Intranasal Deferoxamine: the future of neurological disease therapy?

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Supplemental Video

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Background: Disease-modifying therapy for neurological disease remains one of the greatest gaps in modern medicine. As our population continues to age and the burden of neurological disease grows, the need for novel therapeutics is paramount.

Methods: Herein, we review and argue the promise of intranasal (IN) delivery of deferoxamine (DFO), a high-affinity iron chelator, for treatment of neurodegenerative and neurovascular disease.

Results: An overwhelming body of preclinical and early clinical data has demonstrated that IN DFO and other iron chelators have strong disease-modifying impact in Alzheimer disease (AD), Parkinson disease (PD), ischemic stroke, and intracranial hemorrhage (ICH). Acting by the disease-nonspecific mechanism of iron chelation, we discuss how DFO counters each of these complex disease processes via multifactorial mechanisms. Furthermore, we consider emerging evidence that leads us to suggest mechanisms by which IN DFO may be beneficial in cognitive decline with aging, multiple sclerosis, other neurodegenerative diseases, traumatic brain injury, and vascular dementia.

Conclusions: Weighing its known safety profile, superior delivery method, enormous preclinical efficacy from decades of work across multiple research groups, robust mechanisms, and potential applicability for almost all of neurological disease, we conclude that the case for further development of IN DFO is considerable.

Learning Objectives
1) Describe the challenges to effective neurological disease therapy

2) Discuss the extensive preclinical and clinical research supporting further development of intranasal deferoxamine and other iron chelators across neurological disease

3) Identify the mechanisms by which iron chelation counters neurodegenerative and neurovascular pathophysiology