Glucose and lactate are employed in the brain to meet metabolic demands related to brain function. The variability between these two species is unclear due to a lack of techniques capable of studying them simultaneously on a sub-second timescale.

Fast-scan cyclic voltammetry (FSCV), coupled with carbon-fiber microelectrodes, is used to study dopamine dynamics. Carbon-fiber microelectrodes modified with addition of an enzyme layer containing either glucose-oxidase or lactate-oxidase allows us to detect glucose and lactate using FSCV.

In this work, these biosensors were placed in the dorsal striatum of an anesthetized rat. Electrical stimulation of the dopaminergic midbrain caused a metabolic demand and transient increases in glucose and lactate occurred to meet that demand. Insight into the role of these energetic substrates on brain function, will inform countless future studies used to understand the impacts of diseases on brain metabolism and to inform potential therapeutic strategies.

**Project Goals**

- Hypoxia results in changes in brain metabolism, but little is known about the specific adjustments that occur.
- This project aims to characterize rapid fluctuations in glucose and lactate under normal and hypoxic conditions.
- They were implanted within an anesthetized rat to study the effects of hypoxia on glucose and lactate within the brain.

**Future Directions & Conclusion**

Glucose and lactate enzyme modified electrodes paired with fast-scan cyclic voltammetry is a useful method of measuring glucose and lactate fluctuations in real-time on rats. Ongoing experiments are using these techniques to investigate hypoxic conditions. These studies will lead to improved understanding and treatment for brain injuries related to hypoxia.