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### ***TailTimer*: automating data collection for the rodent tail immersion assay**

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The tail immersion assay is commonly employed in behavioral genetics research to measure opioid-induced analgesia and withdrawal-related hyperalgesia in rodent models. However, quantification of tail withdrawal latency relies on manual timing of tail flick, and precise temperatures of the water at the time of measurement are often not recorded. These two factors greatly reduce the reproducibility of tail immersion data. Here, we report *TailTimer*, a device designed to automatically record and display both tail withdrawal latency and water temperature using a Raspberry Pi computer and a digital temperature sensor. To ensure consistent water temperature, we programmed *TailTimer* to only permit testing when the water is within  $\pm 0.25$  °C of the target. Our software records the identification of the animals using a radio frequency identification (RFID) system. We further adapted the RFID system to recognize several specific keys as user interface commands, allowing *TailTimer* to be operated via RFID fobs for increased usability. Using *TailTimer*, we assessed Sprague Dawley (SD) males ( $N = 8$ ) and found a negative linear relationship between tail withdrawal latency and water temperature, when tested between 47 – 50 °C. We also observed a profound effect of water mixing speed on latency. Following oral gavage of oxycodone (3 mg/kg), we observed significantly longer latencies relative to baseline when measured after 15 mins or 1 h, but not after 4 h. These findings valorize *TailTimer* in its sensitivity and reliability for detecting thermal pain thresholds. Our open-source design is available at <https://github.com/chen42/tailtimer>.