3Rs benefits for cardiorespiratory and activity monitoring in rats using jacketed external telemetry? – Review of evidence

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In vivo monitoring on integrated models is of paramount importance for biomedical research and drug development. This includes the use of physiological measurement methods to achieve an optimal balance between obtaining relevant data and the animal welfare. In that sense, inspired on the telemetric jacket used on large animals, a rat version has been adapted, integrating three different non-invasive sensors (ECG skin-patches, inductive respiratory plethysmograph, and 3D accelerometer) in order to simultaneously measure the cardiac, the respiratory functions as well as behaviour in freely moving animals. This review aims to illustrate the scientific and 3Rs benefits in various studies conducted with this new device including home cage monitoring, pharmacological studies, and treadmill exercise as well as data comparisons with reference methods (Whole Body Plethysmography, Implanted telemetry). This compilation of data highlights that the Jacket is robust and well accepted for measuring socialized animals, its sensors provide physiological signal and parameters comparable to those of reference methods, and parameters capture the physiological and pharmacological variations induced during a study. In conclusion, by allowing the simultaneous monitoring of three function on the same animal in a completely non-invasive way jacketed telemetry offers the opportunity to Reduce and Refine the use of animal in preclinical studies while giving access to physiological monitoring compatible with a wide range of research situation.