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Cardiac Responses to β -adrenergic Stimulation and Induced Vasodilation are Similar in Young Male and Female Rats

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The ability of the heart to increase its work output involves sympathetic activation and coronary vasodilation. It is known that regulation of these systems is different between sexes, as well as with age, however the mechanisms have yet to be fully elucidated. **PURPOSE:** Therefore, the goal of this study was to investigate the functional responses of male and female rat hearts to β -adrenergic stimulation and nitric oxide-induced vasodilation, as well as the effects of SNP-induced vasodilation on myoglobin and mitochondrial oxygenation. **METHODS:** Male and female rats were anesthetized, hearts were excised, and Langendorff-perfused via the aorta at 62 mmHg with a Krebs-Henseleit buffer, pH=7.4, 37°C. After 15 min functional equilibration, 25 μ M sodium nitroprusside (SNP), a vasodilation drug which causes smooth muscle relaxation by breakdown to nitric oxide, was added to the perfusate. In a second subset of hearts, albuterol, a β -adrenergic receptor agonist, 5 μ M was added to the perfusate. Heart rate, coronary flow rate, and aortic pressure were continually monitored. In the SNP experiments, myoglobin oxygenation and mitochondrial redox status were monitored utilizing optical spectroscopy. **RESULTS:** Upon addition of SNP, coronary flow rate increased from 11.2 ± 1.2 mL/min to 13.6 ± 2.1 mL/min in male rats and from 8.9 ± 1.1 mL/min to 11.1 ± 1.6 mL/min in female rats. In both male and female rats, the increase in flow was associated with an increase in myoglobin oxygenation. In response to albuterol, heart rate increased from 257 ± 6 beats/min to 300 ± 10 beats/min in male rats and from 200 ± 13 beats/min to 228 ± 1 beats/min in female rats. **CONCLUSION:** Young male and female rats demonstrate similar responses to SNP-induced vasodilation and β -adrenergic stimulation, however the magnitude of the response may be different. Future studies will assess the response to these drugs in older male and female rats, to determine if there is an interplay between sex and age in response to β -adrenergic stimulation.