Abstract Title: Positive Phase II Double-blind Randomized Placebo-controlled Crossover Trial of Clemastine

Press Release Title: Over-the-Counter Drug May Reverse Vision Damage Caused by Multiple Sclerosis

Objective: To assess the efficacy of clemastine fumarate for remyelination in patients with multiple sclerosis (MS) and chronic optic neuropathy.

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Background: No reparative therapies exist for the treatment of MS. Clemastine was identified as a robust potential remyelinating agent using the in-vitro micropillar screen (BIMA) developed at UCSF. Following in-vivo validation, an FDA IND exemption was granted to investigate clemastine for the treatment of MS. Visual evoked potentials (VEPs) are capable of measuring conduction speed for electrical signals through the visual pathway and serve as a putative biomarker for remyelination.

Design/Methods: We conducted a phase II randomized double-blind placebo-controlled crossover trial comparing twice daily oral clemastine to placebo in 50 patients with MS and chronic demyelinating optic neuropathy. The study period was 150 days. The pre-specified primary efficacy end point was change in latency delay on VEP. Trial outcomes were analyzed using mixed effects multivariable linear regression models.

Results: Enrolled patient’s average age was 40.1 years, EDSS 2.1, and disease duration 5.1 years. Retention was 100% through the course of the study. There was a reduction of the primary efficacy endpoint of VEP latency delay of 1.9 ms/eye (95% CI [.66, 3.1]; p=.003) for the period on treatment. A strong trend for improvement of the principal secondary endpoint of low contrast visual acuity (LCVA) was also observed (p=.089). Clemastine treatment was associated with mild worsening of fatigue on the multidimensional assessment of fatigue (p=.017).

Conclusion: In MS patients with chronic optic neuropathy, clemastine improved VEP latency delay and demonstrated a beneficial trend for the secondary endpoint of LCVA. This is the first RCT documenting efficacy for a candidate remyelinating agent in MS.

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