



# IMAGING AND STIMULATING ADAPTIVE BRAIN PLASTICITY

**A TALK BY  
HEIDI JOHANSEN-BERG**

**WELLCOME CENTRE FOR  
INTEGRATIVE NEUROIMAGING  
UNIVERSITY OF OXFORD**

**23**  
**GENNAIO**  
**15:00**  
**AULA SEMINARI VIMM**  
**FONDAZIONE RICERCA**  
**BIOMEDICA AVANZATA**  
**VIA ORUS, 2**  
**PADOVA**

Animal studies show that the adult brain shows remarkable plasticity in response to learning or recovery from injury. Non-invasive brain imaging techniques can be used to detect systems-level structural and functional plasticity in the human brain. This talk will focus on how brain imaging has allowed us to monitor healthy brains learning new motor skills, to assess how brains recover after damage, such as stroke, and how they adapt to change, such as limb amputation. Although imaging is useful to detect such adaptations, many brain imaging measures are non-specific and do not allow us to pinpoint the underlying cellular changes that are driving observed effects. The talk will also discuss studies in animal models in which both imaging and histological approaches can be used to shed light on the underlying biological drivers for structural plasticity detected using MRI. Finally, the talk will discuss how brain stimulation can be used to manipulate brain remodelling. For example, transcranial direct current stimulation (tDCS) to the motor cortex can speed people's learning of a new task, alter their brain chemistry, or improve function in stroke patients. fMRI identifies changes in cortical activity that may mediate these functional benefits. In future, imaging could be used to guide individually targeted brain stimulation to enhance adaptive brain plasticity.



**HEIDI JOHANSEN-BERG** is Professor of Cognitive Neuroscience at the University of Oxford and director of the Wellcome Centre for Integrative Neuroimaging. She is part of the FMRIB centre and head of the plasticity group. Her research focuses on how the brain changes with learning, experience, and damage. As well as shedding light on how the healthy brain responds to change, our work also has implications for understanding and treating disease. For example, we are testing new methods for rehabilitation after stroke and we are assessing whether taking up exercise could slow the effects of age on the brain.



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