Title: Promoting Myelination as a Strategy to Promote Depressive-like Behavior in Socially Isolated Mice
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Objectives: Depression affects 350 million people globally every year. The current treatment for depression is antidepressant medication but, only 30-50% of this medication is effective. We sought to explore a new method to reverse depression by promoting myelination of axons in the prefrontal cortex (PFC). This was achieved by administering the antihistamine drug, clemastine, in a mouse model.
Methods: In this experiment, the adult male mice were placed in three different groups. Two of the groups were isolated for eight weeks to induce depression, and then either treated with vehicle (placebo) or clemastine for the last two weeks. The third, the control group, was group-housed for all 10 weeks. A social interaction test which entailed a video-tracking device to measure social avoidance and interaction behavior of each test subject was then performed on all groups after which the mice were sacrificed. RNA extraction and analysis was performed as well as electron microscopy to mount the PFC regions of the mice onto slides for further analysis. Immunohistochemistry was then executed. The slides were stained with primary antibodies, CC1 (marker for differentiated oligodendrocytes, myelin-producing neural cells), MBP (marker for myelin), and NG2 (marker for oligodendrocyte progenitor cells).
Results: Results of the social interaction test showed that clemastine was found to reverse social withdrawal behavior in adult male mice. Also, increased myelination and oligodendrocyte differentiation was detected in the clemastine treated group.
Conclusions: Enhanced myelination and OPC differentiation are beneficial for reversing depressive-like behavior in socially isolated adult mice. Clemastine successfully enhanced myelination, OPC differentiation, sufficiently reversed social avoidance behavior in the socially isolated mice. Through staining of secondary antibodies, we were able to deduce that the prevalence of OPCs among the groups was not correlated to the reversal of depression in the mice, but that the differentiation of OPCs is what contributed to the phenomenon. This research confirms a possible method of treatment for socially-isolated or depressed adult male mice; therefore, moving forward, this research may be applicable to the adult brain. This suggests that promoting myelination is a potential strategy to reverse depression.

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Methods: In this experiment, the adult male mice were designated to three different groups. Two of the groups were isolated for eight weeks to induce depression, and then either treated with vehicle (placebo) or clemastine for the last two weeks. The third, control, group was group-housed for all 10 weeks. A social interaction test which entailed a video-tracking device to measure social avoidance and interaction behavior of each test subject was then performed on all groups after which the mice were sacrificed. RNA extraction and analysis was performed as well as electron microscopy to mount the PFC regions of the mice onto slides for further analysis.

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Results: Results of the social interaction test showed that clemastine was sufficient in reversing social withdrawal behavior of adult male mice. Also, increased myelination and oligodendrocyte differentiation was detected in the clemastine treated group.

Conclusions: Enhanced myelination and OPC differentiation are beneficial for reversing depressive-like behavior in socially isolated adult mice. Clemastine successfully enhanced myelination, OPC differentiation, sufficiently rescued social avoidance behavior in the socially isolated mice. Through staining of secondary antibodies, we were able to deduce that the prevalence of OPCs among the groups was not correlated to the reversal of depression in the mice, but that the differentiation of OPCs is what contributed to the phenomenon. This research confirms a possible method of treatment for socially-isolated or depressed adult male mice; therefore, moving forward, this research must be translated to the adult brain. This suggests that promoting myelination is a potential strategy to reverse depression.