UID IDENTIFICATION SOLUTIONS

WHITEPAPER

MICROCHIP IMPLANTATION WITHOUT ANESTHESIA IN PRE-WEANED MICE

INTRODUCTION

Animal identification is essential to ensure the success of any preclinical study requiring the use of animal models. Individual animal identification is required for animal colony management, animal health/medical records, positive identification of group housed animals and research data interpretation. Loss of identification can significantly compromise study results and yield unusable data, which will need to be discarded. In turn, studies need to be repeated, draining laboratory resources and increasing overall study costs.

With the increase of genetically modified animals (especially mice), there is also a growing requirement for early individual identification and maintain data integrity throughout the course of the study. Researchers have known the benefits of using electronic identification methods, such as implantable microchips for many years. Implantable RFID microchips offer a permanent, electronic and simple method for positive identification of laboratory animals as small as pre-weaned mice. Small microchips (1.4mm x 8.5mm) suitable for implantation in small mice are available from Unified Information Devices, Inc. (UID Identification Solutions) individually packaged in a sterile hypodermic needle (1.99mm O.D.) to facilitate insertion. Studies suggest that anesthesia is not required for injection of a mouse microchip using a 1.99mm O.D. hypodermic needle as long as the animals are at least 21 days old (post weaned). To date, data is not available to support microchip implantation, using a 1.99mm O.D. hypodermic needle, without anesthesia in pre-weaned mice (PND <21 days). This study, conducted at Hilltop Lab Animals, Inc. in Scottdale, PA., was designed to evaluate the effects of the microchip insertion, as well as the needle injection on pre-weaned mice without anesthesia using weekly body weights after weaning as the primary evaluation measure.

OBJECTIVES

This study is designed to monitor the body weights of mice following implantation of a microchip without anesthesia on post-natal day (PND) 12, 14, 16 and 21.

MATERIALS AND METHODS

- 8 C57B16 female mice with their litters (66 mouse pups: 36 Males and 30 Females) – (Hilltop Lab Animals, Inc.)
- RFID microchip (UID UC-1485); Size: 1.4mm x 8.5mm; sterile in 1.99mm O.D. hypodermic needle
- 1.99mm O.D. hypodermic needle w/out the microchip (sham injection)
- RFID scanner (UID Identification Solutions)

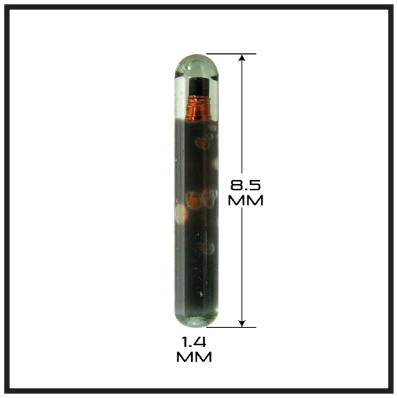


Figure 1. UID Mouse Microchip with its dimensions

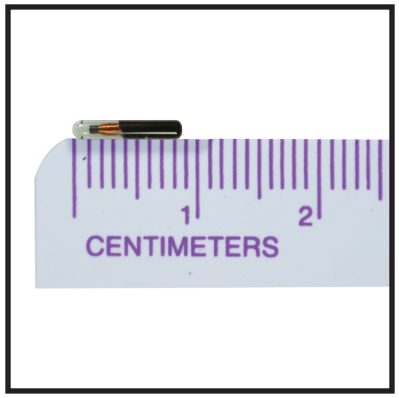


Figure 2. UID Mouse Microchip (UC-1485)

Figure 3. Sterile, hypodermic needle (1.99mm O.D.) for insertion of UID Mouse Microchip

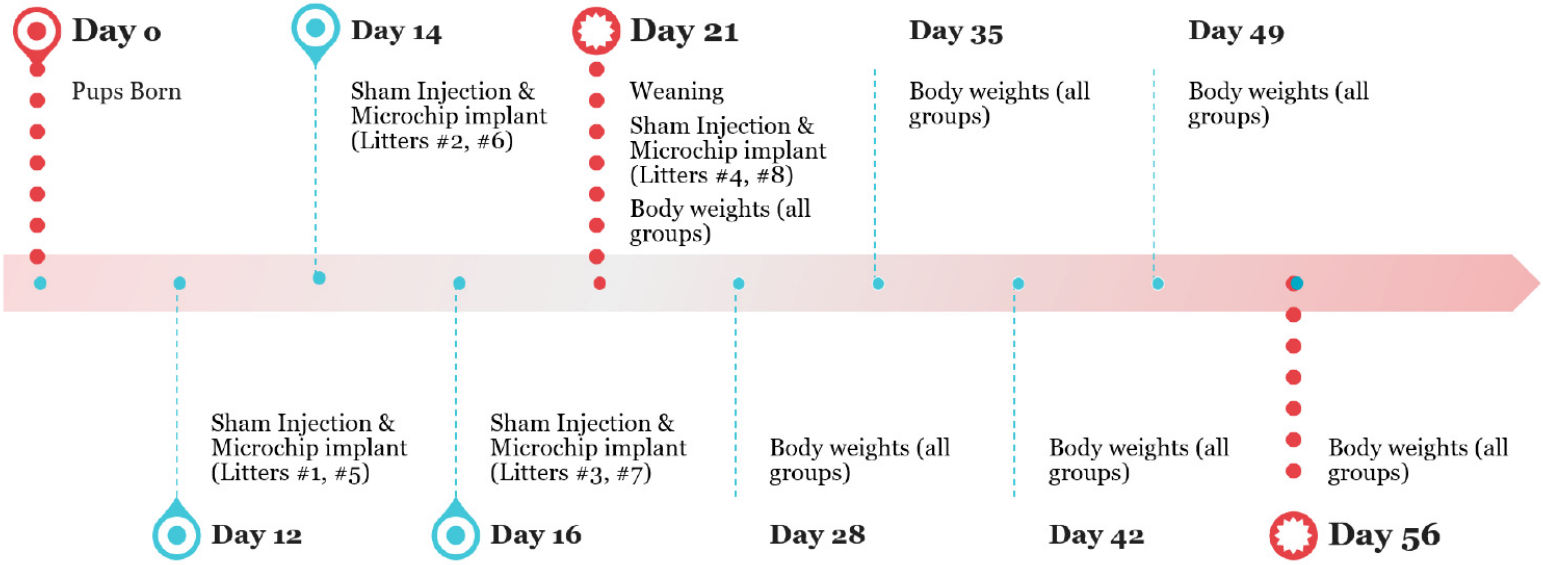
STUDY DESIGN

- A total of 8 mouse litters were used (66 mouse pups: 36 Males and 30 Females).
- One half of the pups within each litter received either a 1.4mm x 8.5mm microchip insertion or a sham needle injection; all via subcutaneous injection using a 1.99mm O.D. hypodermic needle. Microchip or sham injections were performed on PND 12, 14, 16 and 21 (Table 1).
- The other half of the pups in each litter were used as controls and received no needle injection and were not handled until body weights were initiated after weaning (Table 1).
- After the injection (microchip or sham), the mice were not handled (unless necessary) until weaning.
- After approximately 21 days (post weaning), weekly body weights were recorded for all animals in the study during a period of five weeks.
- General observations were recorded during the weekly weights, paying close attention to the injection site and all animals with a microchip were scanned with RFID reader during the weekly weighing.
- After 35 days of weekly body weights, animals were euthanized according HLA SOP 2.36 Humane Endpoint Policy.

TABLE 1. TREATMENT GROUPS (8 LITTERS; 16 GROUPS)

Litter #	Treatment Groups	Control Groups	Injection Day
1	½ Microchip Implant	½ of the litter	Day 12
2	½ Microchip Implant	½ of the litter	Day 14
3	½ Microchip Implant	½ of the litter	Day 16
4	½ Microchip Implant	½ of the litter	Day 21
5	½ Sham Needle Insertion	½ of the litter	Day 12
6	½ Sham Needle Insertion	½ of the litter	Day 14
7	½ Sham Needle Insertion	½ of the litter	Day 16
8	½ Sham Needle Insertion	½ of the litter	Day 21

STUDY TIMELINE



RESULTS

BODY WEIGHT MEASUREMENTS

Mice received either a microchip injection, sham injection or no treatment on PND 12, 14, 16 and 21. The microchip and sham injections were performed without anesthesia. The mice were then evaluated for body weight growth, starting at the time of weaning (PND 21) and weekly thereafter for a period of five weeks. The body weights were compared between all study groups to evaluate the effects of microchip implantation and sham needle injection on pre-weaning mice. Results show no dramatic differences in animal weights between the microchip injection, sham injection or control mice (Fig. 4 & 5). All mice in all study groups show a normal growth pattern as indicated by the increase in body weights from PND 21 to PND 56 (Fig. 4 & 5).

The total weight increase for all mice ranged from 9.9 grams to 19.3 grams. In general, the greatest percentage increase was achieved by the male mice within each litter, while female mice tended to be smaller and gained less weight overall during the study period. In general, there were no dramatic differences in body weight percentage gains between mice receiving sham injection or microchip implantation compared to the control mice within each litter (Fig. 5).

Figure 4. Average body weight gains from PND 21 to PND 56 for mice receiving a microchip implantation, sham needle injection or no treatment at PND 12 (A), PND 14 (B), PND 16 (C) or PND 21 (D).

FIGURE 4.

Average body weight gains from PND 21 to PND 56 for mice receiving a microchip implantation, sham needle injection or no treatment at PND 12 (A), PND 14 (B), PND 16 (C) or PND 21 (D).

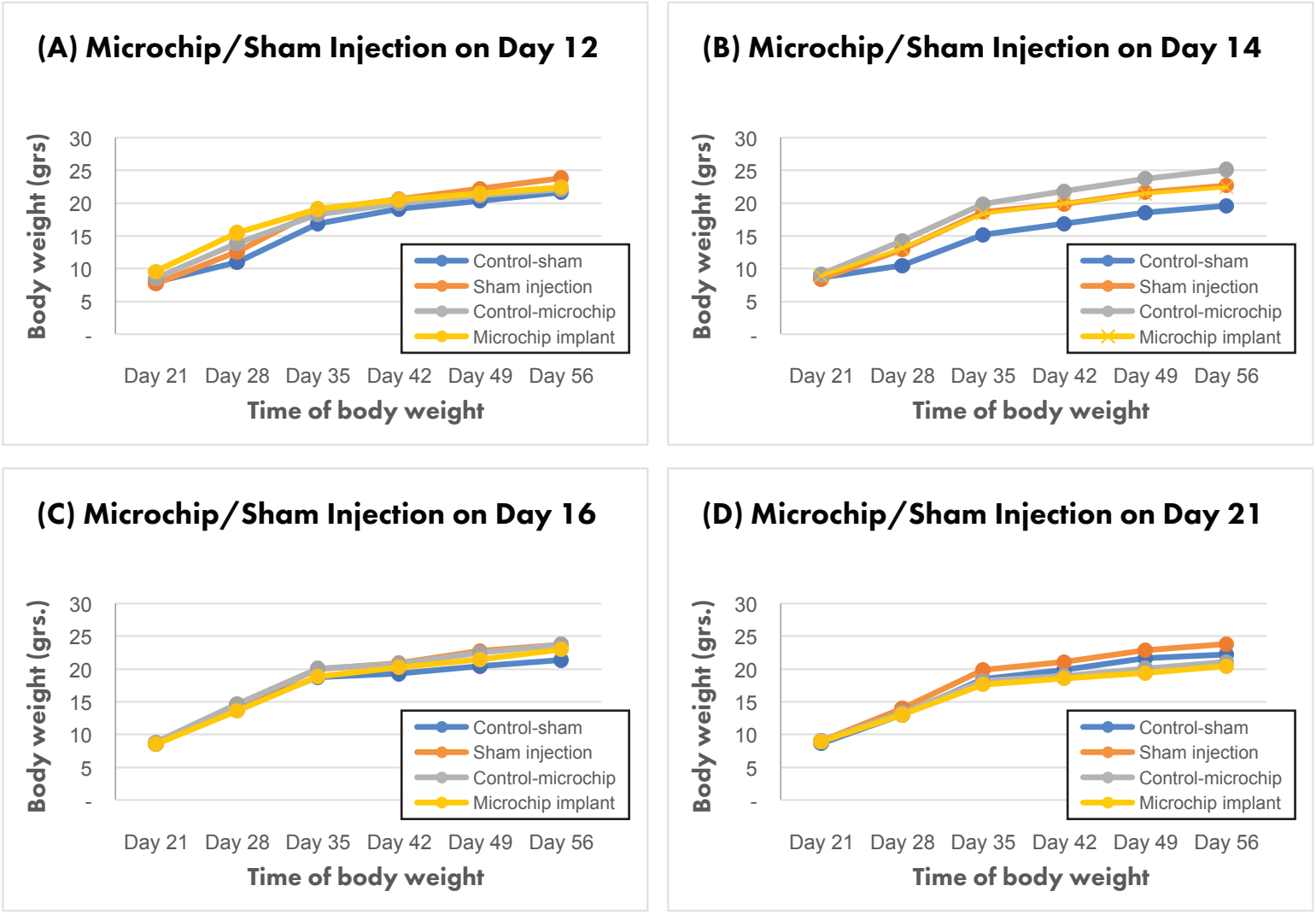
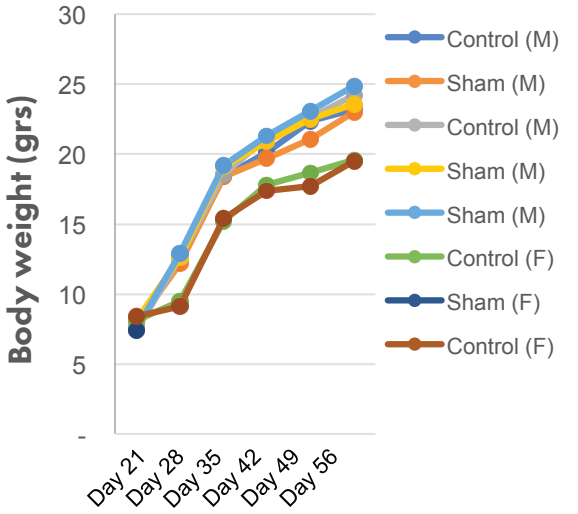


FIGURE 5.

Body weight increase for each mouse within each litter. The graph on the left provides a graphical representation of the body weight gains from PND 21 to PND 56 for mice receiving a sham needle injection (A, C, E, F), microchip implantation (B, D, F, H) or no treatment (A-H) at PND 12 (A, B), PND 14 (C, D), PND 16 (E, F) or PND 21 (G, H). The table on the right shows the weight increase for each mouse by gender.

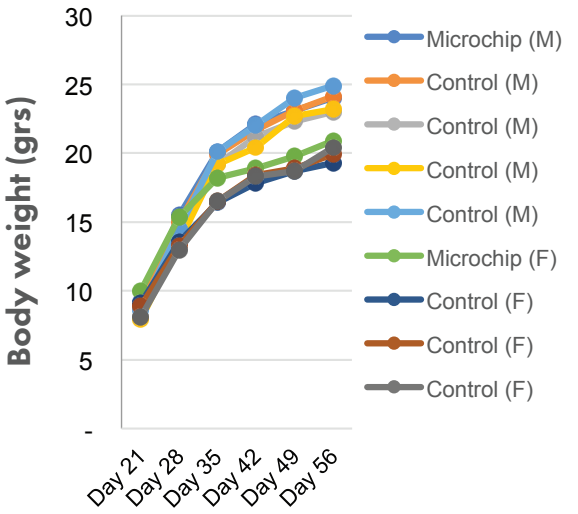
A) Day 12 Sham Injection Litter



Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Control	Male	15.4	197%
Sham	Male	15.2	195%
Control	Male	16.8	227%
Sham	Male	15.5	191%
Sham	Male	17.4	232%
Control	Female	11.5	142%
Sham*	Female*		
Control	Female	11.1	132%

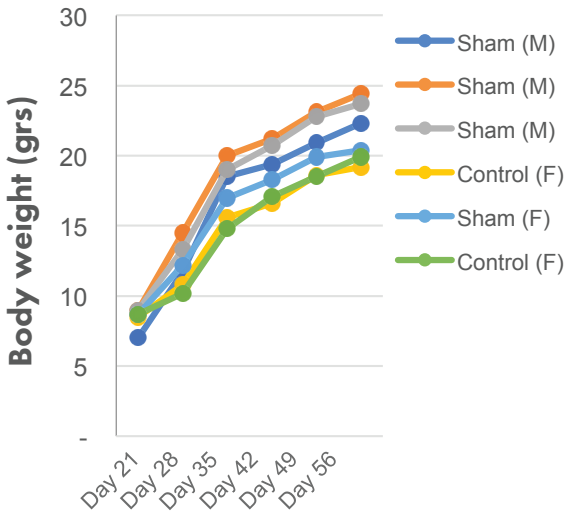
**Animal #7 was the runt of the litter and did not survive post weaning*

B) Day 12 Microchip Implant Litter



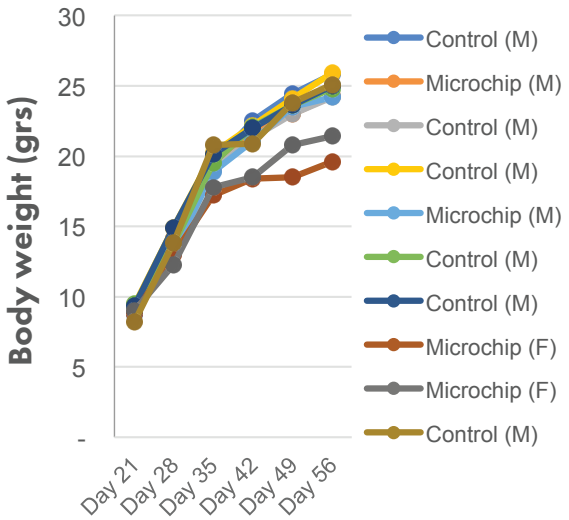
Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Microchip	Male	14.8	161%
Control	Male	15.2	171%
Control	Male	14.9	184%
Control	Male	15.3	194%
Control	Male	16.3	190%
Microchip	Female	10.9	109%
Control	Female	10.2	112%
Control	Female	11	124%
Control	Female	12.3	152%

C) Day 14 Sham Injection Litter



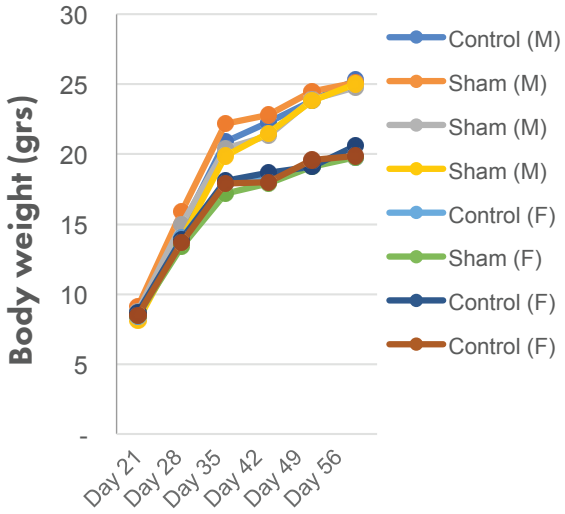
Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Sham	Male	15.3	219%
Sham	Male	15.4	171%
Sham	Male	14.7	163%
Control	Female	10.7	126%
Sham	Female	11.7	134%
Control	Female	11.2	129%

D) Day 14 Microchip Implant Litter



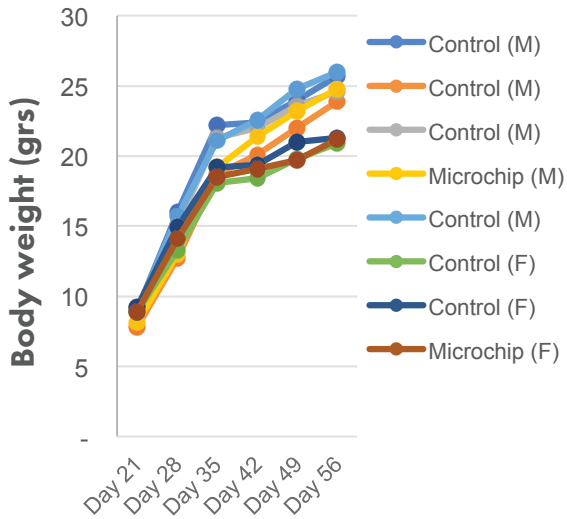
Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Control	Male	16.6	180%
Microchip	Male	15.3	170%
Control	Male	15	163%
Control	Male	16.5	176%
Microchip	Male	15.5	178%
Control	Male	15.3	161%
Control	Male	15.7	169%
Microchip	Female	10.8	123%
Microchip	Female	12.4	138%
Control	Male	16.9	206%

E) Day 16 Sham Injection Litter



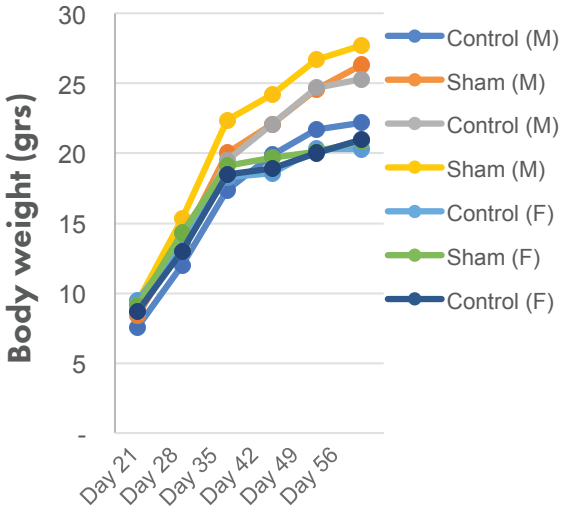
Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Control	Male	16.9	201%
Sham	Male	16	176%
Sham	Male	16	182%
Sham	Male	16.9	209%
Control	Female	11.4	136%
Sham	Female	11.3	133%
Control	Female	11.9	137%
Control	Female	11.4	134%

F) Day 16 Microchip Implant Litter



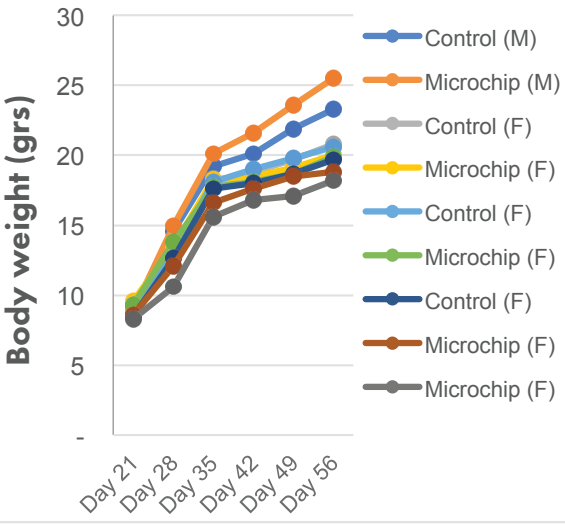
Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Control	Male	16.7	186%
Control	Male	16.1	206%
Control	Male	15.5	170%
Microchip	Male	16.7	206%
Control	Male	17	189%
Control	Female	12	135%
Control	Female	12.1	132%
Microchip	Female	12.3	138%

G) Day 21 Sham Injection Litter



Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Control	Male	14.6	192%
Sham	Male	17.9	213%
Control	Male	16.6	191%
Sham	Male	18.3	195%
Control	Female	10.8	114%
Sham	Female	11.8	130%
Control	Female	12.3	141%

H) Day 21 Microchip Implant Litter



Animal	Sex	Weight Increase (grs)	Weight Increase (%)
Control	Male	14.3	159%
Microchip	Male	16.6	187%
Control	Female	11.5	124%
Microchip	Female	10.4	108%
Control	Female	11.3	122%
Microchip	Female	10.6	114%
Control	Female	11.2	132%
Microchip	Female	10.2	119%
Microchip	Female	9.9	119%

INJECTION SITE OBSERVATIONS

No injection site issues or any other observable abnormalities were noticeable in any of the mice. There wasn't anything noteworthy that occurred throughout the study.

MORTALITY

There was only one mouse that died during the course of the study, but this death was not associated with any treatment. Animal #7 (female) from the Day 12 Sham Injection Litter was the runt of the litter and did not survive post weaning.

CONCLUSION

The results of this study indicate that implantation of a microchip using a 1.99mm O.D. needle without anesthesia can be successfully performed in mice as early as PND 12 without any ill effect on body weights. As shown in Fig. 4, all mice followed a normal growth pattern based on body weights following implantation of a microchip, or sham injection at PND 12, 14, 16 and 21. No significant differences in body weight changes were found among all experimental and control groups (Fig. 4 & 5).

In general, the use of UID microchips appears to be a well-tolerated method for permanent electronic identification of neonatal mice. Based on data obtained from body weight gains, it should be feasible to implant RFID microchips (1.4mm x 8.5mm) using a 1.99mm O.D. needle without anesthesia in mice as young as PND 12.