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## A SYMPOSIUM ON MUSCLE RELAXANTS

### Introduction

THE introduction of muscle relaxants into clinical anesthesiology has been one of the most significant advances made in the specialty. Because of these drugs, concepts of anesthesia have changed so that in many areas today's anesthetic techniques bear little resemblance to those of a short generation ago. Most anesthesiologists who have begun practice in the past decade have little comprehension of the anesthetic routine prior to the advent of the relaxants. Then a rapid, smooth induction of anesthesia and the maintenance of a steady state adequate for the surgical procedure was a work of art, accomplished regularly by relatively few. This ability was obtained only after years of diligent practice. No longer is this true. Unconsciousness can now be produced rapidly by the intravenous injection of barbiturates, and profound muscular relaxation is provided shortly thereafter.

Although the muscle relaxants were originally introduced as a means of obtaining the relaxation of deep ether anesthesia without the undesirable effects associated with such depression, they are now used for other purposes as well. In the majority of instances, tracheal intubation is facilitated by the intravenous injection of succinylcholine. Laryngospasm, cough-

ing, or bucking is often overcome by the injection of relaxants. Indeed, in many quarters, instead of the muscle relaxant being used to augment general anesthesia, a minimal amount of general anesthesia is superimposed upon the profound muscular paralysis resulting from the injection of relaxants.

The extent to which these adjuvants are used in clinical anesthesiology can hardly be overestimated. In many practices, they are given for one purpose or another in a majority of the anesthetics administered. Even in well-conceived teaching programs nearly one-half of all patients given general anesthesia have received muscle relaxants. No other anesthetic drug or adjuvant except oxygen is so widely used. Estimates indicate that the gross income of pharmaceutical firms for the sale of relaxants exceeds two million dollars annually, and that this at least equals the revenue from diethyl ether.

Although widespread clinical use of relaxants is evident, interest in the drugs in the laboratory has grown apace. As will be apparent from the contributions to this symposium, our present knowledge of nerve-muscle conduction depends largely on the study of the various muscle relaxants in the laboratory.

Many have found it difficult to correlate laboratory data with clinical usage, yet the rational and safe use of drugs demands detailed information on their basic actions. Too often, the clinical anesthetist has over-simplified the effects of muscle relaxants. At first, with only *d*-tubocurarine available, we conceived of a single self-limiting effect upon the myoneural junction. With the introduction of decamethonium a second mode of action became apparent, and then it soon became evident that an effect might occur which conformed to neither prototype. As clinical experience with relaxants has increased, more and more interactions of these substances with other drugs and with diseases and alterations in body functions have been demonstrated. Whereas we thought at first in terms of specific action confined to the myoneural junction, we have become aware of the possibility of additional and often undesirable effects at sites remote from the nerve-muscle synapse. Prolonged apnea following relaxants was thought to be best treated simply by the maintenance of adequate ventilation until muscular activity returned. Data purporting to show that this might not be true and that relaxants had an inherent toxicity were presented by Beecher and Todd. However, this concept has been vigorously attacked by most anesthesiologists. Some support for the inherent toxicity argument is presented in the pages to follow. It is apparent, however, that since information about the ac-

tions of these drugs is accumulating rapidly, frequent reappraisal of our knowledge is needed. It is for these reasons that a symposium on muscle relaxants has been prepared.

All participants of this symposium previously have made major contributions to our knowledge of the actions and clinical use of muscle relaxants. None need introduction to the anesthesiologists or pharmacologists. They have provided an authoritative reference work that will be valuable for years to come. The clinician will be particularly interested in reviewing the divergent opinions on the proper clinical use of the drugs; he will obtain answers or possible solutions to some of the perplexing problems surrounding the action of the relaxants, and he will find suggestions for the choice of relaxants and for the prevention or treatment of the complications associated with their administration. The investigator will find an up-to-date account of the fundamental actions of muscle relaxants and their application to clinical medicine; he will also find a valuable and timely source of references. The teacher and student will obtain important information about this vital group of drugs. The latter groups will probably benefit most from the symposium.

The Editorial Board of the JOURNAL is proud to present this compilation of information concerning a group of drugs so important to the practice of anesthesiology.

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