Characterization of Gastrointestinal Motility in Experimental Model of Hyperglycemia

Matos, J.F[1].; Américo, M.F[2].; Sinzato, Y.K[3].; Damasceno, D.C[3].; Miranda, J.R.A[1].
[1]Institute of Bioscience of Botucatu-SP,UNESP; [2]Institute of Biological Sciences and Health Barra do Garças-MT; [3]Botucatu Medical School-SP,UNESP.
Corresponding author: jmatos@ibb.unesp.br

INTRODUCTION

Acute changes in glucose concentration in the blood have important effects on motor and sensory function of the upper GI, and at the same time, the upper intestine plays an important role in the regulation of postprandial blood [1].

AIM

To characterize the profile of gastric motility in rats with severe diabetes model and evaluate the influence of glycemic variations in TGI.

METHODOLOGY

Biosusceptometry AC (BAC) consist of magnetic sensors, where in the external coils function as excitatory and internal and detector. An electrode was placed on the abdomen for measurement of electrogastrography (EGG), and the contractility and gastric emptying was conducted through the measurement of the concentration of magnetic material (feed with ferrite) throughout the gastrointestinal tract by the sensor BAC. Severe diabetes was induced by a beta-cytotoxic agent (streptozotocin – 40 mg/kg, ip) at adult rats.

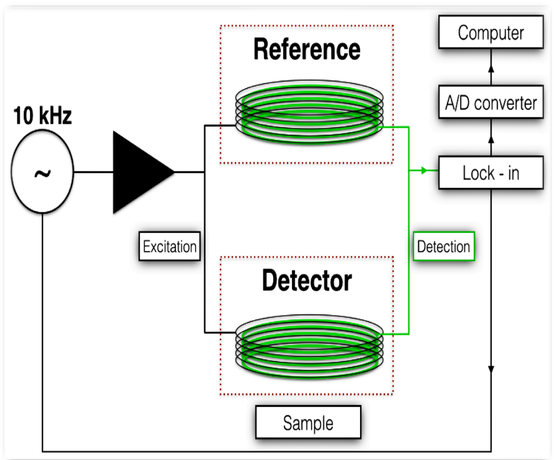

Figure 1- Model BAC sensor used in the experiment.

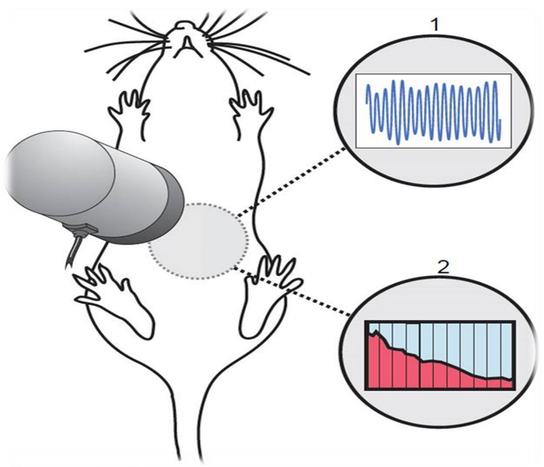

Figure 2- Example of in vivo experimentation using the BAC.

RESULTS

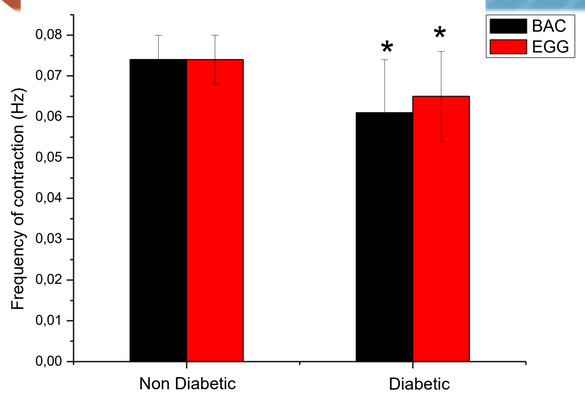

Figure 1- Mean values of the contraction frequency of the non diabetic and diabetic groups. Significant difference with *p <0.001.

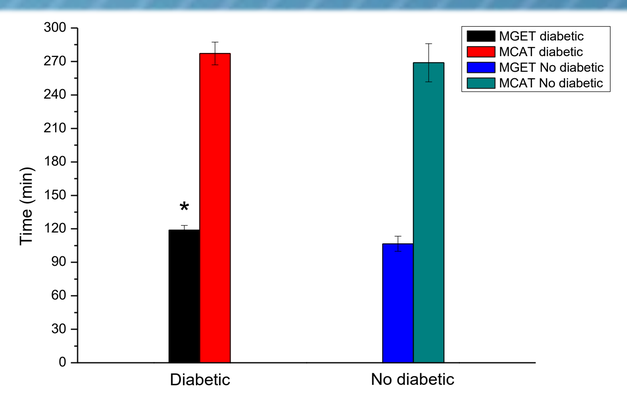

Figure 2- Gastric empty of diabetic and non-diabetic animals. * Means significant difference p <0.05.

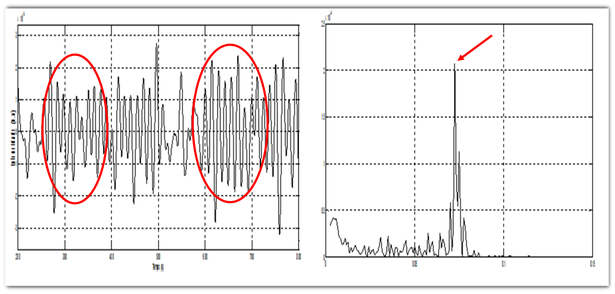

Figure 3- Example of a BAC (Left) signal and its respective Fourier transform (right) of the non diabetic group. Areas circled in red illustrate morphological changes in the signal

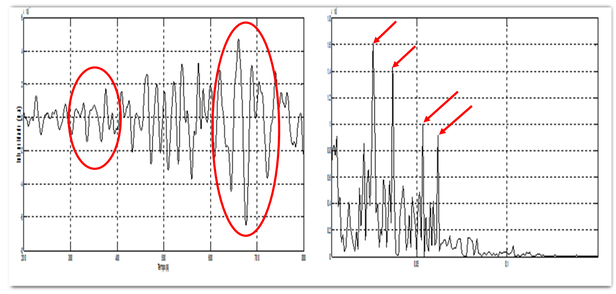

Figure 4- Example of a BAC (Left) signal and its respective Fourier transform (right) of the diabetic group. Areas circled in red illustrate morphological changes in the signal

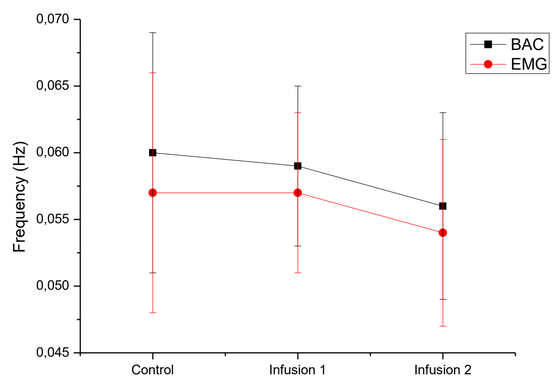

Figure 5- Frequency of gastric contraction of non-diabetic animals submitted to the hyperglycemic clamp. No significant difference was found for p <0.05.

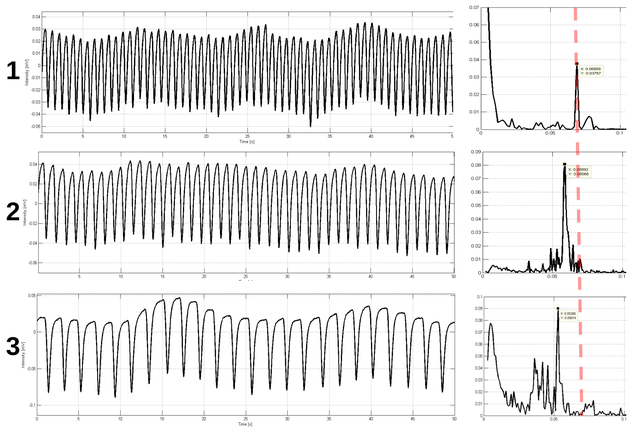

Figure 6- Example of a BAC (Left) signal and its respective Fourier transform (right) of the non diabetic group. Graph 1: it's the moment without glucose infusion (control); Graph 2: it's the time of the first glucose infusion; Graph 3 it's the time of the second glucose infusion. There was a decrease in frequency (dashed line) but there was no significant difference at p <0.05.

DISCUSSION AND CONCLUSION

As for the results it was concluded that there was a change in gastrointestinal motility in diabetic animals, emphasizing the decrease in frequency of contraction and increased gastric emptying time. It is indicated hyperglycemia because it is the first change apparent in the newly induced DM animals, but it is only one of several mechanisms causing disturbances in the body. There was no significant difference in the hyperglycemic clamp data, but it is one visible morphological changes of the signal.

REFERENCES

[1] PHILLIPS, L. K., RAYNER, C. K., JONES, K. L. & HOROWITZ, M. 2014. Measurement of gastric emptying in diabetes. *J Diabetes Complications,* 28**,** 894-903.

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