The role of nitric oxide in the cardiopulmonary response to hypoxia in highland and lowland newborn llamas

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 Key points: Perinatal hypoxia causes pulmonary hypertension in neonates, including humans. However, in species adapted to hypoxia, such as the llama, there is protection against pulmonary hypertension. Nitric oxide (NO) is a vasodilatator with an established role in the cardiopulmonary system of many species, but its function in the hypoxic pulmonary vasoconstrictor response in the newborn llama is unknown. Therefore, we studied the role of NO in the cardiopulmonary responses to acute hypoxia in high- and lowland newborn llamas. We show that high- compared to lowland newborn llamas have a reduced pulmonary vasoconstrictor response to acute hypoxia. Protection against excessive pulmonary vasoconstriction in the highland llama is mediated via enhancement of NO pathways, including increased MYPT1 and reduced ROCK expression as well as Ca2+ desensitization. Blunting of pulmonary hypertensive responses to hypoxia through enhanced NO pathways may be an adapt