Two Neuropathic Pain Models in Cockatiels: Pilot Study
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Hypothesis: An appropriate model for the study of neuropathic pain and its mitigation can be developed in a psittacine species.

Proposed research to accomplish:
The crush injury and chronic constrictive injury of the sciatic nerve are established methods of producing neuropathic pain in rats and mice and were adapted to the bipedal cockatiel by injuring the tibial nerve. Nine cockatiels were split into 3 groups of 3. One group under went a surgery to crush the tibial nerve in right leg, one group experienced a chronic constrictive injury via ligation of the tibial nerve of the right leg and the third group under went a sham surgery in which the tibial nerve was exposed but not manipulated.

Each bird was conditioned to and under went analgesia testing to evaluate different aspects of neuropathic: heat hyperalgesia (via thermal perch), cold alldynia (via acetone application) and mechanical allodynia (via electronic von Frey analgesiometer). It was expected that if neuropathic pain was experienced, then a lower tolerance of heat, cold and pressure would be observed in the birds using these tests.

Motor functioning was also evaluated in each bird prior to and after surgery with a rotational perch to evaluate ambulation and a weight bearing load perch to evaluate stance. By assessing the recovery of motor function, it was possible to determine if any deficits in the analgesia tests would be due to sensory and not motor impairments.

Brief discussion of results:
Cockatiels in the tibial nerve crush injury group recovered function in their right limb by day 22 post surgery as evaluated by the rotational perch and weight bearing rod. Changes in analgesia testing after day 22 can be attributed to sensory deficits. Heat hyperalgesia was observed using the thermal perch test 30 days post surgery suggesting an increase in sensitivity to thermal noxious stimuli.

Cockatiels in the chronic constrictive injury group had not recovered limb function in their right leg by day 50. They had minimal grasping, abnormal posture and position of the right limb. Weight bearing values returned to pre-surgical values by day 30 after surgery indicating some return of function, but the birds were consistently unable to regain their pre surgery performance on the rotational perch. As of day 50 there was no indication of heat hyperalgesia in these birds.

The mechanical allodynia test produced a wide range of values post-operatively in all groups. There was no distinct trend in the pressures that elicit responses from any surgical group. Similarly, the cold alldynia test using acetone elicited inconsistent responses prior to surgery. Post-operatively, inconsistent responses from all birds continued and the responses were either similar or milder compared to pre-surgical responses. Thus, mechanical and cold alldynia have not yet been observed in either model and it is still unclear if these methods of analgesia evaluation are valid in the psittacine model.

The tibial nerve crush injury appears to allow for normal function recovery and elicits heat hyperalgesia, one component of NPP, indicating is the better model for use in the cockatiel. This pilot study will continue for another 6 weeks, testing limb function and evaluating presence of hyperasthesia in both models.