Chronic Stress: A Significant Factor in the Development of Type 2 Diabetes
Jasleen K Pamma, Dr. Marc Nahmani

INTRODUCTION
Modern-day stress affects people of all backgrounds and ages, with links to various physical and mental health issues. Prolonged activation of the hypothalamic-pituitary-adrenal axis due to chronic stress leads to increased glucocorticoid secretion and disrupted glucose metabolism. This is associated with the development of diabetes, a prevalent chronic metabolic disorder affecting millions worldwide. With over 463 million adults currently affected, type 2 diabetes, characterized by insulin resistance, constitutes the majority of cases. While the exact mechanisms remain unclear, chronic stress is thought to contribute to insulin resistance through inflammatory pathways and lifestyle factors like poor diet, exercise, and sleep. Stress also disproportionately affects minority populations' diabetes risk due to social determinants like discrimination and limited healthcare access. Research suggests interventions like mind-body practices and addressing social and environmental factors may alleviate stress-induced diabetes risk. This review aims to illuminate the intricate relationship between chronic stress and diabetes, exploring its biological, psychological, and environmental dimensions, with the goal of informing prevention and treatment strategies.

BACKGROUND
The HPA axis is crucial for stress response. It involves the hypothalamus, pituitary gland, and adrenal glands. Chronic stress triggers excessive cortisol release, impacting glucose metabolism and insulin sensitivity, contributing to diabetes. The axis process involves hypothalamic releasing CRH, pituitary releasing ACTH, and adrenal glands producing cortisol. This helps mobilize energy during stress, affecting blood sugar levels and other functions. Understanding HPA's role aids in managing stress' impact on glucose regulation and diabetes risk.

METHODS
To evaluate the relationship between chronic stress and type 2 diabetes, a literature review was conducted to determine the effects of stress on glucose metabolism, inflammation, obesity, and insulin resistance. Some studies focus on the impact of chronic stress on the body's physiological systems, while others explore potential interventions to mitigate these effects.

RESULTS
- Chronic stress triggers inflammation and disrupts HPA axis.
- Inflammatory response from chronic stress reduces insulin sensitivity and increases resistance.
- Experimental animals showed 6.4% decrease in insulin sensitivity due to chronic stress.
- Chronic stress impacts insulin-secreting pancreatic beta cells, reducing insulin production.
- Inflammation and oxidative stress worsen insulin resistance.
- Findings emphasize complex interplay of chronic stress, HPA axis, inflammation, and insulin processes.
- Insight gained can lead to targeted interventions for stress management and diabetes prevention.

CONCLUSION
Chronic stress significantly contributes to type 2 diabetes risk. Therapeutic approaches involving glucocorticoid receptor antagonists and anti-inflammatory drugs hold promise for managing stress-related diabetes by improving insulin sensitivity and reducing inflammation. While progress has been made, further research is needed to fully comprehend the intricate stress-diabetes link. Mindfulness, meditation, yoga, and pharmacological interventions like propranolol show potential for stress reduction and diabetes prevention. Continued investigation is essential to validate their long-term effectiveness. Overall, understanding this relationship offers opportunities to develop tailored interventions that could alleviate the impact of chronic stress on type 2 diabetes and improve public health outcomes.

FUTURE DIRECTIONS
- Genetic & Epigenetic Factors: Investigate how genetic variations and modifications impact susceptibility to stress-related type 2 diabetes.
- Epigenetic Modifications: Study epigenetic changes caused by chronic stress, exploring their influence on glucose regulation and insulin resistance.
- Cultural & Socioeconomic Factors: Recognize culture and socioeconomic factors, address barriers to stress management and diabetes prevention.
- Addressing Disparities: Address racial/ethnic disparities in stress-related type 2 diabetes incidence, focusing on mechanisms and fairness in prevention.

ACKNOWLEDGEMENTS
I would like you acknowledge Dr. Marc Nahmani and Dr. Jutta Heller for their revisions and resources they provided. I would also like to acknowledge the University of Washington Library and Databases to be able to provide resources in order to research the relationship between stress and type diabetes.

REFERENCES