



# THE EFFECTS OF PHYSICAL EXERCISE ON SALIVARY microRNA LEVELS

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## Introduction

- Concussion diagnosis can provide challenges due to lack of objective measures.<sup>1</sup>
- Salivary microRNA may contribute objective data for concussion diagnosis and management.<sup>2</sup>
- Current research has limitations such as effects of underlying conditions, exercise, on salivary microRNA.
- **AIM:** To examine the effects of physical exercise on salivary microRNA levels.

## Results

- Paired samples t-tests were performed on salivary microRNA that had previously been identified as a promising biomarker associated with concussion diagnosis and management.<sup>3</sup>
- Results showed no statistical significant differences for the 6 previously identified salivary microRNA: miR-155-5p [t(19)=1.676, p=.110], miR-20a-5p [t(19)=-.819, p=.423], miR-182-5p [t(19)=1.770, p=.093], miR-221-3p [t(19)=.292, p=.774], miR-26b-5p [t(19)=-.738, p=.469], miR-29c-3p [t(19)=-1.105, p=.283].<sup>3</sup> Figure 1.
- Since the previously identified salivary microRNA expression levels were unaffected by exercise, this may improve the potential clinical application as biomarkers for concussion diagnosis and management.

**Figure 2. Subject performing graded treadmill protocol**



## Methods

### Participants:

10 Healthy Male Non-Intercollegiate Athletes  
10 Healthy Female Non-Intercollegiate Athletes

### General Protocol:

- Baseline salivary samples were collected prior to subject partaking in graded treadmill protocol (Bruce Protocol) until maximal physical exertion was achieved. Figure 2.
- Heart rate and blood pressure were monitored until subject began to jog, at which time only heart rate was collected to ensure safety.
- Once subject reached maximal exertion, exercise was stopped, and a secondary salivary sample was collected.
- All salivary samples were sent to Quadrant Biosciences for analysis and NextGen sequencing.

### Equipment used:

- p-157: Nucleic acid stabilization kit (DNA Genotek; Ottawa, Canada)

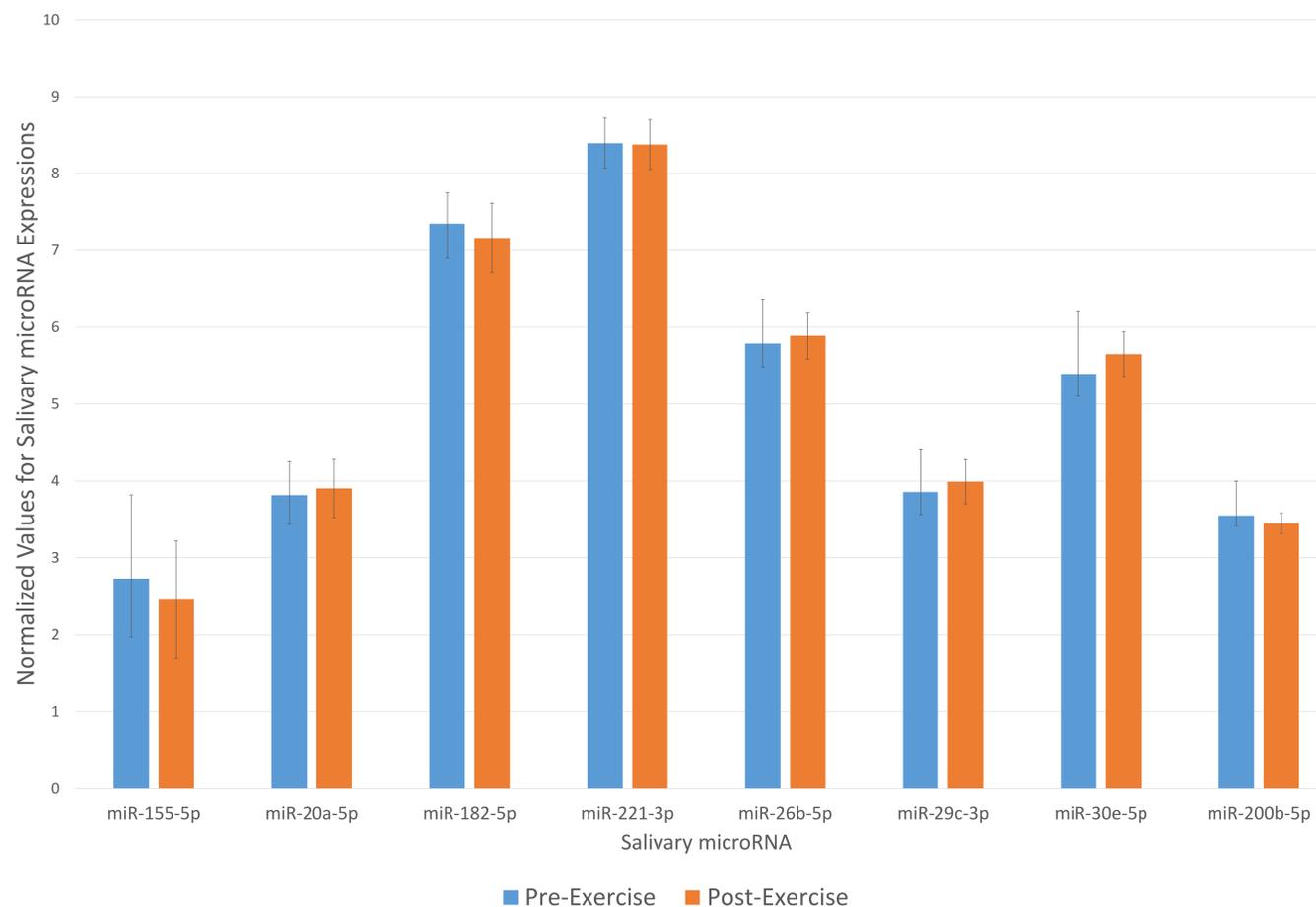
### Bruce Protocol

Stage	Speed (mph)	Grade (%)
1	1.7	10
2	2.5	12
3	3.4	14
4	4.2	16
5	5.0	18
6	5.5	20
7	6.0	22

## Conclusions

- The findings of this study strengthen the current literature identifying the above 6 salivary microRNA as potential biomarkers for concussion diagnosis and management.
- The aforementioned relationship is strengthened as no statistical significant differences were found, indicating that the 6 salivary microRNA expression levels are not affected by exercise.
- Although promising, much research is still indicated to address limitations in the current body of literature such as the effects of mouthguards, diets, time of day, and other orthopedic injuries on salivary microRNA.

**Figure 1. Salivary microRNA expression levels pre and post physical exercise**



## References

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2. Atif H, Hicks SD. A Review of MicroRNA Biomarkers in Traumatic Brain Injury. *J Exp Neurosci.* 2019;13:117906951983228. doi:10.1177/1179069519832286.
3. Hicks SD, Johnson J, Carney MC, et al. Overlapping MicroRNA Expression in Saliva and Cerebrospinal Fluid Accurately Identifies Pediatric Traumatic Brain Injury. *Journal of Neurotrauma.* 2018;35(1):64-72. doi:10.1089/neu.2017.5111.

\*Note each stage lasted for 3 minutes.