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PREFACE

The Third International Symposium on Excitation-Contraction Coupling in Skeletal, Cardiac, and Smooth Muscle, organized by George Frank, C. Paul Bianchi, and Henk E.D.J. ter Keurs, was held in Banff Centre, Banff, Alberta, Canada during June 26 to June 30, 1991. The theme of these symposia has been to recognize the similarities and dissimilarities of excitation-contraction coupling in skeletal, cardiac, and smooth muscle. Cross fertilization of concepts of excitation-contraction coupling in these three types of muscle has occurred since the early studies in the late fifties and early sixties on skeletal muscle. Investigators in each field meet only at specialized symposia which exclude investigators in the other fields. The purpose of the symposia has been to bring together international investigators studying excitation-contraction coupling in skeletal, cardiac, and smooth muscle so that we may learn from each other and hence provide a more global concept of excitation-contraction.

The Third International Symposia has accomplished its objective as we recognize that calcium channels of the sarcolemma and the sarcoplasmic reticulum play key essential roles in excitation-contraction coupling in all three types of muscles. In skeletal muscle the recognition that E-C coupling consists of two parallel mechanisms, one dependent upon a dihydropyridine voltage-sensitive sensors coupled to calcium release from the terminal cisternae via the ryanodine sensitive channel in the foot structure of the triad. The foot structure is dependent upon a membrane bound calcium and binding site associated with the voltage sensor which upon release is involved in the charge transfer observed during excitation-contraction coupling. The single twitch and rapid discharge of calcium is dependent upon the feet-operated channels. However, when frequency of stimulation is increased, a second coupling mechanism which involves calcium influx through L-calcium channels and is related to the positive staircase and tetanus tension development. The concept of two parallel systems one involved in the single twitch and both involved in regulating force development as frequency of stimulation is increased.

Two predominant types of calcium release channels from the sarcoplasmic reticulum of striated, cardiac, and smooth muscles were discussed. The first type consists of a calcium release of calcium channel involved in rapid calcium release and the second, the IP_3-operated channel which possesses much slower kinetics of calcium release and may involve depression of the calcium release of calcium channels allowing calcium-dependent functions of the cells to take place without necessarily involving contraction.

The ground work for advancing to a new level of understanding of excitation-contraction coupling in skeletal, cardiac, and smooth muscle was laid by the 3rd International Symposium on excitation-contraction coupling.

The Editors

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