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Modelling the spatio-temporal organisation of intracellular calcium signalling : from mechanism to physiology

Signal-induced Ca^{2+} oscillations have been observed in many cell types and play a primary role in cell physiology. They mediate vital physiological processes such as secretion, gene expression or fertilization. Specificity in the physiological responses is ensured by the high level of spatio-temporal organization of Ca^{2+} dynamics in the form of stochastic sub-cellular increases, regular oscillations and intra- or intercellular Ca^{2+} waves. In this talk, I'll illustrate on some specific examples how the interplay between experiments and modelling can help uncovering the molecular mechanisms responsible for the spatio-temporal organization of intracellular Ca^{2+} dynamics and for their physiological role. The peculiarities of the Ca^{2+} oscillations induced by stimulation of mGluR5 will be presented in more details.