

## Kinetic characteristics of Lipopolysaccharide-induced immune response in chicken

*Kinetische Charakteristika einer Lipopolysaccharid induzierten Immunantwort in Hühnern*

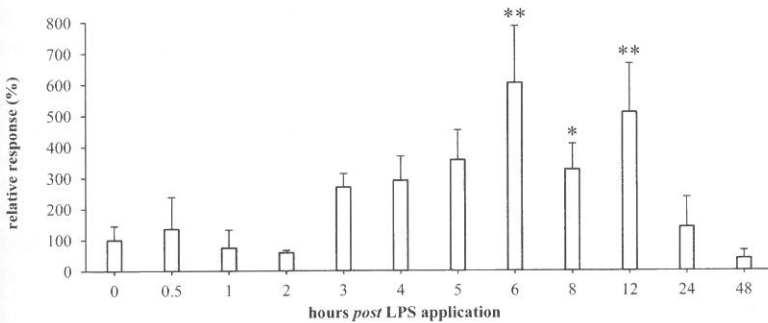
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The aim of the present study was to identify suitable immunologic and hematologic parameters and relevant points in time indicative for an inflammatory response of laying hens in a lipopolysaccharide (LPS) challenge model. In additional future work to (1), different genotypes of laying hens will be compared for their immune responses under nutritive stress conditions. Therefore, we investigated the time course of the inflammatory response in laying hens triggered by exposure to LPS.

**Methods:** Innate immune reaction in 49-week old Lohmann Brown hens (n=36) was induced by intramuscular application of 2 mg LPS (*Escherichia coli* 0111:B4)/kg body weight. Blood was taken directly after slaughtering at different points in time (0, 0.5, 1, 2, 3, 4, 5, 6, 8, 12, 24 and 48 h) and was analyzed for total leukocytes counts and differential cell counts. For evaluation of the redox response the oxidative damage was investigated in plasma via lipid peroxidation, total antioxidative capacity and the production of nitrogen oxides. Clinical characteristics were recorded frequently for 7 h *post* LPS. ONEWAY ANOVA analysis was performed for the factor time using STATISTICA.

**Results:** Leukopenia started after 0.5 h with lowest value at 3 h, and returned to base levels after 5 h with a second decrease at 8 and 12 h due to heterophilia reaching highest value at 5 to 6 h and returning to initial levels then. Lymphopenia occurred after 3 h and started returning to initial levels from 12 h *post* LPS. Clinical symptoms such as ruffled feathers, reduced activity up to somnolence, and anemic wattles occurred within 6 h *post* LPS. Body temperature decreased within 2 h from initially 41.1 °C to 40.4 °C at 2 h, and returned to initial value. Antioxidative capacity was transiently decreased at 2 h to 5 h and then returned to base levels. Lipid peroxidation decreased from 1 h *post* challenge and remained low (both no significance). Nitrite concentrations in blood plasma (Figure 1) increased within 6 h *post* LPS up to 600 % of initial value of 7.6 µM at 0 h.

**Figure 1** Change in nitrite (NO<sub>2</sub>) concentrations in blood plasma relative to starting point over time. Columns represent means (+ SD) of 3 animals at each time. (Dunnett *post hoc* test \* p<0.05; \*\* p<0.001)



**Conclusion:** Maximal immune response of adult laying hens was detected within 6 h *post* LPS challenge for most of the investigated parameters. Analysis of white blood cells and recording of clinical symptoms are useful tools to display the course of inflammatory response in chicken. Determination of nitrite and antioxidative capacity in blood plasma seem to be suitable parameters to show redox response after immune stimulation, while under given conditions lipid peroxidation seems to be not. These findings will determine the time course for the main trial.

Lieboldt MA, Halle I, Frahm J, Schrader L, Weigend S, Preisinger R and Dänicke S (2015): *J Poult. Sci.*, published online. DOI: 10.2141/jpsa.0150067

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