

Global brain activity in different states and anaesthesia levels

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An understanding of the cellular and network mechanisms that generate different brain states — from synchronized to asynchronous states — as well as the transitions between them, is critical to disentangle the basis of the diversity of brain function in both health and disease. In this presentation we will discuss results for a collection of experiments where the brain, and in particular the cortical network and its emergent activity, have been explored in different states that are either spontaneous (sleep, awake), induced by different levels of anaesthesia, or under different network excitability levels induced *in vitro*. In all these different states we find common spatiotemporal features of activity. For example, complexity is low during periods of deep sleep and anaesthesia, in which the brain generates a bistable pattern consisting of alternating active and silent periods of neural activity (known as slow oscillations), and is high during wakefulness or asynchronous states. We will also discuss the non-linear relationship between excitability and complexity. Finally, the experimental results will be interpreted in the light of theoretical models of the cortical network and will be used to better understand the clinical features observed in disorders of consciousness following brain lesions.

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