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Autore	Sebastian Cerdan
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Synaptic transmission demands the operation of a highly specialized metabolic machinery involving the transfer of metabolites and neurotransmitters between neurons, astrocytes and microvessels. In the last years, important advances have occurred in our understanding of the mechanisms underlying cerebral activation, neuroglial coupling and the associated neurovascular response. Briefly, exacerbated oxygen consumption in stimulated neurons is thought to trigger glycolytic lactate and glucose transfer from astrocytes which, in turn, obtain these fuels from the microvasculature. Neurotransmitter release is made possible by a combination of transcellular cycles exchanging metabolites between these three compartments, returning eventually the synapsis to its pre-firing situation in the resting periods. In spite of the enormous progresses achieved in recent years, the drivers determining the predominant direction of the fluxes, their quantitative contribution and their energy requirements, have remained until today incompletely understood, more particularly under the circumstances prevailing in vivo. In many instances, progress derived from the implementation of novel methodological approaches including advanced neuroimaging and neurospectroscopy methods. As a consequence, literature in the field became vast, diverse and spread within journals of different specialities. The e-book "Transcellular cycles underlying neurotransmission" aims to summaryze in a single volume, recent progress achieved in hypothesis, methods and

interpretations on the trafficking of metabolites between neurons and glial cells, and the associated mechanisms of neurovascular coupling.