

BEHAVIORAL AND PHYSIOLOGICAL PHENOTYPE OF THE VIABLE YELLOW MOUSE (A^{vy}/a)

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ABSTRACT

Epigenetics is the study of how heritable phenotypes are transmitted without changes being made to the DNA sequence. One of the best characterized animal models for epigenetics is the viable yellow (A^{vy}) mouse. These animals exhibit a range of coat colors that reflect the degree of methylation of an intracisternal A particle (IAP) inserted in the *agouti* gene. Yellow coat color A^{vy} mice, with an under-methylated IAP, exhibit altered expression of the *agouti* gene, which leads to obesity and diabetes; in contrast, brown A^{vy} siblings, with a highly methylated IAP, and black (a/a) pelage siblings, lacking the IAP, remain healthy. Along with overt phenotypic differences, epigenetic modifications are also thought to change normal behaviors. Here, we examined whether behavioral and body weight differences exist between brown and yellow morph (A^{vy}/a) and black pelage (a/a) mice as they age. In another experiment, a diet high in methyl donors was fed to the A^{vy}/a mice to determine if it would have an effect on coat color, weight, and/or diabetic status. We demonstrated that there are body weight and behavioral differences between *non-agouti* and *agouti* mice. Yellow mice were more lethargic and less motivated to complete the mazes compared to darker furred mice. Brown and black mice outperformed their yellow counterparts in almost all mazes and weighed less by puberty. Caloric differences in the diets explain most phenotypic differences seen in the mice but not in the increase in serum glucose concentrations in mice on the methyl-donor diet.