Thermal and Metabolic Biphasic Response to LPS in Chicks

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Introduction: Severe inflammation may induce body temperature (Tb) reduction instead of fever. In this situation, morbidity and mortality is generally higher. In mammals, based on experimental models of rats injected with endotoxin (LPS), a biphasic thermal response is suggested to be a regulated process. The initial Tb reduction, which avoids tissue hypoxia and damage because of reduction in O_2 demands, is followed by fever, which is considered to be a beneficial response when the LPS concentrations become lower throughout the time. In fact, different humoral pathways are involved in each thermal response, as for example, cyclooxygenase (COX)-1 in the Tb reduction and COX-2 during fever. The demonstration of such phenomenon in other species is important for supporting the adaptive nature of thermal responses to systemic inflammation. In this context, birds are the other endothermic vertebrate group besides mammals, which deserve investigation.

Objective: To use a precocious bird as animal model for investigating: 1) the effect of COX-2 and COX-1 inhibition on Tb changes induced by LPS; 2) the metabolic response to LPS under other two challenging conditions for O_2 demand such as food deprivation and cold.

Material and Methods: Five-day old chicks (*Gallus gallus*; ~100 g) injected with LPS (100 µg/kg, IM) decreased (-1.0±0.0ºC) and increased Tb (+0.9±0.2ºC) 1h and 4h after injection, respectively.

Results: The selective COX-2 inhibitor (SC-236, 1.25 mg/kg) caused no change in the initial Tb fall but attenuated the subsequent fever. In contrast, SC560 (selective COX-1 inhibitor; 1, 2.5, 5 mg/kg) did not affect the Tb reduction, but the lower doses induced a faster increase of Tb after 2h of LPS injection. Regardless the feed (food deprived or not) and thermal (cold-25ºC or neutral-30ºC) conditions, O_2 consumption was reduced 40-60 min after LPS injection, coinciding with Tb falling. The febrile response, however, was affected by cold and fasting as Tb increase was inhibited despite of no change in O_2 consumption. **Conclusions:** Thus, our preliminary results suggest that, similarly to rats,

the febrile response to LPS is affected by other O_2 demands and may be modulated by COX-2 dependent pathways. In contrast, the initial thermal and metabolic decreases of Tb seem not to be affected by competing O_2 demands and is independent of COX-2 activity.

Keywords: Thermal, Metabolic Biphasic Response, inflammation, chikens, rats, Temperature, febrile response