

4th International Conference and Exhibition on **Neurology & Therapeutics**

July 27-29, 2015 Rome, Italy

Finding of myelin energetic function supporting the axonal nervous conduction: Perspectives in Neurology

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In the last years, we have focused our attention on the role of myelin sheath as an energy supporter for the nervous conduction. We have observed that myelin is able to conduct and extramitochondrial oxidative phosphorylation, consuming oxygen to produce ATP. Moreover, we have also demonstrated a direct connection among myelin sheath and neuron, which may allow the transfer of ATP from the sheath to the axon. Interestingly, the energetic role of myelin sheath was recently confirmed by Gat-Viks *et al*, studying the alteration of the energetic metabolism in the vanish white matter disease.

This finding introduces two new paradigms, one in bioenergetic and the other in neurobiology. Firstly, our data demonstrated that mitochondria is not the only “power-house”, but the OXPHOS proteins could be exported to other membranous structure, to provide a more efficient energy production. Moreover, our hypothesis on the energetic function of myelin sheath sheds a new light on the role of this structure, giving a possible explanation of the neuron degeneration observed in the demyelinating diseases, as Multiple Sclerosis.

Biography

Alessandro Morelli (b. 1943) has studied enzyme Glucose-6-P-dehydrogenase and it's molecular mechanism of senescence. He has been working in the field of phototransduction and molecular events in photoreceptor cells of vertebrate retina. He has discovered the protein FX, a NADP dependent enzyme catalizing synthesis of GDP-L-fucose. He has been working on the effects of electromagnetic fields of extremely low frequency on the activity of enzymes involved in bioenergetic process. Recently he has studied the myelin energetic function in brain put in evidence the ATP extramitochondrial synthesis, with application in the study of Multiple Sclerosis and other neurodegenerative diseases.

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