MICROBIOTA MODULATION OF BEHAVIOR AND STRESS RESPONSES: IMPLICATIONS FOR NEURO-IMMUNE RESEARCH IN ZEBRAFISH

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ABSTRACT

The gut microbiota (GM) consists of a large microbial community that play a major role in many physiological processes within the host and are essential for survival. Ongoing research suggests that the GM is not only involved in gut physiology but may also significantly influence CNS function and behavior. This dissertation research investigates the role of the GM on stress-related brain function and anxiety behavior, as well as develops unique approaches for neuroimmune research. Modulation of neurobehavioral phenotypes in isogenic mice was shown to be directly correlated with divergent GM. To further investigate these complicated interactions between the GM and gut-brain signaling, zebrafish were validated as a model system for microbiome-related neuroimmune studies. Through gnotobiotic zebrafish work, it was demonstrated that the GM significantly alters anxiety-related behavior and that the GM is required for mounting an appropriate stress response. Furthermore, it was shown that the probiotic \textit{L. plantarum} is sufficient in mitigating stress- and anxiety-related behavioral responses. This study sets the foundation for microbiome-related neuroimmune research in zebrafish, allowing for the potential of high-throughput screening to assess microbial effects on neuro-modulation.