

Effect of serotonin imprinting on the development of the brain serotonergic system in chickens

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Introduction:

Serotonin (5-HT) prenatally acts as a neurogenic compound to regulate brain development and postnatally as a neurotransmitter to regulate multiple physiological functions including aggression.

Objectives:

The aim of this study was to examine the molecular mechanism of 5-HT imprinting-induced changes of chickens' behaviors.

Results:

Three dosages (saline, 10 ug 5-HT, 20 ug 5-HT) were injected into Dekalb XL (DXL) eggs before incubation. Samples were collected at embryonic 12th day. In the raphe nucleus, the location of 5-HT neurons, the mRNA expression of 5HT1B receptor was significantly increased in the 20 ug 5-HT group but not the 10 ug 5-HT group. The mRNA expression of 5HT1A receptor was also double in the 20 ug 5-HT group compared with the control group. There were no treatment effects on the mRNA levels of 5-HT transporter and tryptophan hydroxylase 2. In the hypothalamus, both 5HT1A and 5HT1B receptor mRNA expressions were doubled in the 20 ug 5-HT group compared with the control group. The data indicate that 5-HT imprinting activates the 5HT1A and 5HT1B receptor-mediated autoregulatory pathways to regulate the serotonergic system development during the early embryonic stages, which may contribute to the reduction of aggression found previously in the 5-HT imprinted hens.

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