'Contractility' Review Series

Contractility in health and disease

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Guest Editor

Differentiated muscle cells make up 45–50% of the body mass [1] and, hence, are major determinants of overall physical health. Cardiac and smooth muscles are effectors of the cardiovascular, respiratory, digestive and genitourinary systems. Together, the abnormal contractile function of muscles encompasses a significant fraction of the concerns of internal medicine. This review series will span work from all three muscle types, cardiac, skeletal and smooth, and focus on recent advances in the understanding of the differentiated, contractile phenotype of these muscles, both with respect to molecular mechanisms and to pathophysiologies and potential therapeutics related to those mechanisms.

Many excellent muscle biology reviews have been written on the topics of basic mechanisms of muscle developmental biology, and muscle cell proliferation and apoptosis as studied in cell culture models [2–10] and, thus, these topics will not be a focus of the present review series. In contrast, the current series will focus on recent advances in signalling mechanisms, the cytoskeleton, and disease in differentiated muscle tissue, areas to which relatively little attention has been given in recent reviews in translational journals. The contributors to this series span and integrate the fields of the fundamental muscle biology of contractile tissues and the pathophysiology and therapy of human muscle diseases.

Initial challenges in the application of new molecular technologies to differentiated muscle cells (*e.g.* poor transfection efficiency, slow protein turnover rates and corresponding difficulty in knockdown approaches, loss of contractile phenotype in cell culture models) delayed the elucidation of the molecular details of function in these cell types. However, in recent years significant technical advances in basic studies in this field have improved our understanding of molecular mechanisms of contractility. The surprise is that these mechanisms are far more complex than initially imagined. Clearly, the regulation of contractility involves much more than a simple $[Ca^{2+}]_i$ switch. As a result, many new molecular targets for potential drug discovery programs have become apparent. These areas will be reviewed in the coming articles.

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