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► **COVER:** 'Pyramid schemes' by Kirsten Lee, inspired by the Review on p206.



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Observing changes in neuronal activity and morphology as they occur in living humans and animals has been crucial for our current understanding of many aspects of nervous-system function. Two articles in this month's issue demonstrate how *in vivo* imaging on the micro- and macroscopic levels can be used to answer some of the most important and challenging questions facing neuroscience today.

On page 195, Kerr and Denk explore the application of multi-photon microscopy (MPM) to *in vivo* imaging of the nervous system. MPM can be used to measure activity in single neurons or neuron populations, and even changes that occur on a subcellular scale can now be observed. Using specific examples to demonstrate how this technology is pushing back the boundaries of what can be studied *in vivo*, Kerr and Denk provide insights into future applications and point out some of the current challenges, such as accessing deeper brain structures without causing severe damage to overlying structures.

Advances in imaging technologies also have enormous implications for the application of neuroscience to many legal and clinical decisions. On page 235, Owen and Coleman consider one of the most striking recent uses of functional MRI, which suggested that some patients who had been diagnosed as being in a vegetative state in fact showed some level of conscious awareness.

New *in vivo* imaging technologies will contribute greatly to our understanding of the macroscopic and microscopic changes that occur in the brain during development, as a consequence of adult experience and in disease, and will be useful in determining the effectiveness of treatments for disease-induced abnormalities.

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