Visualization techniques
From immunohistochemistry to magnetic resonance imaging
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Biology is, undoubtedly, a fascinating subject and the opportunity of studying its different aspects *in vivo* or *in vitro*, is even more intriguing. The development of systems able to follow the expression/localization/behavior of several different proteins helped researchers to better understand some of the fundamental biological dogma.

This volume belongs to the *Neuromethods series* and covers a wide range of visualization techniques from immunohistochemistry to magnetic resonance imaging, from high speed imaging of 3D objects to digital infrared thermography.

Methods are accurately described and the note sections are full of tips, troubleshooting and tricks that a diligent researcher will not neglect. In addition, all chapters contain nice figures (black and white and/or color) and schemes extremely useful to understand which kind of signals can be obtained from the different techniques explained in this book. In my opinion this is an important aspect that a manual like this should cover.

In particular, the first three chapters are dedicated to the immunohistochemical and in situ hybridization labeling of peripheral neurons, rat brain and central nervous system sections, with detailed explanations on how to fix samples, how to choose the correct primary and secondary antibodies and how to set up the microscopes (both wide field or confocal) to obtain good and reliable images in order to determine thresholds for which signals are to be considered positive and negative. These chapters stress the importance of having good controls to calibrate the obtained results. Chapter 4 is specific for the visualization of GABA receptor using a combination of confocal laser scanning microscopy and multiple immunofluorescence analysis. The notes section is particularly rich in details although the entire chapter is more structured as a brief scientific report than as a methodological one. Chapter 5, interestingly, presents a powerful application to locate all the molecules close to the plasma membrane of a cell with fluorescence microscope. This is a very useful method not only for neurobiologists but also for whoever is interested in studying the trafficking and exocitosis of molecules. Chapters 6, 7 and 8 are more focused on live imaging important for the quantification of mitochondria and other cellular parameters taking advantage of an automated epifluorescence video microscope and a two-photon microscopy. Both systems present advantages and disadvantages that can be enhanced or modified depending on the signal you want to see from your sample. The ability to follow single cells or cell populations is useful for different aspects of cell biology: for example, I think that it could also be used to follow the evolution of cancer cells treated with specific drugs *in vivo*. Chapter 9 describes the ability to label a single neuron from an intact live animals using a juxtacellular labeling approach, a powerful technique able to determine the phenotype and structure of a neuron from cortex or spinal cord; it can be applied in other cellular systems, too. Chapters 10 and 11 are dedicated to the use of green fluorescent proteins (GFP) and viral transneuronal tracers that can be used, for example, to follow and detect normal brain function or loss of function due to injuries or diseases. In particular, chapter 11 contain beautiful and easy-to-understand schemes in addition to the methods and notes sections. Chapter 12 describes less invasive methods that can be applied to freely moving animals using the digital infrared thermography: an interesting technique able to reveal physiological phenomena associated to changes in skin temperature, without the need to sacrifice an animal. Infrared thermography is a probes-free technique that can measure the temperature of visible surfaces in a single point, ignoring the variation of temperature over extended surfaces. Finally, chapter 13 is dedicated to the cerebral perfusion assessed by dynamic-susceptibility-contrast MRI (DSC-MRI).

In addition to the detailed *Methods* section, the reader can find an interesting part devoted to the application of this technique in different fields. The notes section defines twelve concepts (explaining what flip angle, acquisition sequence, NSF, non linear and partial effects, *etc*., are) that are mentioned in the text; several references are also indicated, to help the reader to shed the light on this topic.

Definitely a very useful book recommended to researchers of different field.

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