

# Fasting Insulin as an Early Predictor for Type 2 Diabetes: CARDIA Cohort Analysis

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## Introduction

- As of 2022, 96 million Americans have pre-diabetes.
- Current ADA screening standards include fasting glucose, oral glucose tolerance test, or HbA1c.
- Studies found that hyperinsulinemia spikes preceded glucose elevation by 3 years prior to type 2 diabetes (T2D) diagnosis.<sup>2</sup>
- Studies suggest fasting insulin is a potential marker for T2D risk, especially those with glycemia on the upper limit of normal or in the low pre-diabetic range.<sup>2,3,4</sup>

## Objective

- While using ADA screening criteria, assess predictive value of fasting insulin with fasting glucose in T2D conversion risk after 5 years.

## Methods

- Using SPSS, fasting glucose and fasting insulin quartile data was analyzed on year 25 and 30 from the Coronary Artery Risk Development in Young Adults (CARDIA) cohort database.

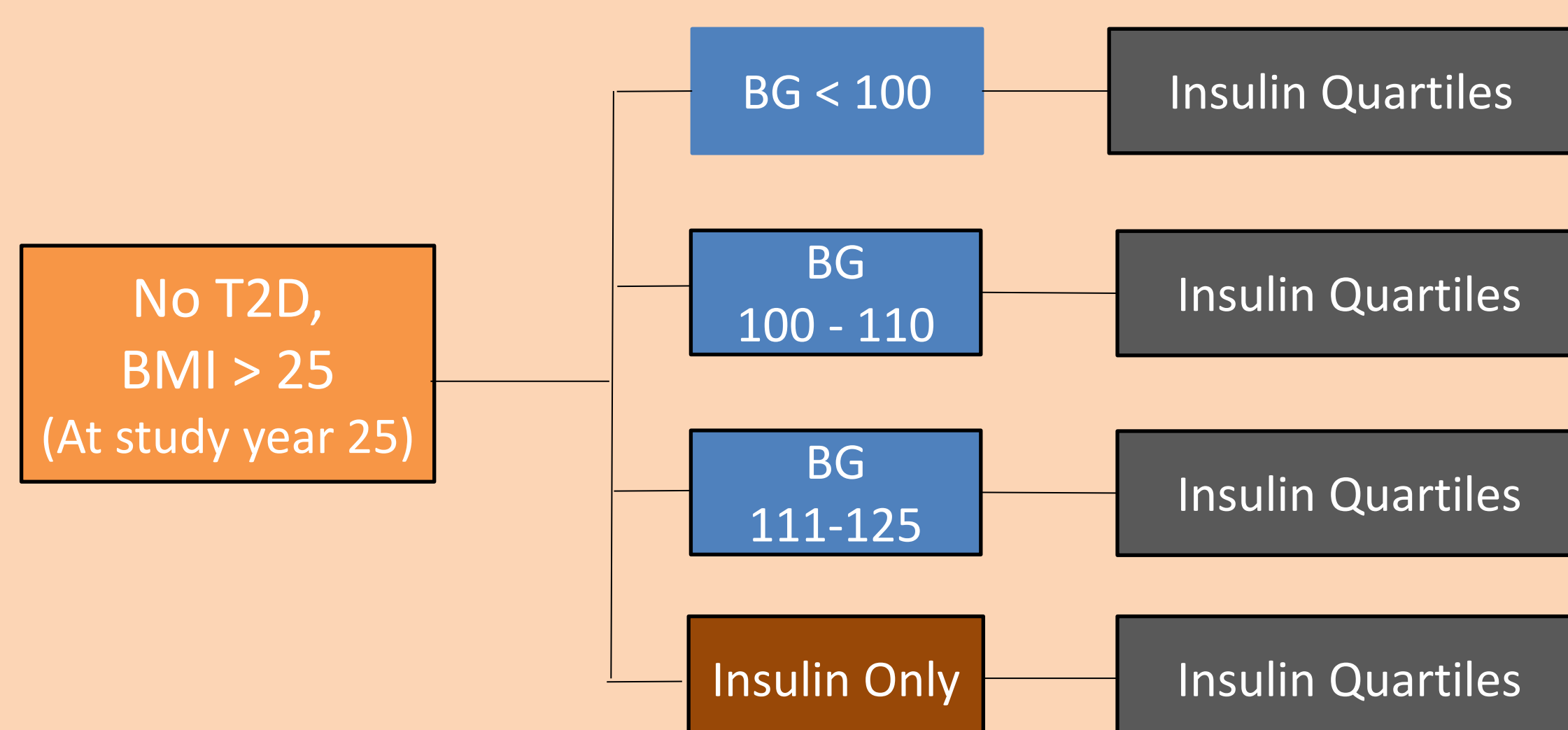


Figure 1: Flowchart for inclusion criteria and analysis on year 25 and 30.

## Methods/Results

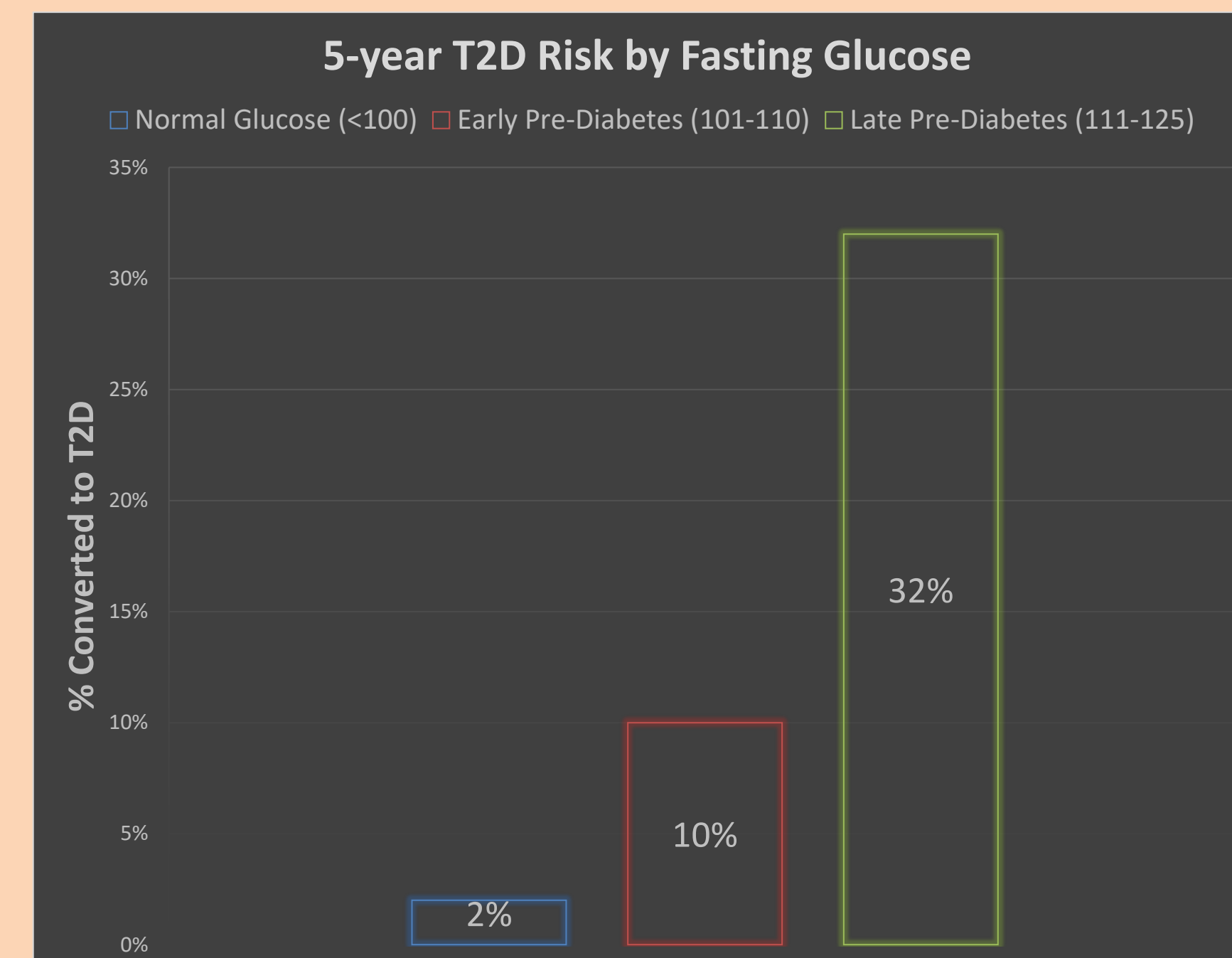


Figure 2: Distribution of converted T2D after 5 years by fasting blood glucose levels.

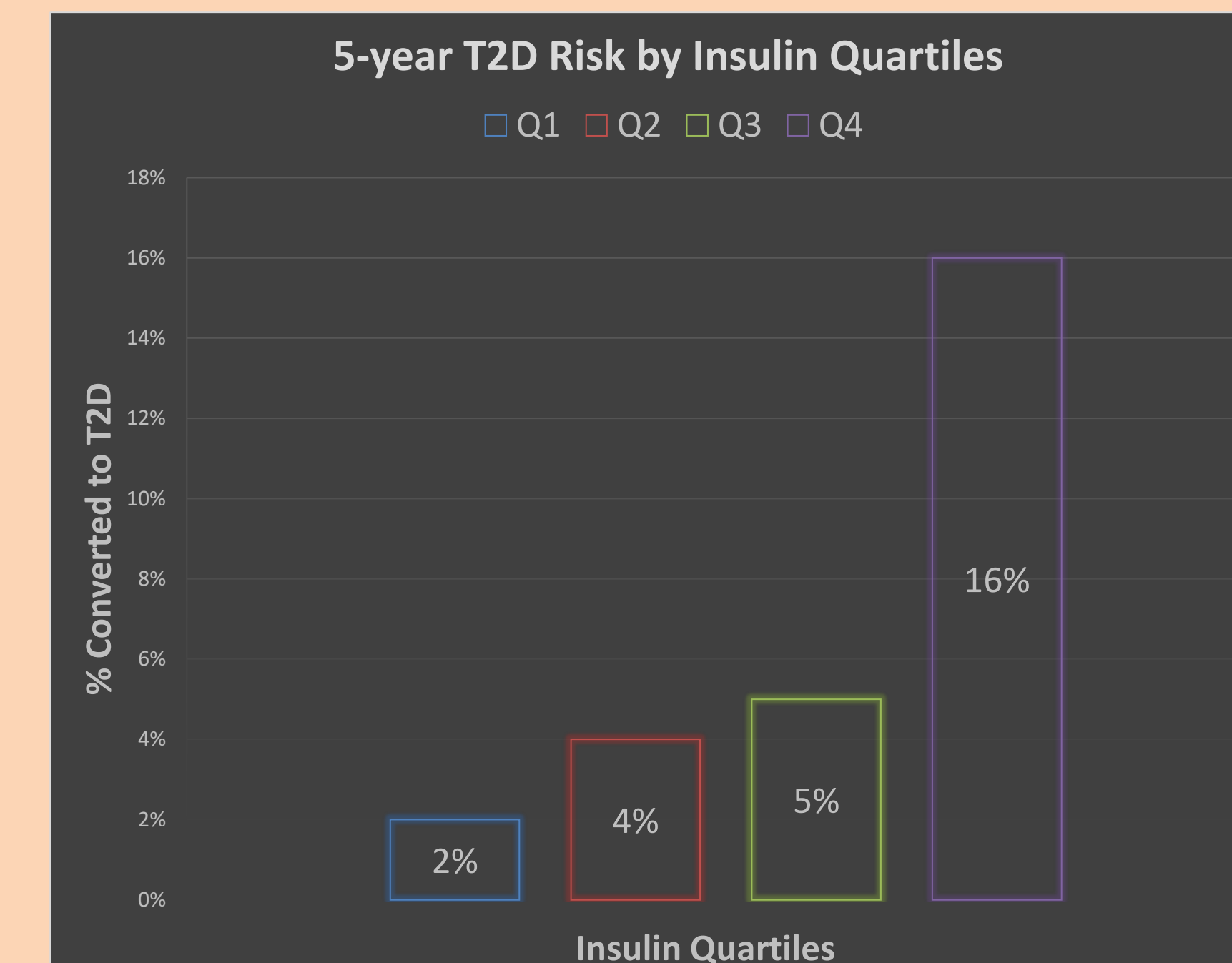


Figure 3: Distribution of converted T2D after 5 years by fasting insulin quartiles.

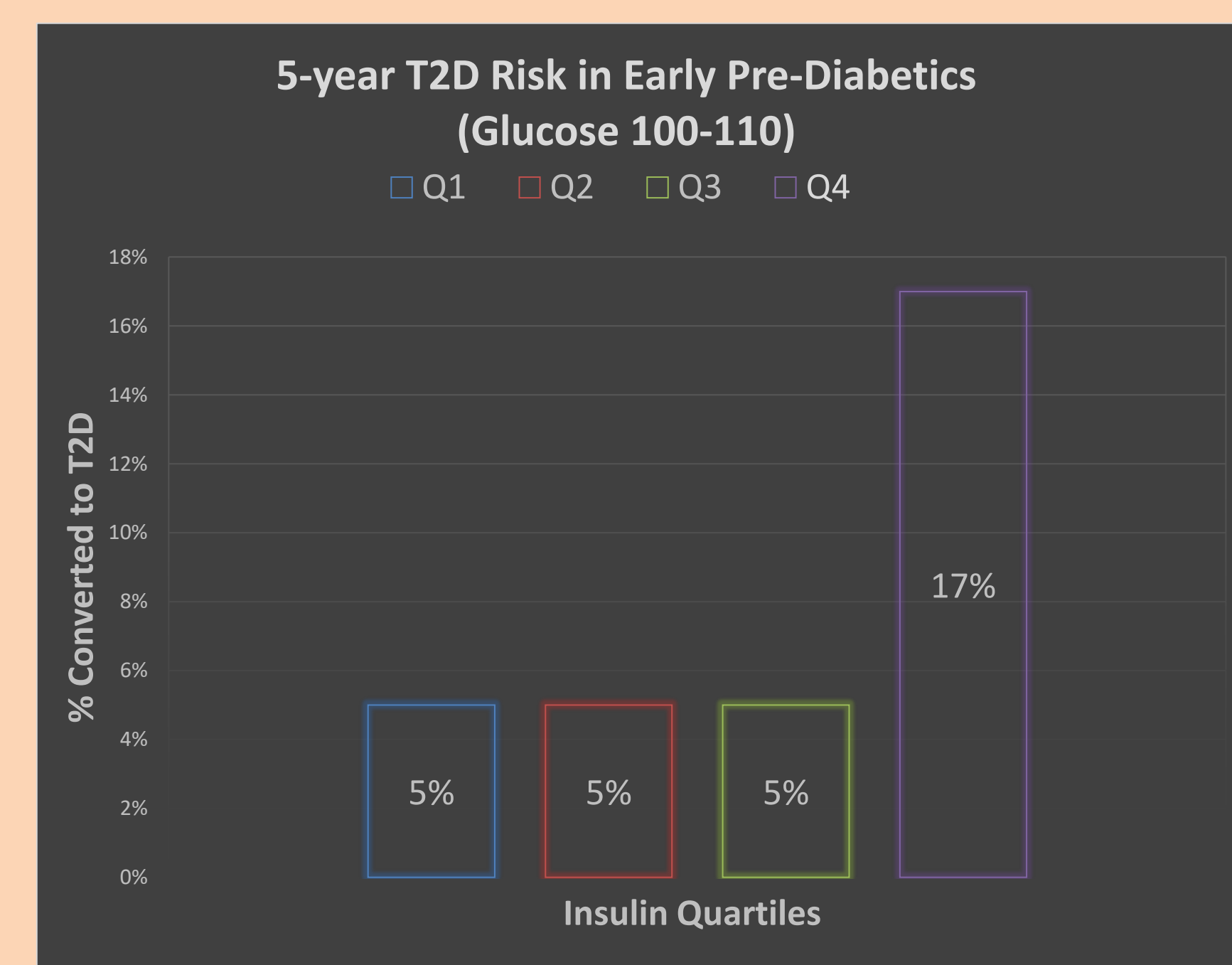


Figure 4: 5-year risk of developing T2D in early pre-diabetic group by insulin quartile. From 234 individuals in Q4, 17% of them had T2D after 5 years.

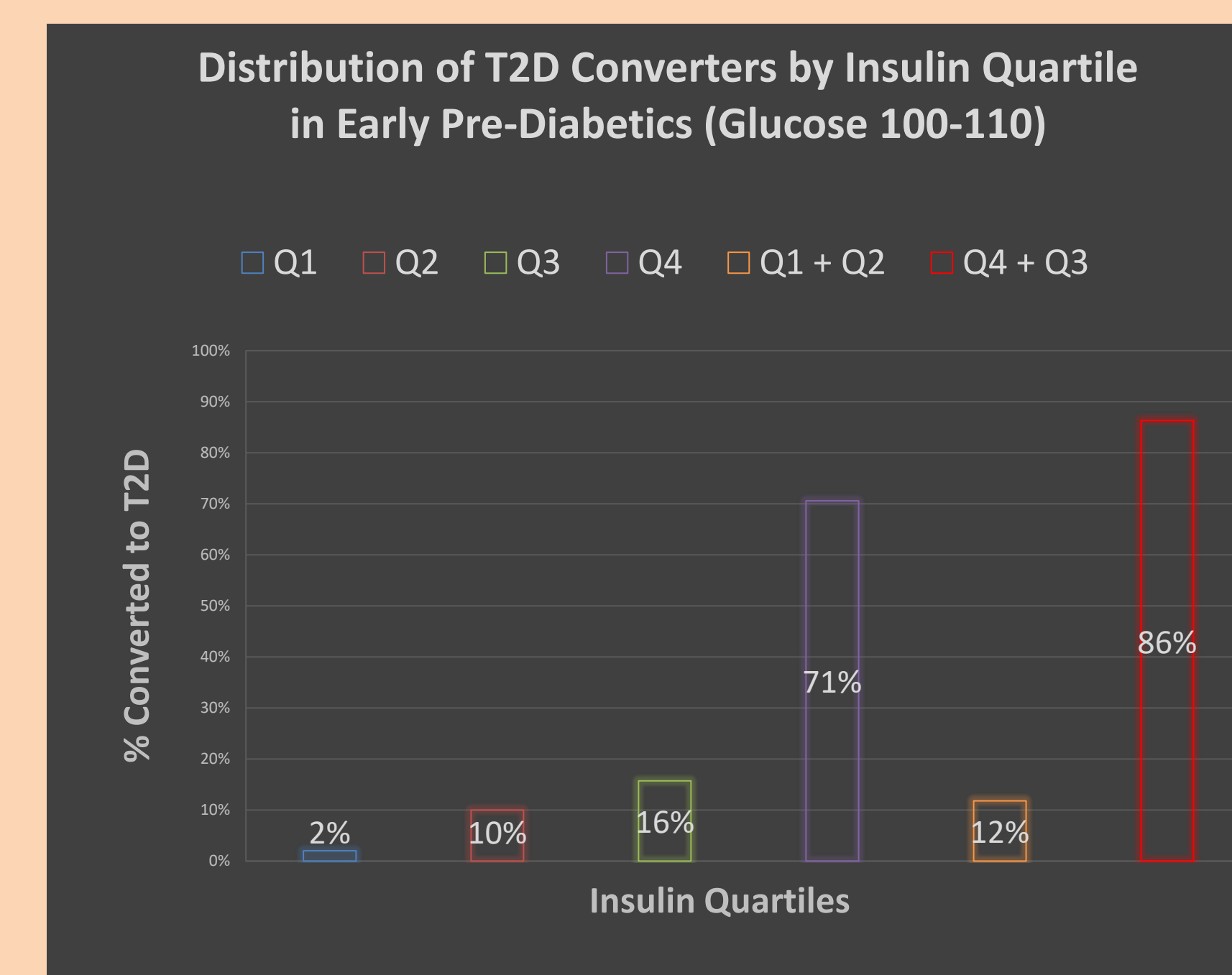


Figure 5: Distribution of converters from early prediabetes to T2D after 5 years by insulin quartile. 51 total pre-diabetics developed T2D after 5 years, 71% of which was in Q4.

Insulin Quartiles (mIU/L)	
Q1 < 5.4	Q3 8.7-14.2 (hyperinsulinemia)
Q2 5.4-8.6	Q4 > 14.2 (hyperinsulinemia)

Table 1: Fasting insulin values by quartile.

Insulin Quartiles	Early Pre-diabetic		Proportions (% Q4)	Proportions (%) Q1	P-Value	95% CI	
	Raw Data Q4	Raw Data Q1				Lower (%)	Upper (%)
Q4 vs Q1	36/51	1/51	70.6	2	<0.0001	52.64	79.43
Q4 vs Q2	36/51	5/51	70.6	9.8	<0.0001	43.21	72.85
Q4 vs Q3	36/51	8/51	70.6	15.7	<0.0001	36.55	67.98
Q4+Q3 vs Q1+Q2	44/51	2/17	86.3	11.8	<0.0001	57.8	83.83

Table 2: Statistical analysis of T2D converters in early pre-diabetics by fasting insulin quartiles.

## Discussion

- There was a 10% 5-year T2D risk for early pre-diabetics when using fasting glucose alone vs. 16% 5-year T2D risk for Q4 when using fasting insulin alone.
- Along with a 17% 5-year T2D risk for early pre-diabetics + Q4 fasting insulin group.
- For patients in early prediabetes group that developed T2D after year 5, 71% of them were in Q4 and 86% from Q3+Q4.
- This study is limited by sample size and inability to exclude participants pregnant in the study.

## Conclusion

- Early prediabetic patients who converted to T2D were more likely to have elevated insulin levels 5 years prior to diagnosis.
- Using fasting insulin increased 5-year risk predictability for early pre-diabetics (10% vs. 17%).
- It is conceivable utilizing fasting serum insulin can enhance screening of pre-diabetic to T2D conversion rather than using glucose alone.
- Suggestions for future studies on using fasting serum insulin to assess patient risk of conversion from pre-diabetes to T2D versus using glucose alone.

## References

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