

Signaling downstream cascade crosstalk induced by noradrenaline on angiotensin II metabolic activity in adipocytes.

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Abstract

The role of angiotensin II (AII) on lipolytic metabolism is still controversial in the literature. Diversely, noradrenaline (NOR) is an important stimulator of lipolysis and glycolysis in adipocytes. Spontaneously hypertensive rats (SHR) have lower body weight and smaller adipocytes when compared to its control, Wistar-Kyoto, with higher basal lactate production by area and volume. We aimed in this work to evaluate the influence in downstream cascade of AII and NOR, co-incubated or not, in the production of glycerol and lactate in three different strains. The combination of NOR and AII potentiated the lipolytic activity by decreasing the glucose metabolism to lactate. This effect may be associated with the NOR activity on adrenergic receptors or by the AII activity blockade at AT1 receptors, highlighting the antilipolytic activity of this receptor and the crosstalk between downstream cascade induced by these agonists.

Key words: Angiotensin II; noradrenaline; glycerol; lactate.

Introduction

The role of angiotensin II (AII) as a stimulator or inhibitor on lipolytic activity remains unclear in the literature^{1,2}. Noradrenaline (NOR) has an important role in the energy metabolism of adipose tissue and exhibited a positive stimulus for lipolytic and glycolytic activity, increasing lactate and glycerol production^{3, 4}. Spontaneously hypertensive rats (SHR) have lower body weight and smaller adipocytes when compared to its control, Wistar-Kyoto, with higher basal lactate production by area and volume⁵. We aimed in this work to evaluate the influence of AII and NOR, co-incubated or not, in the production of glycerol and lactate in different strains.

Results and Discussion

Ethical Committee approved the protocol under number 4073-1. Male 15-week-old Wistar (WIS), WKY and SHR rats (n=5-12) were used for the experiments. The normality was confirmed by Shapiro-Wilk test and then we performed Student's t-test for parametric and Mann-Whitney for nonparametric data. The results are expressed in nmol/mm².60min. Glycerol production increased in all strains under NOR stimulation at [10⁻⁷] (WIS - 10⁻⁷: 0.1488, 10⁻⁶: 0.5159; WKY - 10⁻⁷: 0.1664, 10⁻⁶: 0.3513; SHR - 10⁻⁷: 0.2145, 10⁻⁶: 0.6868) and for the combined action of NOR+AII (WIS - 10⁻⁷: 0.2668, 10⁻⁶: 0.4152; WKY - 10⁻⁷: 0.154, 10⁻⁶: 0.403; SHR - 10⁻⁷: 0.2403, 10⁻⁶: 0.5095). Under influence of AII, no changes were observed. Lactate production did not change under any conditions in WIS, but WKY exhibited an increase in presence of NOR at [10⁻⁷] (10⁻⁷: 0.193; 10⁻⁶: 0.2368) and a decrease in NOR+AII co-incubation (10⁻⁹: 0.2849; 10⁻⁷: 0.1835). There were no changes observed under influence of AII. SHR only showed a decrease in lactate production under co-incubation of NOR+AII (10⁻⁶: 0.2279, 10⁻⁴: 0.1696).

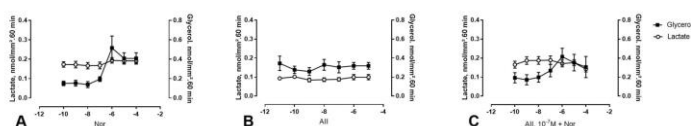


Figure 1 – Glycerol and lactate production in Wistar under influence of: A) NOR; B) AII; C) NOR+AII.

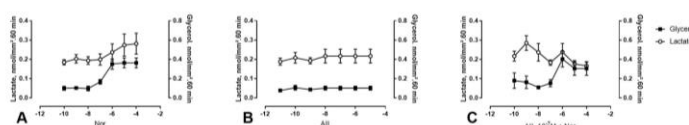


Figure 2 – Glycerol and lactate production in Wistar-Kyoto under influence of: A) NOR; B) AII; C) NOR+AII.

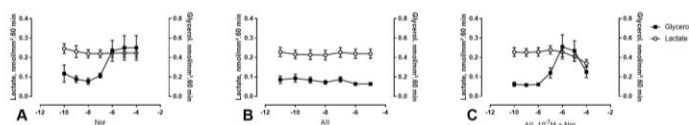


Figure 3 – Glycerol and lactate production in SHR under influence of: A) NOR; B) AII; C) NOR+AII.

Conclusions

We confirmed that NOR exhibited a positive stimulus in the lactate and glycerol production. The isolated action of AII can not be observed, but its combination with NOR potentiated the lipolytic activity by decreasing the glucose metabolism to lactate. This effect may be associated with the NOR activity on adrenergic receptors⁴ or by the AII activity blockade at AT1 receptors, highlighting the antilipolytic activity of this receptor⁷ and the crosstalk between downstream cascade induced by these agonists.

Acknowledgement

FAPESP, FAEPEX, CAPES, SAE, PIBIC – CNPQ

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