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Parasympathetic response to acute stress is attenuated in young Zucker obese rats

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ABSTRACT

We compared arterial blood pressure (BP) and heart rate (HR) control in 9- to 11-week old obese Zucker rats ($n=10$; weight= 452 ± 45 g, average \pm SD) to age-matched, lean Zucker animals ($n=13$; weight= 280 ± 46 g). BP was measured by indwelling catheter. Baseline pressure was 113.1 ± 7.0 mm Hg in the lean vs. 111.7 ± 5.6 in the obese rats (NS). Baseline HR was 413 ± 43 in the lean vs. 422 ± 22 bpm in the obese animals (NS). Rats were classically conditioned by following a 15-second tone (CS+) with a 0.5-second tail shock. There were no between-group differences in the BP response to CS+. Conversely, heart rate (HR) decreased significantly ($p<0.05$) more during the last 10 s of the tone in the lean group (-46.0 ± 21.5 bpm) vs. the obese (-17.8 ± 21.7 bpm). This bradycardia was blocked by atropine. Finally, the change in HR divided by the change in arterial BP ($\Delta HR/\Delta BP$) following an intravenous bolus of phenylephrine (PE; 5 μ g/kg) and following sodium nitroprusside (NP; 5 μ g/kg) was determined. The $\Delta HR/\Delta BP$ following PE was smaller in the obese ($n=6$; -1.36 ± 0.60) vs. lean ($n=5$; -2.80 ± 0.92); there was no difference in the response following NP. These data indicate that the BP response to a behavioral challenge did not differ in the obese rat vs. the lean animal, but that the obese subjects had an attenuated parasympathetic response to the stress, probably secondary to alterations in baroreflex function.

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