Preface

Glycolysis is a metabolic hub that is known since the pioneer work of Otto Meyerhof in the earliest years of the 20th century. Since then, our understanding of the function and regulation of this pathway has greatly expanded. For instance, the identification of new isoforms of the glycolytic enzymes, such as hexokinase and pyruvate kinase, has highlighted the importance of tissue-specific regulation of glycolysis. It is now recognized that glycolytic enzymes are capable of changing their location within cells and exerting different functions. Owing to the advances in imaging techniques and the use of glucose analogs, real-time monitoring of glucose uptake and utilization is possible in different cell types and conditions.

In this book, our aim is to provide readers with the latest research and developments for a comprehensive understanding of glycolysis, one of the most fascinating and versatile metabolic pathways in cells. Our goal is to not only elucidate the intricacies of glycolysis but also highlight its tissue-specific regulation and impact on tissue and organ functionality. By exploring the dynamic interplay between glycolysis and other metabolic pathways, we provide a holistic perspective on how this pathway functions in different physiological and pathological sets.

We begin this book by introducing the fundamental concepts of glycolysis and its regulation, highlighting the main achievements in our understanding of this key metabolic pathway in recent years. We then move on to examine the diverse role of glycolysis in tissue-specific contexts, focusing on several organs and systems such as skeletal muscle, heart, bone, adipose tissue, liver, reproductive system, and pancreas. From there, we examine the role of this pathway in pathological conditions, including cancer, cardiovascular, cardiopulmonary, and neurodegenerative diseases, diabetes mellitus, viral infections, and in the inborn defects related to this pathway. Finally, we analyze the latest approaches used to study glycolysis, including bioinformatics tools to investigate the dysregulation of glucose metabolism and the ones based on the analysis of metabolic flux.

Throughout the book, we emphasize the importance of an integrative approach to study glycolysis, highlighting the interconnectedness of this pathway with other metabolic processes in cells. We focus on the intricate network of pathways that occur in cells to fulfill energetic needs and maintain regulatory metabolite levels in response to distinct stimuli. We also showcase numerous examples of how our understanding of glycolysis and, thus, metabolism, has led to advances in various fields such as health

promotion. We are very grateful to our coauthors for bringing their expertise and fresh perspectives to these topics.

We hope that this book will serve as a valuable resource for students, researchers, and anyone interested in the fascinating and challenging world of metabolism.

Rita Ferreira
Pedro Fontes Oliveira
Rita Nogueira-Ferreira