

Perseverative behavior in the Dahl Salt-Sensitive and chromosomal substitution strains

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Previously we have demonstrated that the introgression of chromosome 13 from the Brown Norway (BN) rat onto the genetic background of the Dahl salt-sensitive (SS) strain, yielding a novel strain known as the SSBN.13 consomic animal, results in rescue of an acquisition deficit on the Morris Water Maze (MWM) task of spatial memory. The current research was conducted in an effort to determine whether the cognitive impairment observed in SS animals extends to perseverative behavior and evaluate how the introgression of BN chromosome 13 affects this phenotype in a systematic evaluation of perseveration. Male SS, BN, and SSBN.13 animals were assessed on an adapted version of the T-maze designed specifically to assess perseverative behavior. Animals were assessed for paw preference in a spontaneous alternation task and then exposed to training. All animals were trained to respond to the choice arm opposite their paw preference for a food reward. This phase was considered acquisition and continued for 10 trials a day until animals reached a criterion performance of at least 80% correct responses for three consecutive days. Upon reaching criterion performance, rats underwent a reversal phase whereby the food reward was placed in the opposite choice arm for 10 consecutive trials daily. Again, animals were trained to a criterion performance of three consecutive days with at least 80% correct responses. Finally, animals underwent a second reversal phase during which the food reward was placed in the initial location. Results indicated that all rats were able to acquire the first and second reversal phases of training adequately. There were no significant differences in the days to reach criterion for either reversal. However, SS and SSBN.13 animals exhibited a significant amount of perseveration compared with BN animals as evidenced by significantly fewer correct responses on the first days of the reversal and second reversal phases of training. Results indicate that introgression of BN chromosome 13 onto the genetic background of the SS parent strain selectively rescues some learning deficits while sparing others. The current study demonstrates the potential application of consomic animals for the behavioral characterization of disease strains. Further, consomic technology may be useful in gene or pathway identification in such models.