



# Inhibition of Cyclooxygenase Contracts Chicken Ductus Arteriosus

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## Keywords

Ductus arteriosus · Prostaglandin · Chicken

Ductus arteriosus (DA) is an essential fetal artery that connects the main pulmonary artery and the descending aorta. Mammalian DA closes right after birth through vasoconstriction via a decrease in circulating prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) [1]. Avian DA also closes after birth although avians have no placenta that is a source of PGE<sub>2</sub> in mammals. Previous studies have demonstrated that the PGE<sub>2</sub> signal pathway is not involved in the constriction of isolated chicken DA [2]. However, the in vivo effect of PGE<sub>2</sub> in avian DA has been little investigated.

We first measured blood concentration of PGE<sub>2</sub> in chicken at embryonic day 19 (just before hatching) by enzyme immunoassay to confirm whether PGE<sub>2</sub> circulated in the chicken blood during a perinatal period. Plasma PGE<sub>2</sub> was significantly high in chicken compared to rat. PGE<sub>2</sub> was strongly produced in chicken DA compared to chicken aorta and rat DA. Next, we determined the expression of prostaglandin E receptors (EP1, EP2, EP3 and EP4) in chicken DA. EP2 and EP3 receptors in fetal chicken DA were significantly higher than that of fetal chicken aorta. Especially, the EP2 receptor was significantly up-regulated before hatching and down-regulated after hatching. Finally, we performed a rapid whole-body freezing method to evaluate DA closure in vivo. We measured the internal diameter of DA two hours after in ovo injection of indomethacin, which is a non-selective cyclooxygenase inhibitor. Indomethacin constricted chicken DA at embryonic day 19 but did not constrict chicken aorta. These data suggest that, similar to mammals, PGE<sub>2</sub> acts as a vasodilative factor on DA closure in avians.

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We demonstrated that factors of the PGE<sub>2</sub> signal were detected in chicken DA and inhibition of cyclooxygenase contracted chicken DA. We concluded that the PGE<sub>2</sub> signal may play an important role in acute vasodilatation of chicken DA closure.

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