



**2024 Dr. JP Bramhall Faculty Research Grant Award  
from the Huffines Institute for Sports Medicine and Human Performance**

*Investigating the Therapeutic Effects of Hippotherapy for Parkinson's Patients*

Principal Investigator: Dr. Deanna Kennedy

**Congratulations to Dr. Deanna Kennedy**, Associate Professor in the Department of Kinesiology and Sports Management at Texas A&M University. Dr. Kennedy has been awarded funding for her project titled *Investigating the Therapeutic Effects of Hippotherapy for Parkinson's Patients*.

**Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by motor deficits, including tremors, rigidity, bradykinesia, postural instability, and poor coordination.** These symptoms significantly impair balance and movement control, reducing quality of life. Conventional therapies, such as medication and physical therapy, offer limited relief and often fail to address complex coordination deficits inherent in PD (Tomlinson et al., 2013, Vu et al. 2012). As the prevalence of PD continues to rise, there is a pressing need for innovative therapeutic interventions that can enhance motor function and improve the overall quality of life for individuals living with this condition.



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**Hippotherapy, a therapeutic intervention involving horseback riding, has shown promise in enhancing motor function and balance in PD patients (Goudy et al., 2019).** However, the underlying mechanisms through which hippotherapy exerts its therapeutic effects remain poorly understood. A critical need exists to understand the complex interactions between horses and patients and how this influences therapeutic outcomes and treatment plans for PD.

**The long-term goal of this research is to elucidate the mechanisms underlying the therapeutic effects of hippotherapy on movement control in individuals with PD.** By understanding these mechanisms, we aim to improve and personalize hippotherapy protocols, ultimately enhancing the quality of life for PD patients. In the future, we plan to submit an NIH R01 application, leveraging preliminary data from this project. The central hypothesis is that the therapeutic effects of hippotherapy on movement control in PD are mediated by complex neuromuscular, biomechanical, and affective interactions between the horse and the patient. These interactions can be quantified using inertial measurement units (IMUs) for acceleration data, interaction frequency for quantifying the emotional interaction between horse and patient, and electromyography (EMG) for muscle activity coherence analysis. Specifically, EMG-EMG coherence and the associated neural frequency bands may reveal the underlying mechanisms that influence coordination dynamics and the effectiveness of the treatment plan.

**The significance of this project lies in its potential to fill critical gaps in our understanding of how hippotherapy improves motor function in PD patients.** This research will systematically investigate the complex interactions between horses and patients during therapy sessions by employing a dynamic systems framework. The study will capture detailed data on movement dynamics and muscle activity using advanced wearable technologies such as inertial measurement units (IMUs) and electromyography (EMG). This multi-modal approach will provide a comprehensive picture of the coordination dynamics and neuromuscular synchronization during hippotherapy.