics reported by Dr. Theye are changes from a hypermetabolic state rather than a resting state.” Assurance stems from several sources that this was not the case and that the conditions at the lowest halothane concentration (<0.2 per cent, expired) were not those of a hypermetabolic state. Mean whole-body VO2 in this circumstance of our study was 6.46 ml/min/kg.1 This is quite close to