Adrenal glands are relatively small organs responsible for the production of hormones that regulate key bodily functions such as the stress response, blood pressure, and metabolism. **Preptin**, a recently discovered bioactive peptide consisting of 34 amino acids, is secreted into the bloodstream and functions as a hormone. Although preptin is known for its role in increasing insulin sensitivity and maintaining energy balance, its impact on adrenal gland function remains unknown.

This project aims to investigate the effects of preptin on the adrenal glands in mice. Specifically, we focus on understanding how preptin influences hormone secretion from the adrenal cortex and the proliferation of adrenal cells. Studying these processes will expand our knowledge of the mechanisms involved in stress management and the maintenance of essential physiological functions in the body.

Research Methodology includes a series of experiments conducted on mice to which we administer preptin and monitor its effects on hormone levels and adrenal cell growth. The use of advanced techniques, such as spatial transcriptomics, will enable the mapping of changes in gene activity within the adrenal glands. Additionally, we will analyze the molecular signaling pathways through which preptin acts, focusing on specific mechanisms controlling cell growth and hormone production.

The project consists of four main research modules: 1) **Impact of Preptin on Adrenal Hormone Secretion**: I**n vivo studies** using mouse models to assess both immediate and long-term effects of preptin on the hypothalamic-pituitary-adrenal axis. **Ex vivo and in vitro experiments** aimed at determining the direct impact of preptin on hormone secretion. 2) **Intracellular Mechanisms Influenced by Preptin**: **Identification of signaling pathways** activated by preptin in adrenal cells. **Use of pharmacological inhibitors** to analyze these molecular mechanisms. 3) **Effect of Preptin on Adrenal Cortex Cell Proliferation**: **Utilization of in vivo models** of adrenal regeneration and compensatory growth. **Monitoring of cell proliferation in real-time** to assess the impact of preptin on adrenal cell growth and differentiation. 4) **Role of Preptin in Adrenal Cortex Cancer**: **Investigation of preptin's effect** on hormone secretion into the bloodstream and cell proliferation in adrenal cortex cancer cell lines and primary human adrenal cortex cancer cultures. **Correlation of preptin expression** in blood serum with clinical data to evaluate its potential as a prognostic marker.

By employing state-of-the-art methodologies, such as spatial transcriptomics and RNA sequencing, this project aims to provide a comprehensive understanding of the role of preptin in adrenal gland physiology. The research findings may have significant implications for developing new therapeutic strategies for treating adrenal disorders, including adrenal insufficiency and adrenal cancers. Furthermore, uncovering the mechanisms by which preptin regulates hormone secretion and cell growth will contribute to the advancement of the field of endocrinology, offering potential benefits in managing metabolic and endocrine disorders.