

MEETING ABSTRACT

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# Type 1 diabetes induces biomechanical changes in skeletal muscle of Wistar rats?

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## Background

Chronic hyperglycemia caused by diabetes mellitus type 1 is associated with damage, dysfunction and failure of several organs and systems, including the musculoskeletal system[1]. In the installed framework of diabetic insulin deficiency, there is an imbalance between the rates of protein synthesis and degradation, causing a condition called diabetic myopathy[2]. However, there are no reports about investigations of biomechanical characteristics of skeletal muscles in diabetic state.

## Objectives

To evaluate the biomechanical properties of the gastrocnemius muscles of rats induced to experimental type 1 diabetes.

## Materials and methods

Male Wistar rats were used and were divided into two groups: a) control group, CG (n=11); b) Diabetic Group, GD (n=19). The GD group was induced to diabetes by intraperitoneal administration of Streptozotocin. After nine weeks, the gastrocnemius-plantar complex of all groups was collected and forwarded to the mechanical tests, which provided the biomechanical parameters. For statistical analysis Kolmogorov-Smirnov normality test was used, with the Student t test for parametric data and Mann-Whitney test for nonparametric,  $p < 0.05$ .

## Results

Biomechanical testing GD group exhibited lower values for the variables: maximum power (GC  $51.5 \pm 9.21$ ,

$26.52 \pm 9.74$  GD;  $p = 0.0001$ ), deformation (GC  $17.85 \pm 5.75$ ; GD  $10.2 \pm 3.30$ ;  $p = 0.002$ ), specific strain (GC  $41.04 \pm 15.89$ , GD  $26.59 \pm 8.23$ ,  $p = 0.019$ ), force/width (CG  $2.06 \pm 0.37$ ,  $1.05 \pm 0.39$  GD;  $p < 0.001$ ) power/area (GC  $45.58 \pm 2.71$ ; GD  $4.9 \pm 2.21$ ;  $p = 0.003$ ), cross-sectional area (GC  $67.49 \pm 16.37$ ;  $30.13 \pm 7.48$  GD;  $p = 0.0001$ ). There was no difference in voltage values at full strength and elastic modulus. In clinical and metabolic parameters, experimental diabetes reduced body weight (GC  $429.8 \pm 32.65$ g; GD  $238.8 \pm 26.98$ g,  $p < 0.001$ ) and increased blood glucose values when compared to GC group from the first week post induction by the end of the experiment (GC  $103.82 \pm 16.59$ /GD  $471.30 \pm 71.55$ ,  $p < 0.001$ ).

## Conclusion

Most of the evaluated parameters showed a biomechanical disadvantage in the gastrocnemius-plantar complex of animals submitted to Diabetes type 1, making them weaker when subjected to traction.

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## References

1. Arkkila, *et al.*: 2003.
2. Krause, *et al.*: 2011.

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