

# Assessing Microchip Locations For Mouse Temperature Data Collection

Alexandria Hernandez, Tina Sutterfield, Lauren Long, Bonnie Lyons, Michael Campagna

The Jackson Laboratory, Sacramento, CA



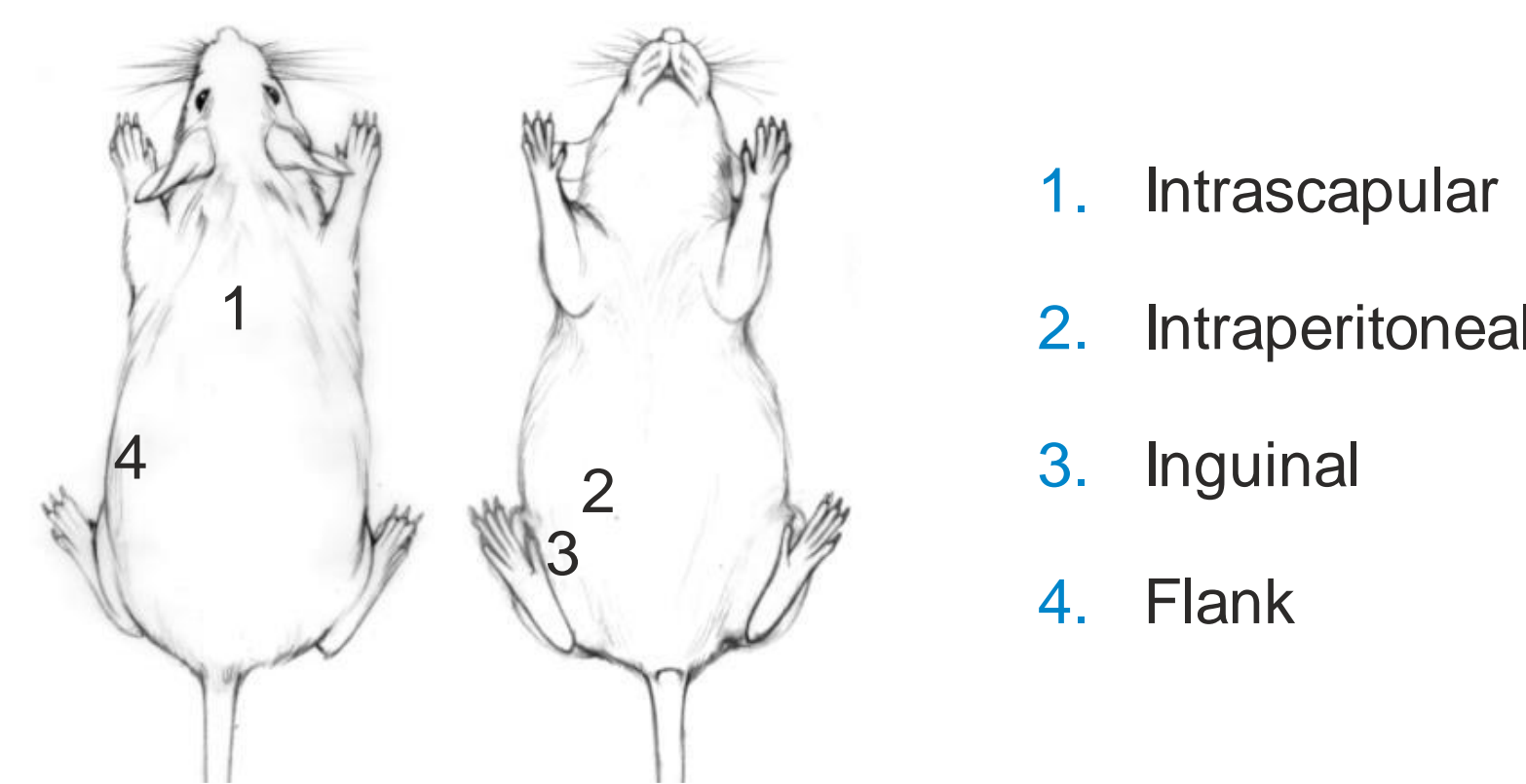
## Introduction

RFID microchips are a convenient and reliable mechanism for collecting experimental data, while minimizing the amount of stress experienced by research animals. Temperature programmable microchips are capable of providing both identification and non-invasive temperature monitoring. This is particularly valuable in studies of inflammatory responses or infectious disease. This study was designed to determine if the location of implanted microchips has a significant effect on temperature readings in mice. We hypothesized that temperature readings would vary depending on location.

## Methods

- 6 week old C57BL/6J (JAX strain 000664) were divided into five groups as follows:

Group	Location	Male	Female
1	Intrascapular	5	5
2	Intraperitoneal	5	5
3	Inguinal	5	5
4	Flank	5	5
5	Intrascapular/Intraperitoneal (Dual)	5	5



- Mice were placed under 3% Isoflurane anesthesia and an eye lubricant was applied.
- Subcutaneous insertion sites were wiped with 70% ethanol.
- The intraperitoneal insertion site was clipped and wiped with an alternating 70% ethanol and surgical scrub.
- Mice were implanted with temperature programmable microchips (Unified Identification Solutions UCT-2112).

## Data Collection

- Temperatures were collected daily for the first week, then weekly for four weeks, and again at four months post implantation using a handheld scanner.
- Body weights were taken at baseline, 2 weeks, 4 weeks, and 4 months post implantation.
- At four months post implantation a subset of mice were housed in cages above a plate reader that allows for continuous, undisturbed monitoring over a period of several hours (Figure 9).
- Necropsy was performed at six months and mice were assessed for gross pathology and microchip location.
- Temperatures between groups and between a subset of individual animals were compared using ANOVA and Tukey's multiple comparisons test.
- There were no significant differences between intraperitoneal temperatures in groups 2 and 5 or between intrascapular temperatures in groups 1 and 5. Values from these groups were analyzed together (Figures 1 and 2).

## Temperature Data By Group (Intermittent Monitoring)

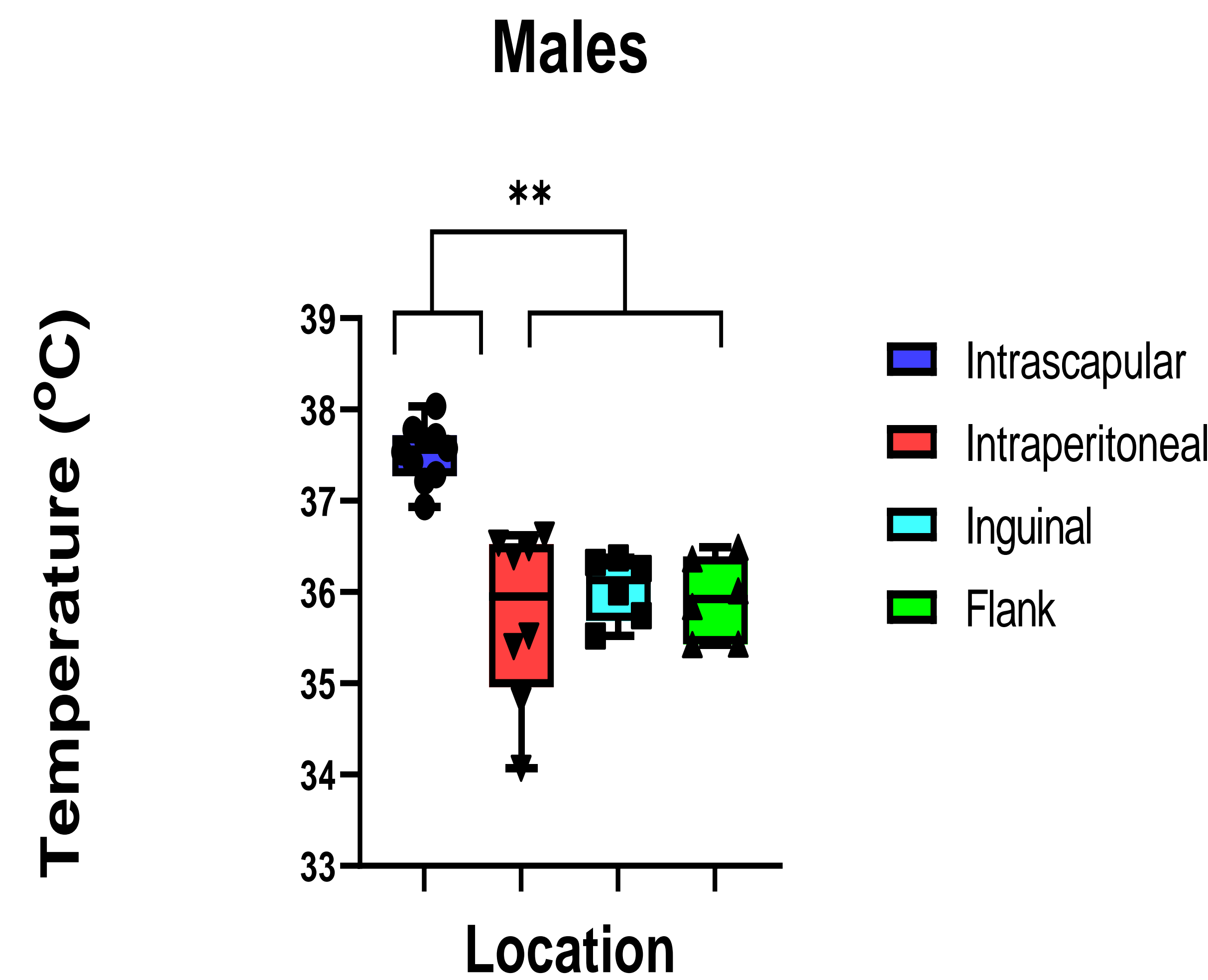


Figure 1. Combined temperature value comparisons between locations with all data points depicted.

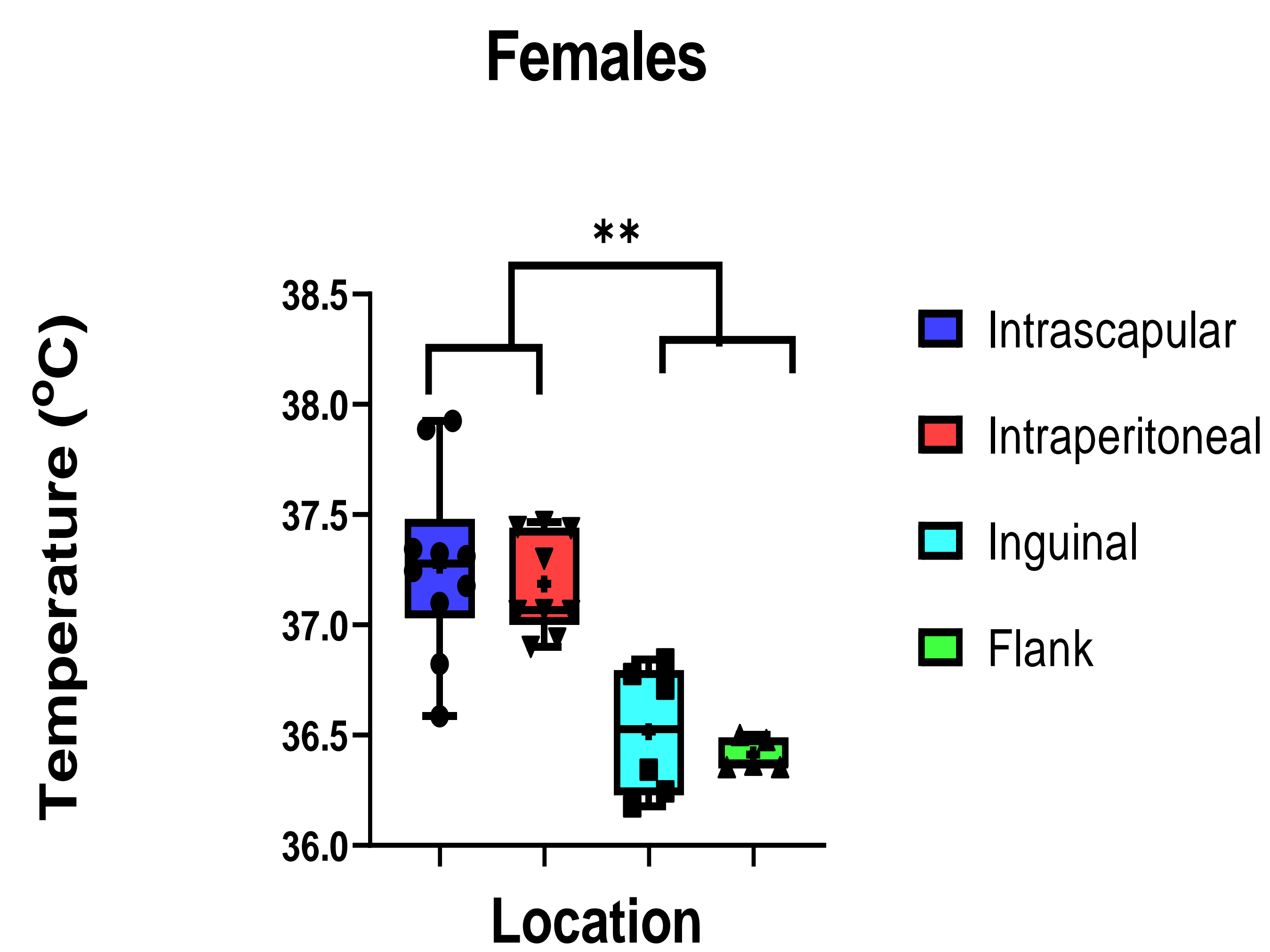


Figure 2. Combined temperature value comparisons between locations with all data points depicted.

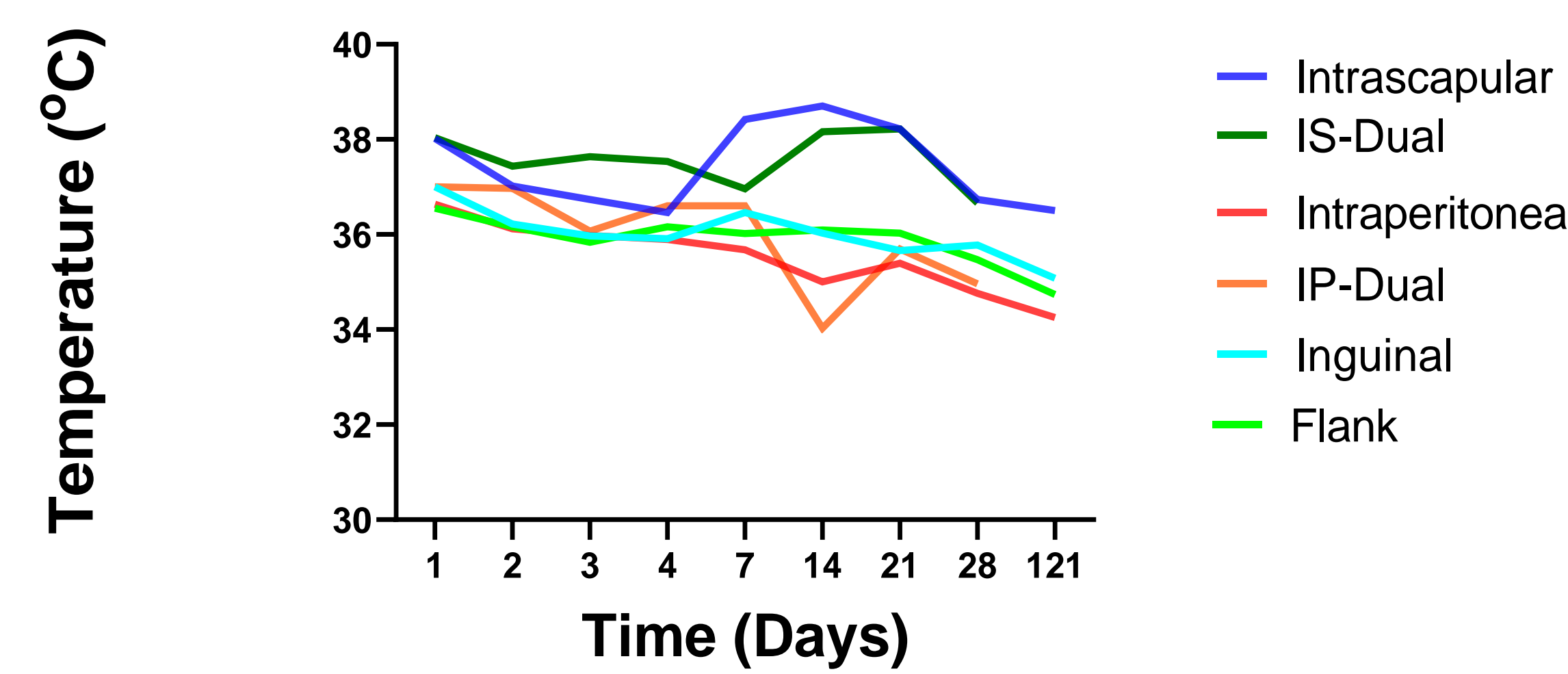


Figure 3. Temperature values over time per group in males.

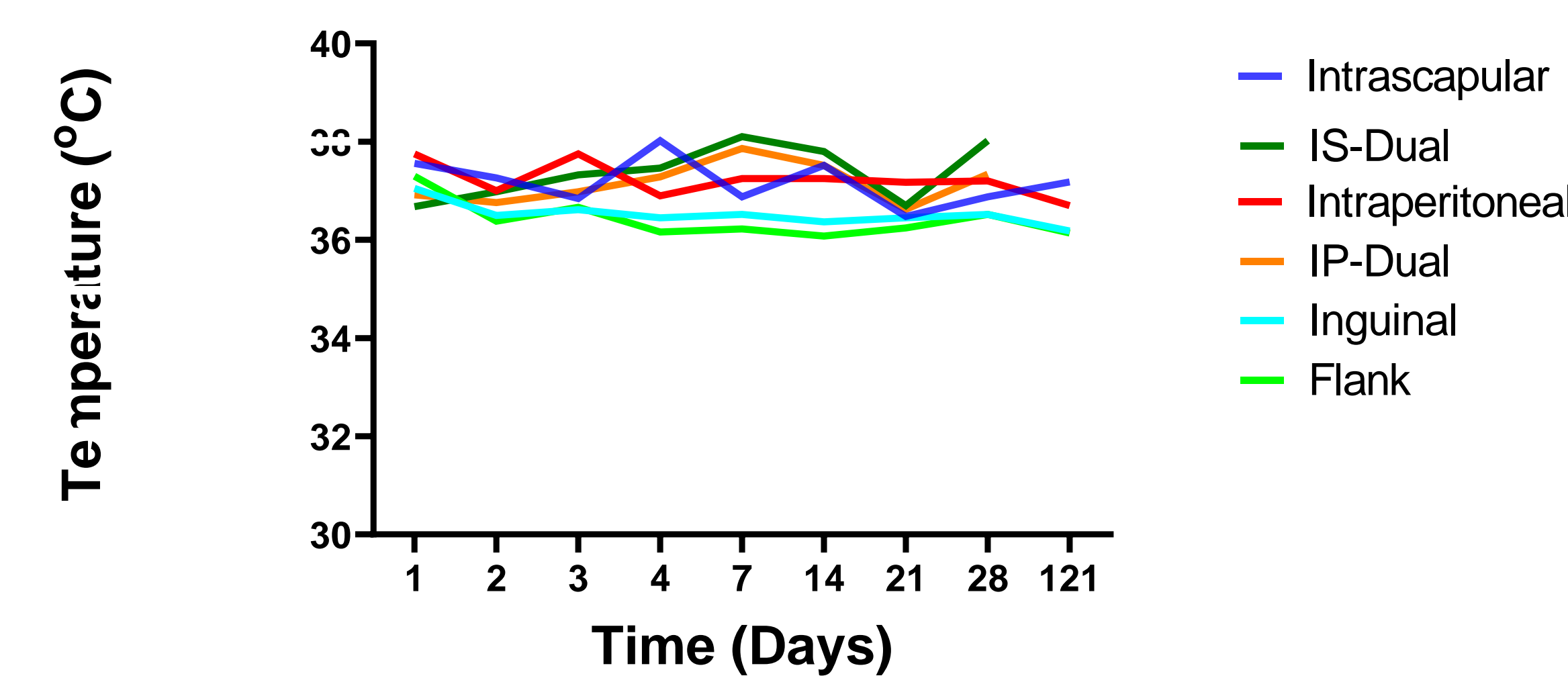


Figure 4. Temperature values over time per group in females.

\*\*denotes P<0.05  
Box plots show min and max readings

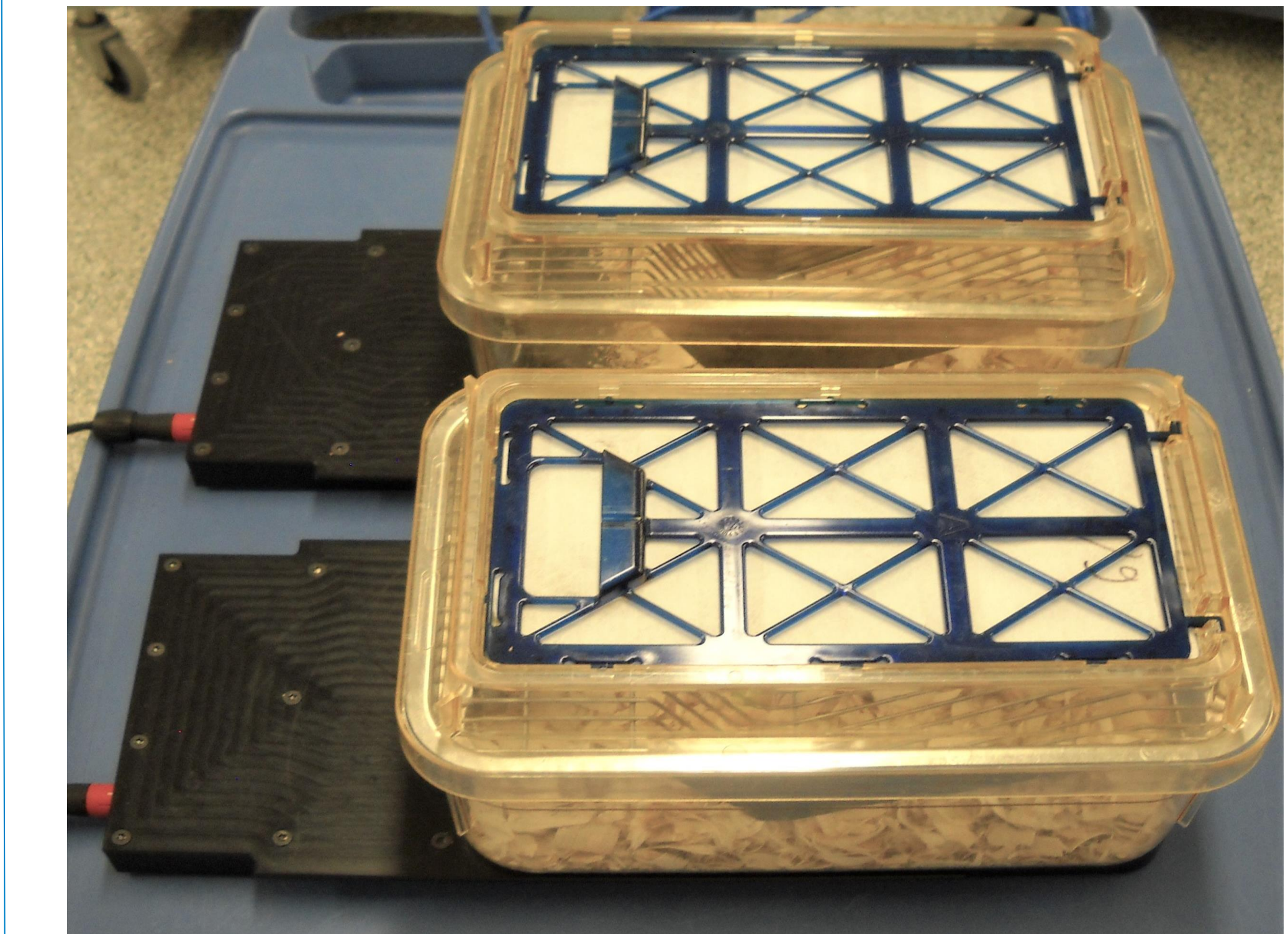


Figure 9. Plate Reader for continuous temperature monitoring.

## Results

- There were no significant differences in weight between members of the same sex.
- Individual animal temperatures ranged from 35.1-38.7°C.
- Average intermittent temperatures for each sex per group:

Location	Male	Female	P
Intrascapular	37.52°C	37.28°C	0.5908
Intraperitoneal	35.80°C	37.24°C	P<0.0001
Inguinal	36.15°C	36.63°C	0.0623
Flank	36.04°C	36.51°C	0.1094

- Intraperitoneal values between males and females are significantly different. No other groups had significant differences.
- In females, average intrascapular and intraperitoneal temperatures were significantly higher (P<0.05) than inguinal and flank temperatures (Figures 2 and 4).
- In males, average intrascapular temperatures were significantly higher (P<0.05) than all other locations (Figures 1 and 3).
- In males, intraperitoneal chips can migrate into the scrotum, resulting in lower temperatures and a larger range of values (Figure 1).

## Conclusions

- Intraperitoneal administration in males is not preferred due to the higher variability and significant difference from females.
- Intrascapular values are consistently higher for both males and females. We hypothesize this may be due to the presence of brown fat, which is more metabolically active.
- Although all subcutaneous methods are acceptable, intrascapular administration is the easiest method and allows for greatest consistency in both male and females. Inguinal and flank values are consistently lower for both male and females.

## Temperatures by Individual Mouse (Continuous Monitoring)

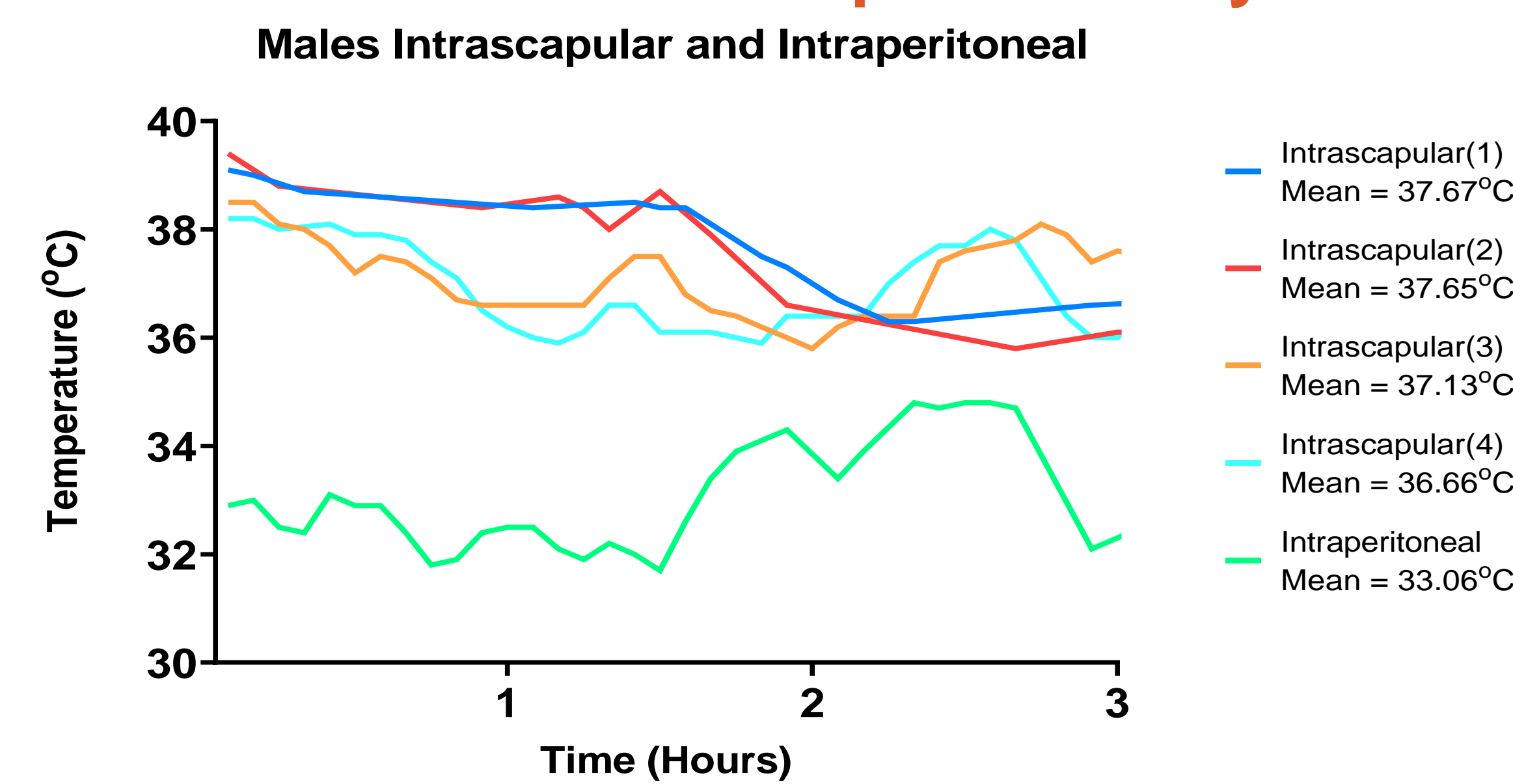


Figure 5. Continuous monitoring of five individual male mice over a three hour period.

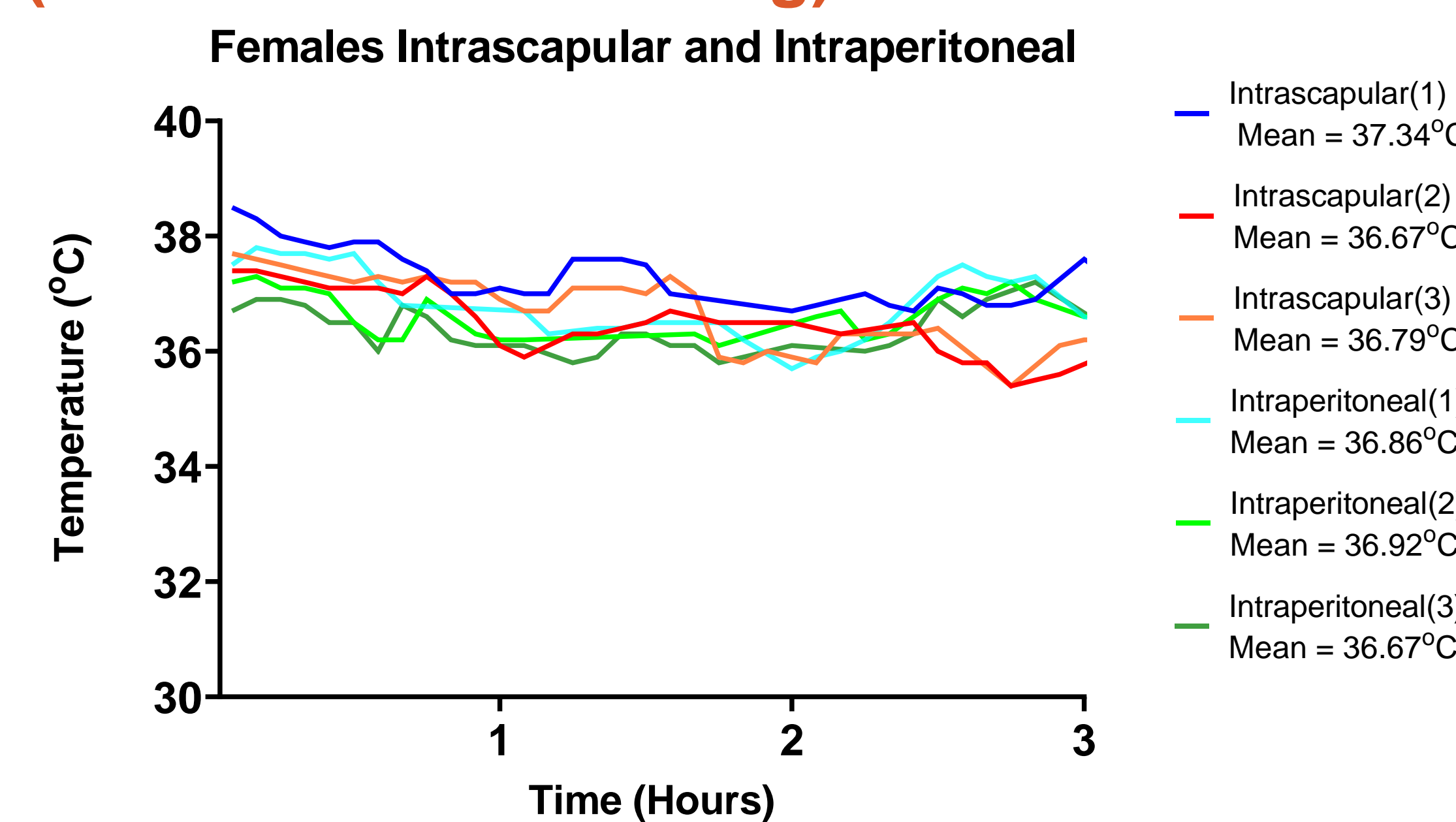


Figure 6. Continuous monitoring of six individual female mice over a three hour period.

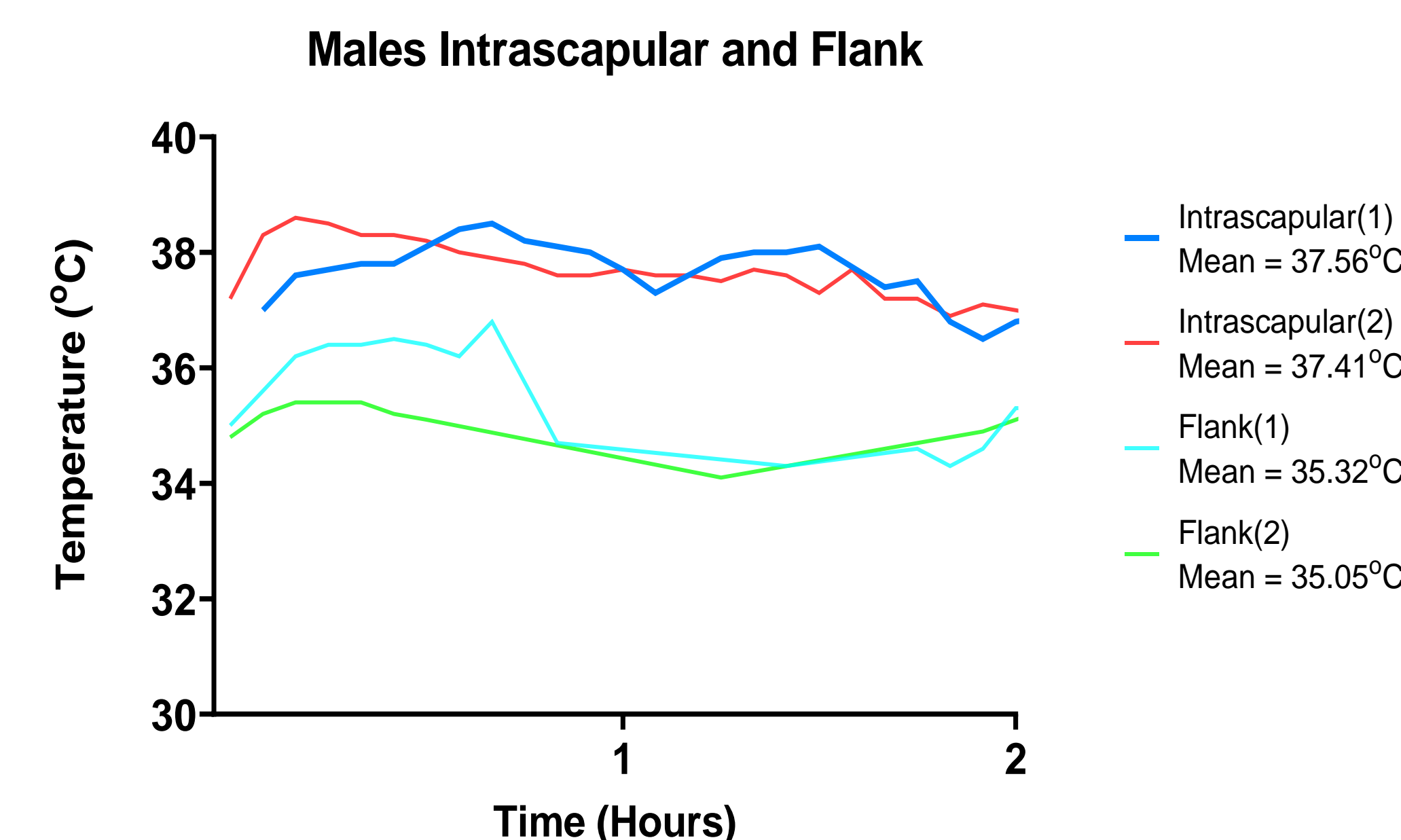


Figure 7. Continuous monitoring of four individual male mice over a three hour period.

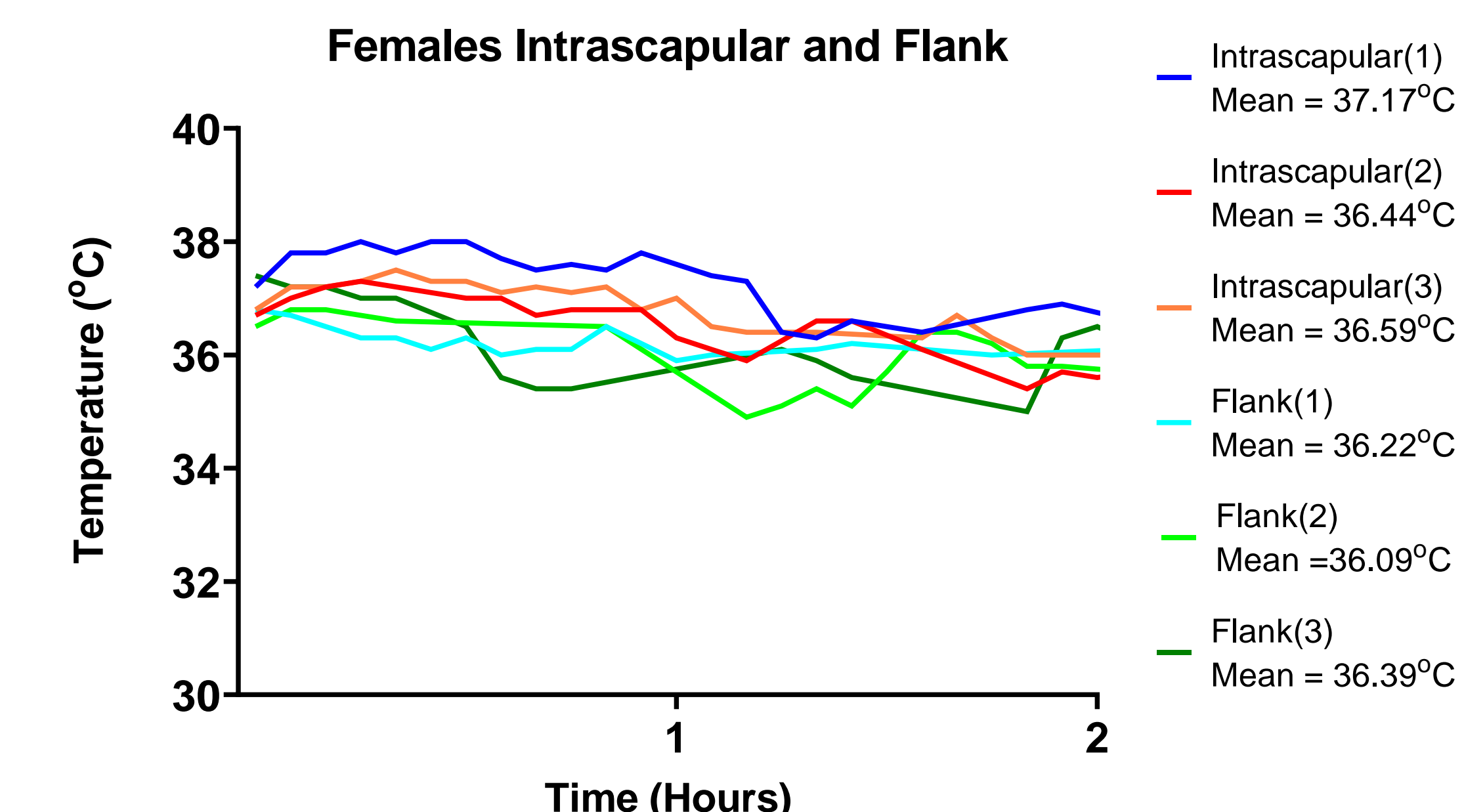


Figure 8. Continuous monitoring of six individual female mice over a three hour period.