

## **Contribution of social isolation, restraint, and hindlimb unloading to changes in hemodynamic parameters and motion activity in rats**

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Titre Contribution of social isolation, restraint, and hindlimb unloading to changes in hemodynamic parameters and motion activity in rats

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Résumé en  
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The most accepted animal model for simulation of the physiological and morphological consequences of microgravity on the cardiovascular system is one of head-down hindlimb unloading. Experimental conditions surrounding this model include not only head-down tilting of rats, but also social and restraint stresses that have their own influences on cardiovascular system function. Here, we studied levels of spontaneous locomotor activity, blood pressure, and heart rate during 14 days under the following experimental conditions: cage control, social isolation in standard rat housing, social isolation in special cages for hindlimb unloading, horizontal attachment (restraint), and head-down hindlimb unloading. General activity and hemodynamic parameters were continuously monitored in conscious rats by telemetry. Heart rate and blood pressure were both evaluated during treadmill running to reveal cardiovascular deconditioning development as a result of unloading. The main findings of our work are that: social isolation and restraint induced persistent physical inactivity, while unloading in rats resulted in initial inactivity followed by normalization and increased locomotion after one week. Moreover, 14 days of hindlimb unloading showed significant elevation of blood pressure and slight elevation of heart rate. Hemodynamic changes in isolated and restrained rats largely reproduced the trends observed during unloading. Finally, we detected no augmentation of tachycardia during moderate exercise in rats after 14 days of unloading. Thus, we concluded that both social isolation and restraint, as an integral part of the model conditions, contribute essentially to cardiovascular reactions during head-down hindlimb unloading, compared to the little changes in the hydrostatic gradient.

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