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A Brief Review of the Sections

Section I: *Basic Biochemistry of Creatine and Creatine Phosphate*

This section covers aspects of the basic metabolism of creatine and creatine phosphate with particular emphasis on the enzyme creatine kinase, the creatine phosphate shuttle hypothesis, recent observations in animal and cellular models, on the high energy phosphate changes in physiological studies, $\beta$-GPA feeding, and some muscle disorders. The regulation of oxidative phosphorylation is discussed and findings relating to creatine kinase gene manipulation models are summarized.

Section II: *Biochemical Basis for a Therapeutic Role of Creatine and Creatine Phosphate*

In this section the mechanism underlying the mode of action by which creatine and creatine phosphate are thought to act as therapeutic agents is presented. A detailed description of the biophysical actions of creatine phosphate is given as well as *in vitro* observations on heart cells. This is a transition section between the basic and clinical science sections.

Section III: *Magnetic Resonance Spectroscopy of Creatine Phosphate in the Cardiovascular System*

Magnetic resonance spectroscopy is a non-invasive analytical technique for measuring chemical species, such as creatine phosphate, in humans, animals, cellular and other systems. This section outlines the current findings and requirements in NMR spectroscopy of the human heart and skeletal muscle in heart failure.

Section IV: *Therapeutic Aspects of Creatine and Creatine Phosphate Metabolism*

In the last section the uses of creatine phosphate as a therapeutic agent are introduced both for clinical and sports medicine application and in performance. This section finishes with a look towards future developments.
Appendix: Assay for Creatine and Creatine Phosphate

For the interested reader a detailed method for the assay of creatine phosphate and creatine has been summarized.
Preface

Creatine and creatine phosphate (CP, also called phosphocreatine, PCr) are important metabolites in high-energy phosphorus metabolism. They rank with dietary carbohydrates fats, proteins and other compounds as central components of the metabolic system involved in the provision of energy for work and exercise performance.

Over the past century numerous investigators have explored the basic biochemistry and in the past 20 years a whole science has developed around methods for measuring the molecules in vivo – proton and \(^{31}\)P magnetic resonance spectroscopy. Some investigators have begun to examine the therapeutic role of the agents for the treatment of cardiovascular and other disease and in recent times much interest has developed in the potential of creatine (and PCr) for exercise and performance enhancement.

This book is designed to focus attention on creatine and creatine phosphate. The contributions have been invited from many of the key investigators in the field of high-energy phosphorus metabolism and, as such, represent an important distillation of the observations, ideas and theories which form the foundation for the exciting future of this science.

Each chapter represents the views of the individual authors and not necessarily those of the editors. Also, the book represents a reference and sourcebook and is not designed as a therapeutic manual. Hence, the administration of creatine and creatine phosphate must be performed according to the recommendations of the manufacturers and suppliers.

Michael A. Conway and Joseph F. Clark
1996
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