“Sex steroids as therapeutic tool in neurological diseases”

Abstract: Gonadal steroid hormones are neuroprotective in different neural disease models and after acute neurotrauma. There is compelling evidence from in vitro and animal studies that estrogen and progesterone can preserve neuronal function and prevent neuronal cell death. The high complexity of molecular action of both steroids and their varying cellular targets make it however difficult to understand the precise mechanisms which account for cell protection.

Using animal and cell models for ischemia and multiple sclerosis, we aim to identify the cellular players, cell-cell interactions and related (patho)physiological parameters which are regulated by sex steroids and subject to neuroprotection. It sounds plausible that acute traumatic events require different protective strategies compared with long-lasting neurodegenerative disorders. From our studies, we might draw several conclusions. Both hormones affect a multitude of intracellular processes which participate to variable degrees in the prevention and attenuation of cell damage. Under hypoxic challenges, steroids appear to stabilize the energy production machinery, uncouple ATP production from the formation of reactive oxygen species, and dampen the early neuroinflammatory cascade. Under chronic degenerative conditions, steroids might additionally recruit progenitor cell and promote myelination as well as balance local inflammation.

Translational human studies which have already started have now to provide evidence of the efficacy of hormone therapies for the described disease models.

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