Who Is the Mice's King? Key Factors for Regulation of Social Hierarchy on C57BL/6 Mice

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Clear social hierarchy is critical in maintaining a stable population. The social hierarchy of rodent population has been reported, but the underlying mechanism and the key regulating factors are largely unknown. In this project, male C57BL/6 mice were first used to explore whether mice could establish social hierarchy under the laboratory environment and how the social hierarchy is regulated. Tube tests were used to evaluate the social rank. We found that social hierarchy of mice is prevalent and can be quickly established in the laboratory environment. The dominant mouse showed significant endurance advantage and higher frequency of social inquiry or attack behaviors when encountering other mice. In addition, whisker trimming affects the social rank in a short period. Interestingly, a new social hierarchy can be established within one week when mice of low social rank were put in the same cage. Most importantly, we observed a significant increase of the social rank when the new dominant mouse was put back to the original cage, suggesting the importance of successful experience. Next, electrophysiology and RT-PCR were performed to investigate the cellular mechanisms. Our data indicated that the dominant performance is associated with the frequency of AMPA-receptor mediated response and the expression level of the GluR4 receptor. Our findings provide insights into the developments of new education theory.

Awards Won:
Second Award of $2,000