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Once orthodox, the view of mitochondria acting solely as a powerhouse of the cell is no longer accurate. Besides its participation in the cell bioenergetics, primary targets of mitochondrial studies included their interplay with other important processes within the cell, including redox and calcium homeostasis and apoptosis. However, the recent increasing evidences of their dynamic behavior, continuously moving, fusing and dividing, and the interaction of these events with cellular degeneration and plasticity in neural cells make this classic view outdated. This field will be greatly nurtured by novel technologies that are developed and applied to identification and clarification of the mitochondrial role in neural plasticity using both cultured cells and *in vivo* approaches. The complete understanding and modulation of such mechanisms may represent a novel and promising therapeutic approach for treatment of diseases affecting central and peripheral nervous system.

For this special issue, we kindly invite researchers studying mitochondria from neurosciences and related fields to contribute with original research articles as well as review articles that focus on the participation of mitochondria in neural plasticity and its relevance to health and disease states. We aim with this special issue to shed some light on these novel and exciting roles of mitochondria, which may or may not be related to the classical functions of this organelle, including cell bioenergetics and redox homeostasis.

Potential topics include but are not limited to the following:

- ▶ Mitochondrially targeted chemicals that modulate neural plasticity
- ▶ Mitochondrial dynamics influencing structural and functional plasticity of neural cells and dendritic spines
- ▶ Role of mitochondria in the morphogenesis and plasticity of synapses and neurotransmission
- ▶ Mitochondrial proteins modulating neural plasticity
- ▶ Mitochondria and neural plasticity in the pathophysiology of diseases
- ▶ Novel compounds with potential mitochondria-related therapeutic action for diseases affecting central and peripheral nervous system
- ▶ Novel technologies to investigate mitochondrial participation in neural plasticity

Authors can submit their manuscripts through the Manuscript Tracking System at <http://mts.hindawi.com/submit/journals/np/imnp/>.

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