

Genome-wide transcriptomes integrate animal intra- and inter-organism processes and evoke the eco immunological concept in animal health

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Abstract

Whereas classic immunology deals with animal health primarily in the immune system of a laboratory-based animal species, the emerging discipline of ecoimmunology seeks to understand bona fide immune reactions integrating into intra-organismic systems and interacting with ecological and even evolutionary processes. In this context, non-bias transcriptomic analyses, such as RNA-Seq, provide genome-wide gene expression profiles underlying versatile interaction of the immune system with other systems at intra and inter-organismic levels. For example, our transcriptomic analysis of porcine macrophages at different activation statuses in response to a viral infection, not only revealed differential expression of multiple immune gene families but also highlighted the involvement of lipid metabolism and even circadian rhythm genes linking to neuroimmune regulation. In addition, our RNA-Seq data in ileal samples of obese rats induced using high-fat diet plus an adenoviral infection showed that not only genes in lipid metabolic pathways but genes in endocrine and immune systems were significantly differentially regulated. Moreover, gene ontology (GO) analysis of the rat ileal RNA-Seq data also revealed that signaling pathways involved in multi-organism interaction were significantly altered in the obese animals, indicating that inter-organism processes (such as gut microbiota alteration) provoke the development of obesity. In sum, as multifaceted interactions centered on immune responses may be intuitive and highlighted in other related studies in animal health, genomewide transcriptomic analyses provide a non-bias quantifying approach for studying multi-system integration, which may elicit mechanistic studies and therapeutic strategies pertinent to the discipline of eco immunology.

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Yongming Sang has completed his DSc and PhD at Nanjing Agricultural University and Kansas State University, respectively. He is a principal investigator an Assistant Professor currently at Kansas State University. He has

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