

Type 2 diabetes (T2D) is a chronic metabolic disorder affecting hundreds of millions of people worldwide. One of the main causes of T2D development is insulin resistance, a condition in which peripheral tissues such as skeletal muscles, the heart, and adipose tissue do not respond properly to insulin, a hormone secreted by pancreatic  $\beta$ -cells responsible for maintaining proper blood glucose levels. When cells "ignore" insulin, blood glucose levels rise. If left untreated or poorly controlled, hyperglycemia can eventually lead to serious complications, including cardiovascular disease, kidney damage, vision impairment, and nervous system dysfunction. Although numerous therapies are currently available that enable effective glycemic control, no treatment has yet been developed that can completely cure T2D or permanently halt its progression. Therefore, intensive research is ongoing to identify new compounds and innovative therapeutic strategies that target specific molecular mechanisms underlying the disease. Our project aims to investigate the mechanisms of action of a novel synthetic peptide BbKI, which exhibits potential antidiabetic properties. The amino acid sequence of BbKI was inspired by naturally occurring peptides found in *Bauhinia* plant extracts, known for their anti-inflammatory and antioxidant activities. Our preliminary studies suggest that BbKI may enhance insulin sensitivity in skeletal muscle cells and reduce blood glucose levels in mice with dysfunctional pancreatic  $\beta$ -cells. To understand how BbKI may improve insulin sensitivity in peripheral tissues, we will conduct studies using both cellular and murine models of insulin resistance, employing advanced proteomic and molecular biology techniques. We will examine how BbKI affects glucose uptake from the bloodstream, how it modulates key components of the insulin signaling pathway, and through which receptors it exerts its effects. Although this is a basic research project, the insights we gain could provide a foundation for future therapeutic strategies. We hope that our findings will contribute to a better understanding of insulin resistance and support further efforts toward more effective treatments for type 2 diabetes and related metabolic diseases.