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Session PSTR432 - Neuromodulation Techniques: Thermal, Magnetic, and Ultrasound

PSTR432.26 / AA8 - Light-activated drugs to restore neuronal activity in neurological disorders

October 9, 2024, 8:00 AM - 12:00 PM | MCP Hall A

Presenter at Poster
Wed., Oct. 9, 2024 8 - 9 a.m.

Session Type
Poster

Grant Support
ICT-36-2020-101016787

Grant Support
945539

Grant Support
PID2019-111493RB-I00

Grant Support
2021-SGR-01410

Grant Support
2021-SGR-00064

Grant Support
BES-2017-082496

Citation
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Disclosures
R. Sortino: None. **H. Gerwe:** None. **N.F. Pérez Pérez:** None. **C. Matera:** None. **F. Riefolo:** None. **M. Decker:** None. **P. Gorostiza:** None.

Abstract
The lack of tissue selectivity of conventional systemic pharmacological agents has long sparked the desire for compounds enabling on demand, localized control. Even drugs with highly selective pharmacological profiles act on their target at unintended organs and locations, with pharmacokinetics that cannot be externally altered. Consequently, the predominant unselective and fixed kinetics of action of conventional pharmacological agents pose significant challenges, particularly in treating neurological disorders such as stroke, traumatic brain injury, Parkinson's and Alzheimer's diseases, and schizophrenia.Photopharmacology has emerged as a promising avenue, providing reversible control of endogenous receptor activity with high spatiotemporal resolution by photoswitching ligands between an active and an inactive isomer.Here, we report novel photoswitchable drugs, named neuroswitches, that remain inactive in the dark but can be activated under orange, red, and infrared light, capable of penetrating the skull. These compounds demonstrate photoreversible efficacy both *in vitro* and *in vivo,* with no observed acute toxicity. Our proposed approach entails systemic delivery of the inactive neuroswitch followed by precise spatiotemporal activation using light patterns within the targeted region (***e.g.***, the area surrounding a neurologically damaged site). This strategy aims to regulate neuronal activity while avoiding systemic adverse effects associated with conventional pharmacological interventions.