
Preface

Enzyme-linked immunospot assay (ELISPOT) has been known for almost three decades as a unique state-of-the-art technique for studying the cytokine-secreting activity of immune system cells. ELISPOT appears to be one of the fast growing applications in biomedical research and has become an indispensable tool in vaccine development, HIV research, transplantation studies, and cancer and allergy research. After publishing the 1st edition of the Handbook of ELISPOT in 2005 which received a strong positive feedback from novices, advanced users, and ELISPOT experts, a wealth of new experience with this assay has been accumulated, bringing about the 2nd edition. The very fact that almost twice as many ELISPOT papers were published in 2010 than when the first edition was written in 2004, suggests that ELISPOT is gaining popularity as a must-have research tool. In addition, ELISPOT appears to be a very dynamic technique that can be modified and adapted for a large variety of diverse research tasks. In spite of its apparent simplicity, ELISPOT is complicated and capricious, and setting up an assay and executing it requires a great deal of understanding of its chemical and biological aspects. Furthermore, even knowing the latter is not sufficient enough because it is also critically important to understand the principles of analyzing ELISPOT images, spot quantification, extracting the biological information from the images of spots, and performing a statistical analysis.

The 2nd edition of the Handbook of ELISPOT is not just a reformatted 1st edition but rather an extension of the former. It is only the second book in the field which is entirely dedicated to ELISPOT assay, helping researchers not only to learn it but also to advance and become experts. In addition, this book is also intended to assist both novice and experienced researchers from other areas of biomedical science, including stem cells, neuroscience, and endocrinology who are looking for additional cell-based research tools.

Part I of the Handbook of ELISPOT includes two chapters introducing the reader to the strengths (Chapter 1) and challenges (Chapter 2) of ELISPOT assay. Part II covers veterinary applications of the ELISPOT assay with equine (Chapter 3), feline (Chapter 4), and canine (Chapter 5) species. Advanced applications are grouped in Part III, covering multicolor fluorescent ELISPOT (Fluorospot, Chapter 6), as well as using ELISPOT for such novel applications as studying oxidative stress (Chapter 7) and secretory activity of microglial cells (Chapter 8), stem cell research (Chapter 9), and combining ELISPOT with ELISA to measure amounts of cytokine secreted by a single cell (Chapter 10). Principles of ELISPOT image analysis are presented in Part IV (Chapters 11–13) along with protocols on statistical data analysis (Chapters 14 and 15). Finally, Part V concludes this volume with chapters on using ELISPOT for vaccine development (Chapters 16 and 17), a diagnostic tool (Chapter 18), and it ends with an overview of membranes and membrane plates used for research and diagnostic ELISPOT applications (Chapter 19).

As with the 1st edition, the ultimate goal of putting the current volume together was a compilation of a technical reference and a troubleshooting guide for researchers worldwide. The material presented in this book is written by the leading scientists in their fields who

translated their hands-on experience into concise how-to protocols, walking the reader step-by-step through their merits and shortcomings. Even after dedicating 10 years to this field with more than 50 developed ELISPOT assays and considering myself an expert, I found contributed chapters as excellent educational materials with a lot of new tricks and hints to learn.

I wish to thank contributing authors for sharing their knowledge and expertise with the rest of us, and spending a lot of time (often their personal) on writing and reviewing their chapters to make them both highly informative and easy to comprehend by researchers at different knowledge levels and training skills. I also hope that protocols presented in this volume will serve as food for thought for inquisitive minds in their attempts to develop the next generation of ELISPOT assays that can better meet the challenges presented by the biomedical science.

Minneapolis, MN

Alexander E. Kalyuzhny

Handbook of ELISPOT

Methods and Protocols

Kalyuzhny, A.E. (Ed.)

2012, X, 261 p. 59 illus., 13 illus. in color., Hardcover

ISBN: 978-1-61779-324-0

A product of Humana Press