Feasibility of Using Biomarkers to Examine Associations between Commercial Cigarette Smoking and Glycemic Levels during a Smoking Cessation Attempt

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BACKGROUND

- American Indians are disproportionately diagnosed with type 2 diabetes mellitus and have a higher incidence of commercial cigarette smoking when compared to other racial groups.
- The complex relationship between smoking, cessation, and glycemic control is not well understood. We examined the feasibility of using continuous glucose monitoring (CGM) and mobile health (mHealth) to understand the acute effects of smoking and cessation on glycemic levels.

METHODS

- In a 4-week observational study, we recruited T2DM patients aged 21 to 75 in the Cherokee Nation Health System who were current smokers willing to make a smoking cessation attempt
- Patients wore a 14-day FreeStyle Libre Professional continuous glucose monitor (CGM) at baseline and at the 2-week visit to monitor glycemic levels two weeks pre-cessation and two weeks post-cessation.
- Participants received a Samsung Galaxy S9 to answer morning and evening surveys and a remote carbon monoxide (CO) sensor to biochemically verify abstinence
- Participants also used the smartphone to report real-time cigarettes, meals, exercise, tobacco, and nicotine replacement therapy

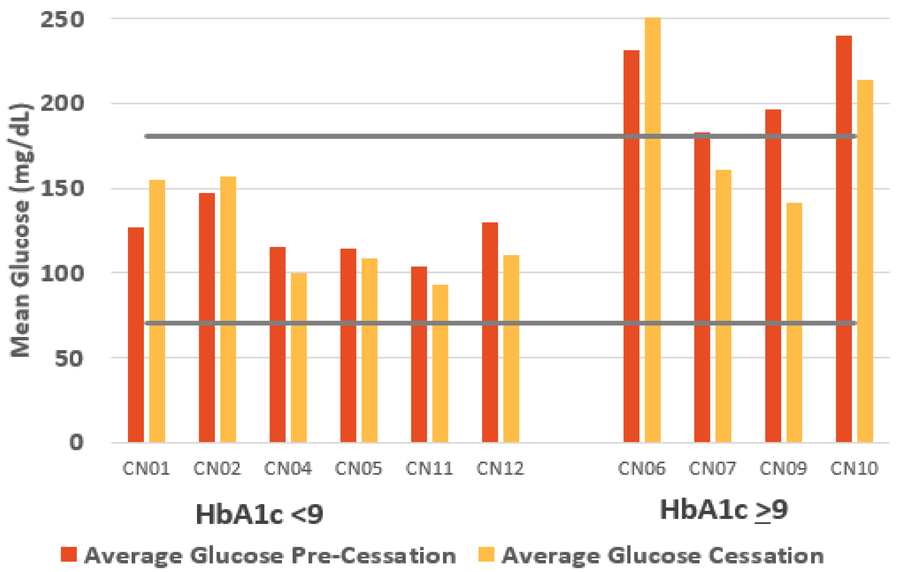
RESULTS

- We enrolled 13 participants and 10 made a smoking cessation attempt defined as at least a 10% reduction in cigarette consumption.
- Out of the 8 participants with complete CGM data, most who had a decrease in cigarettes consumption experienced a decrease in mean glucose levels.

Table 1: Baseline Characteristics

Participants (n=10)	Number (%)
Age, years	
45-60	7 (70%)
61-75	3 (30%)
Gender	
Male	3 (30%)
Female	7 (70%)
Cigarettes Per Day	
10 or fewer	2 (20%)
11 to 20 per day	5 (50%)
21 to 30 per day	1 (10%)
31 or more per day	2 (20%)
Baseline HbA1c	
Below 9	6 (60%)
Above 9	4 (40%)

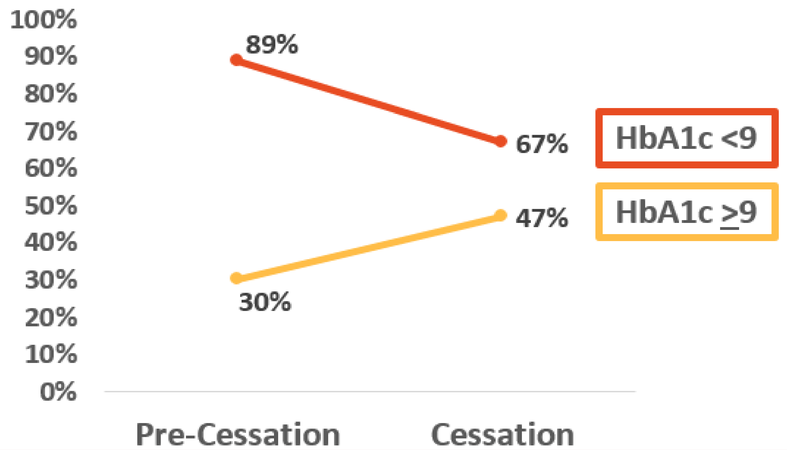
Figure 1: Mean Glucose* Pre- and Post-Cessation by Baseline HbA1c Level



*Horizontal bars reflect desired Time in range defined as 70-180 mg/dL

- Participants in the study on average experienced a 13% absolute change in time in range in the two weeks post-cessation but the direction varied.
- For those who normally experienced high glucose levels, their glucose levels also decreased and for some led to an increase in time in range.
- Glycemic variability increased in most patients, and most recorded weight loss.
- Participants were able to use the technology and expressed satisfaction in the study overall.

Figure 2: Percentage of Time in Range by Baseline HbA1c Pre- and Post-Cessation



CONCLUSION

- A decrease in cigarettes per day resulted in a decrease in glucose levels initially, which suggests an acute change in glucose metabolism
- CGM provides a more granular view of acute glycemic changes during smoking cessation.
- A better understanding of the relationship between smoking, cessation, and glycemic control could inform tailored interventions for smokers with T2DM.

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ACKNOWLEDGEMENTS: Programming and technological support was provided through the Mobile Health Shared Resource of the Stephenson Cancer Center via an NCI Cancer Center Support Grant (P30CA225520). Data analyses were supported through the Oklahoma Tobacco Settlement Endowment Trust grant R21-02.