



School of Medicine

# Continuous Ultrasonic Transit-Time Blood Flow and Arterial Blood Pressure Monitoring in Freely Moving Sprague-Dawley Rats via Implantable Telemetry

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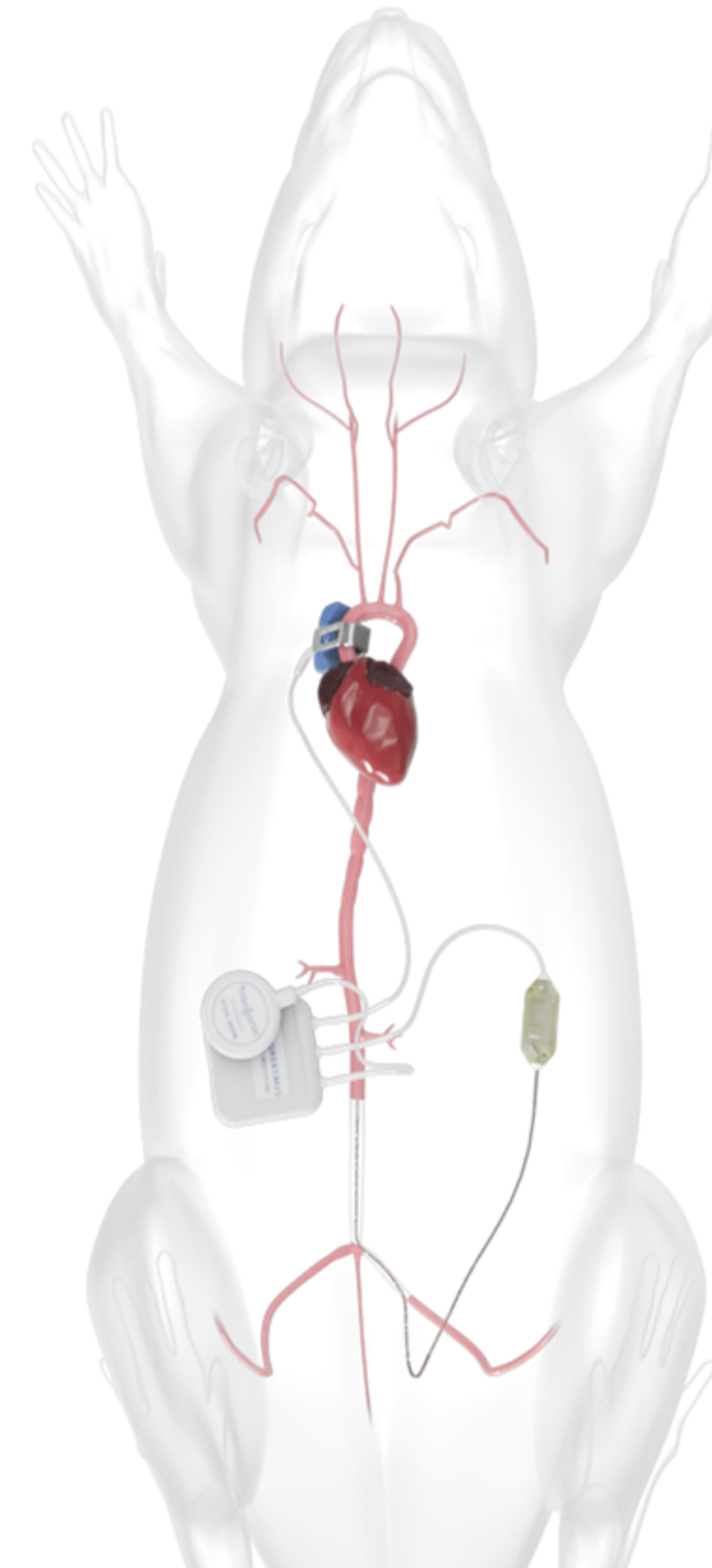
## Introduction

Simultaneous blood flow and pressure measurements provide a more comprehensive hemodynamic assessment in cardiovascular studies. However, current cardiac output (CO) measurements, by flow probes or imaging, require either anesthesia or a tethered setup, which result in limitations due to anesthesia effects and/or monitoring time.

## Objectives

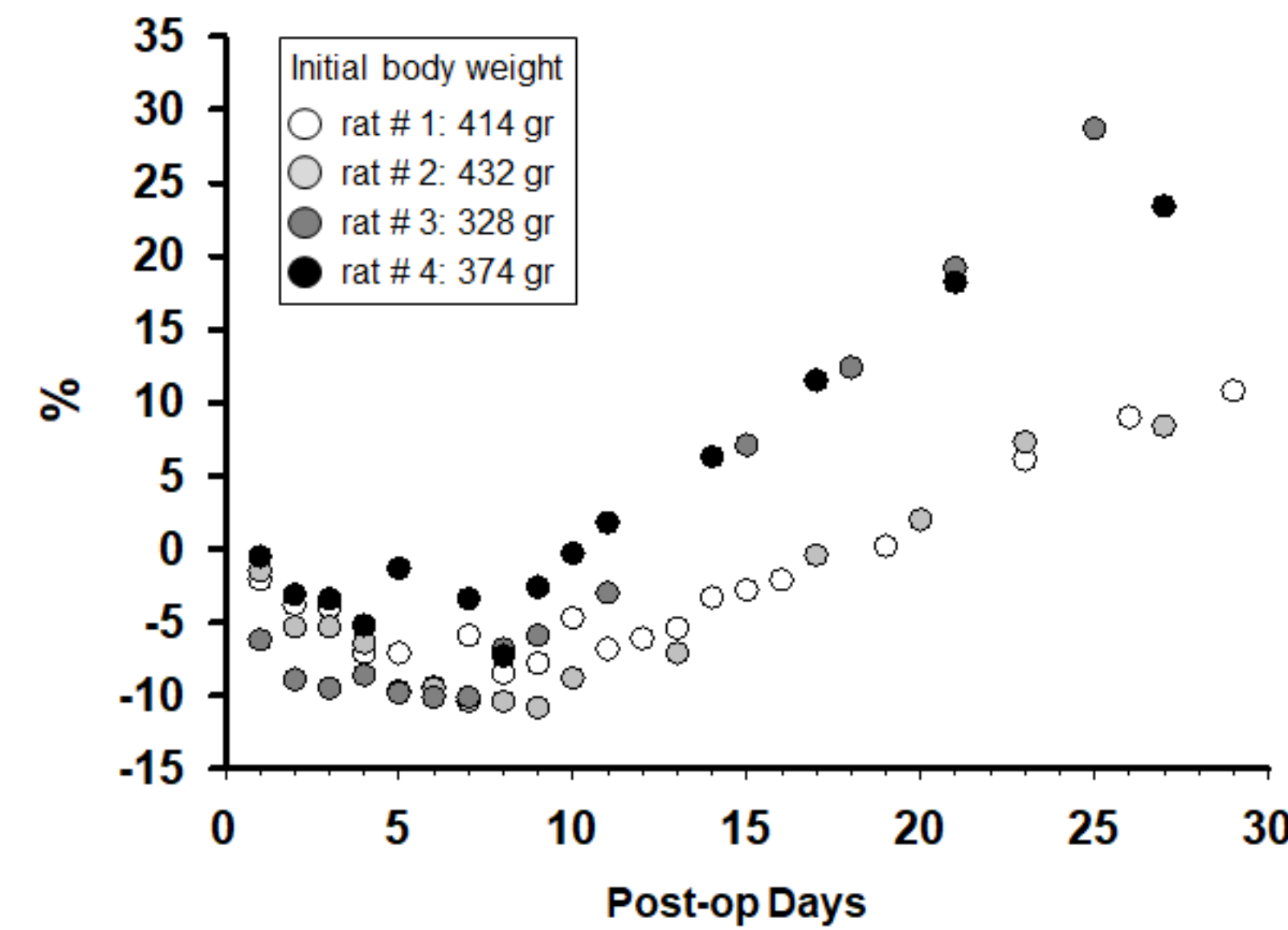
To use the EndoGear implantable telemetry device (Transonic Systems Inc., Ithaca, NY) to measure continuous cardiac output (real-time ascending aortic blood flow), and mean arterial pressure (MAP) in conscious, freely moving rats, and to verify the ability of the system to capture well known circadian oscillations in major cardiovascular parameters.

## Methods



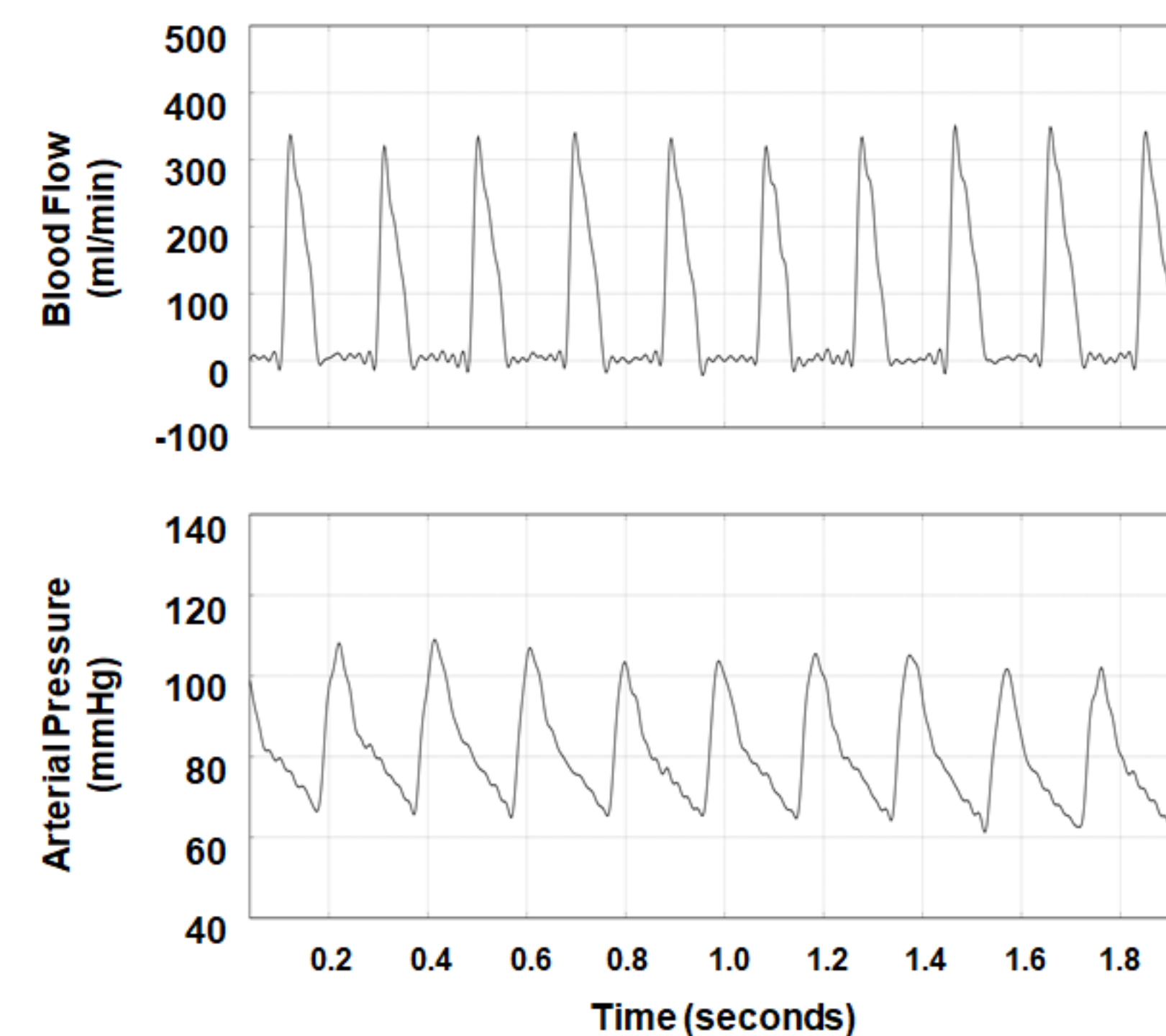
- Studies were conducted in male Sprague Dawley rats (n=4).
- CO, MAP, temperature, and activity were continuously recorded with EG transmitter.
- An ultrasonic transit-time flow probe was placed around the ascending aorta (via right thoracotomy, 4<sup>th</sup> IC space).
- A pressure catheter was inserted into the abdominal aorta (via iliac artery and advanced ~ 2.5 cm).
- The transmitter was implanted intraperitoneally.
- The inductive power receiver associated with the implant was placed in an abdominal subcutaneous pocket.
- Body weight, food and fluid intake were monitored daily for the first 10 days.

## Post-op Body Weight



Implantation effects on body weight presented as percentage changes from pre-implantation body weight.

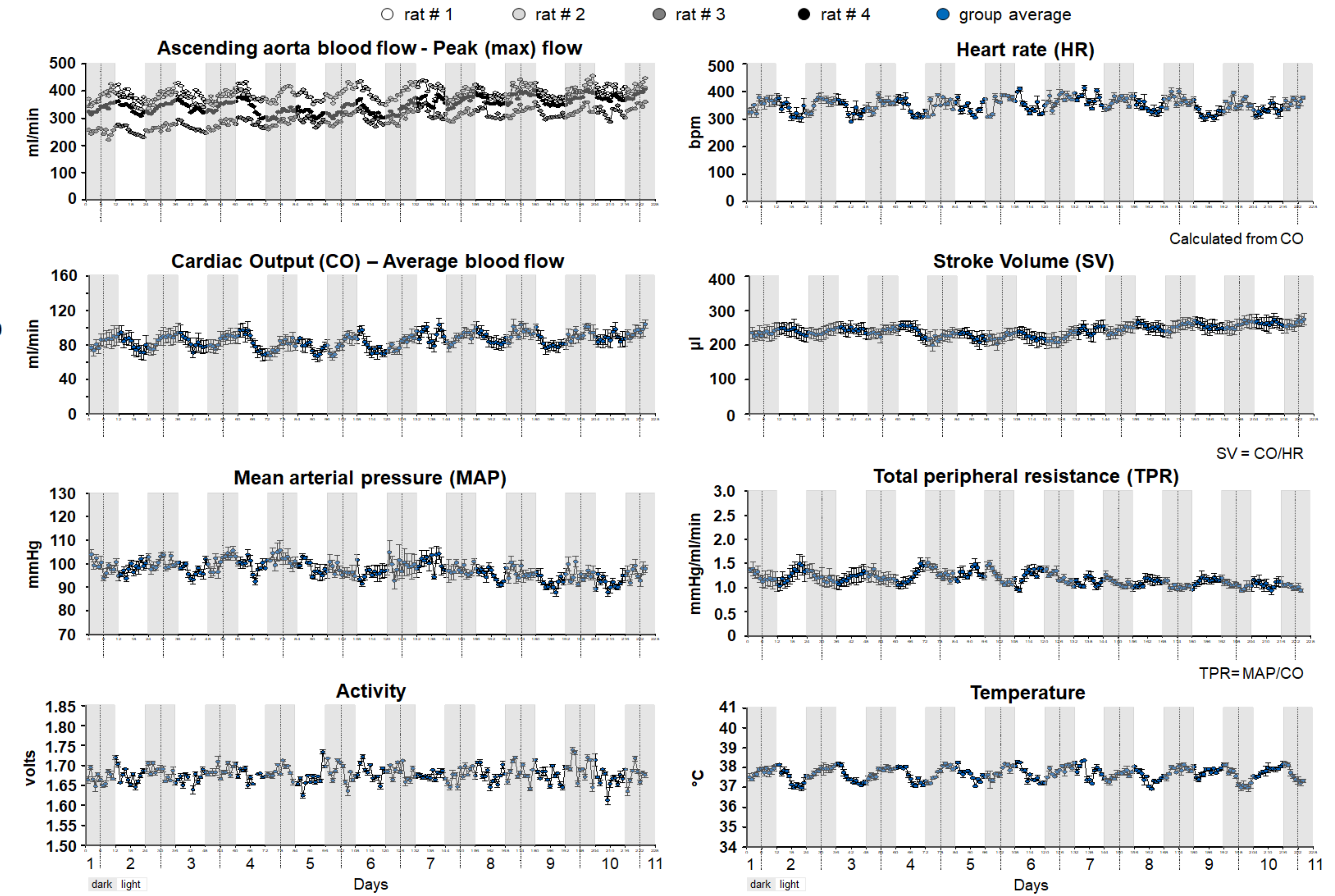
## Blood Flow and Pressure Samples



Trace examples from one animal showing cardiac output (top panel) and arterial pressure (lower panel).

## Results

### Effects of Circadian Rhythms on Hemodynamic Variables



## Conclusions

Preservation of the expected circadian rhythms in CO, MAP, temperature, activity, and calculated parameters (HR, SV, TPR), indicate that the EndoGear implant was effective in reliably acquiring continuous blood flow and blood pressure via telemetry in rats.