

Glycemic Patterns of Male Professional Athletes With Type 1 Diabetes During Exercise, Recovery and Sleep: Retrospective, Observational Study Over an Entire Competitive Season

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1 Introduction

Reports on **endurance exercise of prolonged duration** in people with **type 1 diabetes (T1D)** have only been provided over a **short period of time**. Our objective is to analyze the glycemic control of professional athletes with type 1 diabetes **over a competitive season**.

2 Research Design and Methods

In a retrospective observational study, we analyzed the **continuous glucose monitoring (CGM)** data of **12 professional male cyclists with T1D** during exercise, recovery and sleep on days with competitive exercise (CE) and non-competitive exercise (NCE), following consensus guidelines¹.

The analysis was two-fold:

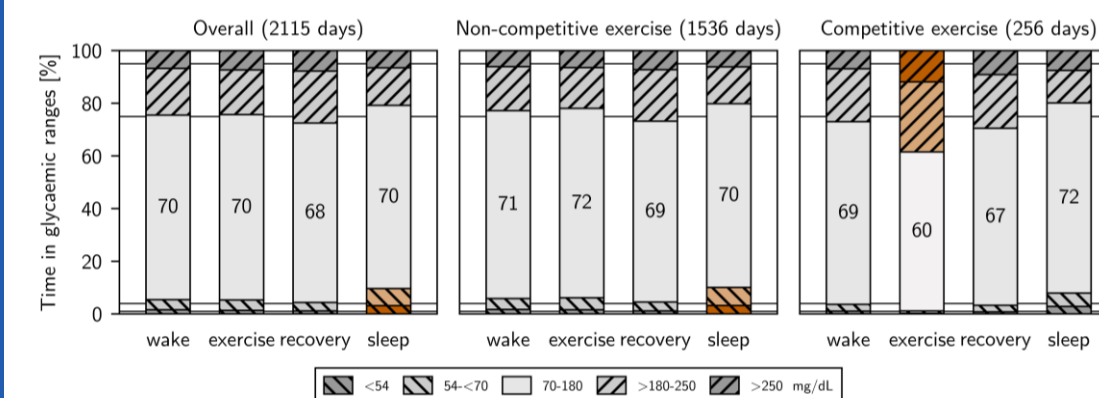
1. Comparison of glycemic control with clinical targets²
2. Comparison of glycemic control during CE with NCE



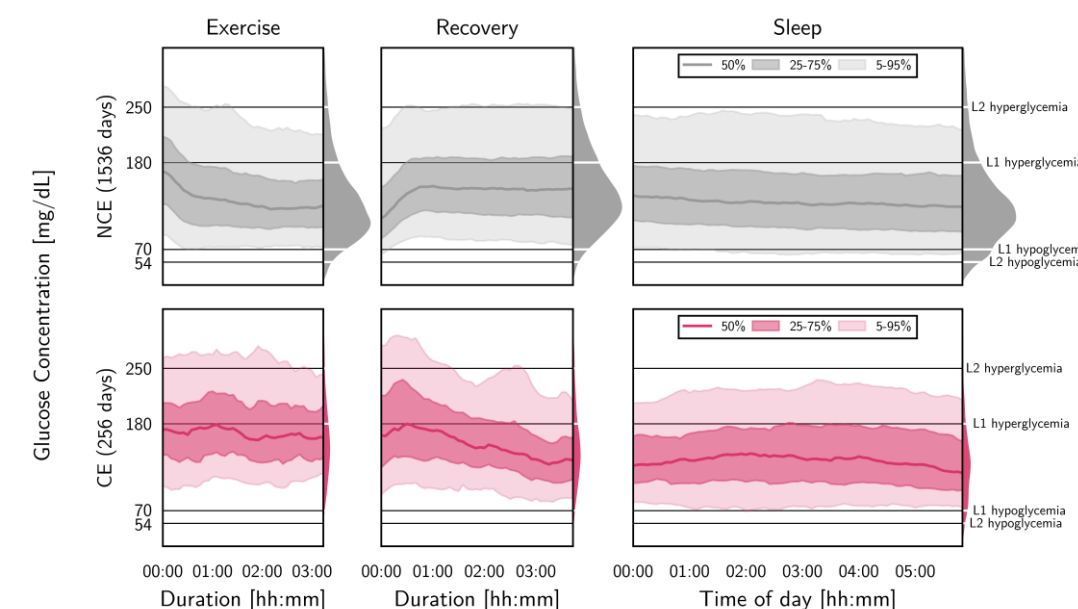
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3 Results

Comparison of glycemic control with clinical targets



Comparison of glycemic control during CE with NCE



Mean **age** was 25.6±4.4 years, **duration of T1D** was 10.4±4.9 years, and **HbA_{1c}** was 6.7±0.5% (50±5 mmol/mol). All participants used a basal-bolus insulin regimen administered via **multiple daily injections (MDI)**. The participants **cycled** on 280.8±28.1 days during the season, of which 34.7±15.3 days were during CE.

- **Overall**, time in range (70–180 mg/dL) was 70.0±13.7%, time in hypoglycemia (<70 mg/dL) was 6.4±4.7%, and time in hyperglycemia (>180 mg/dL) was 23.6±12.5%.
- During **NCE days**, time in hypoglycemia was increased overnight (10.1±7.4% vs. 4%, $p=0.008$).
- **CE days** revealed an increased time in hyperglycemia (25.2±12.5% vs. 25%, $p=0.012$). Time in hyperglycemia during CE was higher than during NCE (38.5±12.9% vs. 21.9±13.9%, $p<0.001$), exceeding consensus targets ($p=0.003$).

4 Conclusion and Discussion

We provide insights into the glycemic control of professional athletes with type 1 diabetes over a competitive season. While **overall glycemic control was within range**, the substantial challenges associated with the life of a professional athlete with type 1 diabetes may explain that consensus targets were not always reached. Specific emphasis should be put on **intensified monitoring and treatment during competitions and overnight periods**, not only to further improve training adaptation, but to reduce short-term and long-term risks for athletes with type 1 diabetes.

References

1. Danne T, et al. (2017) International consensus on use of continuous glucose monitoring. *Diabetes Care* 40:1631-1640
2. Battelino T, et al. (2019) Clinical targets for continuous glucose monitoring data interpretation: Recommendations from the international consensus on time in range. *Diabetes Care* 42:1593-1603