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The discovery of fluorescent proteins has revolutionized light-microscopy technology, and fluorescence imaging has become one of the most powerful tools to study cellular processes. This collection of articles illustrates its breadth of applications — from studying early mammalian development at a cellular level to visualizing tumorigenesis in living animals.

Robert M. Hoffman describes how different fluorescent proteins can be used to colour code and compare cancer cells with a specific genotype or phenotype (for example, high-metastatic versus low-metastatic cells). Real-time fluorescence imaging is especially important when evaluating the efficacy of therapeutics in mouse models. *In vivo* imaging can also be used to study diseases other than cancer, such as neurological disorders. Thomas Misgeld and Martin Kerschensteiner describe the advantages of using multiphoton imaging in combination with sophisticated transgenic technology to label single cells in the nervous system, allowing their neuropathologies to be monitored.

Moving from disease aetiology and therapy to basic cellular processes, Magdalena Zernicka-Goetz tracked the fluorescently labelled nuclei of blastomere cells and quantified their clonal progeny to examine the cleavage-division pattern in early mouse development.

Fluorescence imaging can also be applied to large-scale analyses. Rainer Pepperkok and Jan Ellenberg discuss how to combine high-throughput fluorescence imaging with functional genomics approaches to probe gene functions, and highlight recent developments in imaging techniques and image-analysis software.

This collection of articles, which is freely available until September 2007, is accompanied by a web focus (www.nature.com/reviews/focus/fluorescence) that contains a selection of primary research and review-type articles on fluorescence-imaging techniques and their applications. The collection and the web focus were made possible thanks to generous support from Olympus.

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