# The Effects of Heat Stress on the Immune Function and Morphological Structure of Avian Gut-associated Lymphoid Tissues

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High ambient temperature increases susceptibility to infections caused by enteric pathogens, such as Salmonella spp. in broiler chickens. Among numerous factors involved in immune activation and regulation, secretory immunoglobulin (Ig), especially IgA, has been known to play a key role in the gastrointestinal tract in protecting the tissues from pathogen-medicated functional disorder. However, knowledge of the effect of heat stress (HS) on the gastrointestinal Ig production in chickens remains obscures. This study investigated the immune function and morphological structure of cecal tonsils and cecal patches, both of which are composed of lymphoid follicles, in broiler chickens reared under either thermoneutral (24.5°C) or HS conditions (34.5°C). Our results revealed that both cecal tonsils and cecal patches displayed severe depression of Bu1+ B cells and CD3+ T cells including CD4+ T cells and CD8+ T cells in the HS conditions. HS also caused a hypoplasia of germinal centers in cecal tonsils, wherein mature B cells differentiate into plasmablasts undergoing Ig class-switching. In contrast, such morphological structure necessary for B cell differentiation was maintained adequately in the cecal patches even under the HS conditions. Due to the resistance of cecal patches to HS, the production of IgM, IgA and IgY in the gastrointestinal tract of heat-stressed chickens was sufficiently sustained at same level as those of thermoneutral chickens. These findings suggested that the breeding and/or feeding strategy to preserve the immune function and morphological structure of cecal patches may be useful to maintain the health of chickens in the HS conditions.