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TLR-mediated immune modulation of chicken macrophages by *Saccharomyces boulardii*

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Macrophages are professional phagocytic cells that play critical roles in activating immune responses of the host. It is possible that macrophages are targeted by microbes to modulate these responses. Here we demonstrate that lipopolysaccharide (LPS), *Saccharomyces boulardii* (Sb) altered the phenotype and biological functions of avian macrophages. Using scanning electron microscopy, we showed that the altered morphology was due to the direct attachment of Sb on the surface of chicken macrophages. Additionally, transmission electron microscopy revealed the efficient engulfing and degradation of Sb. In an effort to demonstrate immunological changes in responses to these stimuli, we observed that LPS could induce higher gene expression levels of surface markers (CD40, CD80 and CD83), cytokines (IL-6 and iNOS), TLRs (TLR1, TLR4 and TLR15) and associated factors (MyD88, TRAF6, NF- κ Bp65 and JNK) in chicken macrophage compared to Sb. On the other hands, Sb could decrease the response of macrophage to LPS by TLR signaling pathway. Conclusively, these results emphasize a potentially important role of *Saccharomyces boulardii* in modulating immunological functions of chicken macrophages by TLR signaling pathway.

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