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## Preface

In vitro assessment of cellular viability has become a generic approach in addressing a vast range of biological questions in many areas of biomedical research. The spectrum of available cell viability indicators assessing individual physiological, structural, or functional parameters is large and is continuously increasing with the availability and optimization of new or existing technologies. Depending on the number and diversity of employed fitness indicators, a cell viability assay can generate fitness phenotypes of varying complexity: when a single indicator is used, the information provided on the cellular condition is very limited, potentially resulting in poor dataset concordance, whereas when various indicators are employed, e.g., in a multiplexing approach, combining different methods in one experiment, cellular fitness is reflected more comprehensively, allowing for decreased interassay variability and increased reproducibility of experimental results. While cell-based viability screening is typically carried out using simple and single indicator-based approaches, a paradigm shift toward more advanced methods generating complex cell fitness phenotype read-outs is currently taking over as indicated by an increasing availability of protocols describing multiparameter assaying techniques.

This book is intended to provide an overview and to discuss the strengths and pitfalls of commonly used cell fitness indicators. We aim to give an in-depth view of protocols that are used in the classical cell-based viability screening approach and to provide experimental methods for advanced cell viability assaying strategies, including evaluation of e.g. cellular transporter activity, intracellular calcium signaling, electrical network activity, synaptic vesicle recycling or ligand-gated ion channel function. In this volume, we cover biochemical, fluorescence and luminescence-based strategies as well as computational and label-free methodologies for assaying cellular viability by means of e.g. viscoelastic properties, impedance and multiphoton microscopy. The biological samples used in the described approaches cover a broad range of specimen including conventional culture models, stem and primary cells as well as parasites. These chapters address an interdisciplinary audience, including graduate students, postdoctoral fellows, and scientists in all areas of biomedical research. As the concept of this series is meant to shed light into the sometimes tiny “tips and tricks” that decide over the success or flaw of biological experiments, we hope that the chapters will provide useful hints to the community.

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