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Title: Identification and remote regulation analysis of super enhancers associated with body fat traits in broilers

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Abstract

Statement of the Problem: Excessive accumulation of body fat (especially abdominal fat) is a prominent problem in broiler production, and it is mainly caused by abnormal regulation of gene transcription. Recent studies have identified a large number of enhancer-enriched transcriptional regulatory regions on chromosomes, called "super enhancers". Super enhancers are important for the transcriptional activation of many tissue-specific genes, but research on super enhancers related to body fat in broilers is still in a gap.

Clinical Practice: In this study, we used broilers of 7 weeks of ages from the 23rd generation of Northeast Agricultural University broiler lines divergently selected for abdominal fat content (NEAUHLF) as the research material, and used ATAC-seq technology to find the chromatin open regions of abdominal adipose tissue, and used Chip-seq data (histone modifications of CTCF, H3K27ac, H3K4me1, H3K27me3) to define the promoters, and Hi-C technology was used to identify the transcriptional regulatory relationships between super enhancers and distant target genes.

Conclusion & Significance: In recent years, an increasing number of studies have focused on the specific mechanisms by which enhancers alter the spatial conformation of chromatin and thereby regulate gene transcription at a distance. In this study, we used a multi-omics method to analyze the chromatin conformation as a hub linking enhancers and transcriptional regulation, and analyzed the specific regulatory mechanisms of super enhancers affecting broiler body fat deposition from a unique perspective of three-dimensional genome, and the results provide important information for revealing the molecular mechanism of body fat formation in broiler chickens.

Biography

: Linyong Shen is a Ph.D. student under the direction of Prof. Hui Zhang. Hui Zhang is a professor and doctoral supervisor of Animal Science and Technology College, Northeast Agricultural University. She is a backbone of the Key Laboratory of Chicken Genetic Breeding, Ministry of Agriculture and Rural Affairs, and mainly responsible for the construction of statistical genomics platform. Currently, she is an expert of Heilongjiang Modern Agricultural Industry Technology Cooperative Innovation Extension System (poultry system). She is the director of both Poultry and Animal Genetics and Breeding conferences of the Chinese Association of Animal Science and Veterinary Medicine.