Network resilience in clustered neuronal cultures

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The understanding of the key mechanisms behind neuronal network resilience is a highly active field of research. To shed light on this study, we introduce a new experimental paradigm using *clustered* neuronal cultures upon a local physical damage. These neuronal cultures are constituted by islands of hundreds of neurons termed *clusters* and are formed through a self-organizing process. A remarkable feature of these cultures is that they display a rich spatiotemporal spontaneous activity, with assortative connectivity and a rich club core [1], features that have been related to network resilience [2, 3].

Here, we present the results of the experiments carried out in collaboration with the Institute of Photonics Sciences (ICFO), in which a single cluster of the network is silenced by a laser beam. The changes in spontaneous dynamics of these clustered networks after the physical attack allow us to study the resilience of these networks and their recovery mechanisms. In particular, our results show that local damage does not initiate a cascade of failure, but rather activates global network response to boost up recovery.

References

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