

# Analyzing the Gut Microbiota of SwHi and SwLo Rats

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In the United States, Major Depressive Disorder (MDD) has become one of the most common mental disorders, affecting ~7.1% of American adults (under the DSM-5 definition). Thus, researching and developing antidepressants is critical. Relevant to preclinical research, the purpose of the Porsolt Swim Test (PST) is to test experimental manipulations intended to stimulate or prevent depressive states for the evaluation of antidepressant compounds. The PST is characterized by placing rats in a tank of water and measuring active and passive escape behaviors. There is much disagreement on the reliability and interpretation of the test, the largest reasons being its basis on conditional stressors and lack of holistic consideration of behavior. Likely attributed to the hesitation of its value, the PST is a rare assay. However, with its expected purpose and results and economical and noninvasive nature, it is a better model than many available, suggesting high potential and abilities for valuable reapplication. Relevant to obtaining more information on proper interpretation of the PST, gut microbiota and their host organisms have codependent relationships. This research utilized the concept of the gut-brain axis by quantifying gut bacteria genera relevant to serotonin synthesis. The significant imbalances of relevant taxa identified in the gut compositions aligned with the behavioral phenotypes of the rats, validating the PST as a model for studying depression. This research provides support for reviving the PST as a common antidepressant research practice and implicates many other applications. Composition diversity and functions of microbial communities have potential to inform more personalized approaches to drug development strategies, augmenting treatment efficiency.