

# Nitric Oxide and Embryo Development

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Nitric oxide (NO) is a simple combined molecule of oxygen and nitrogen, and has a wide variety of action on the physiological and pathophysiological function of the body. It is a key transducer of the vasodilator message from the endothelium to vascular cells. However, its different roles have been elucidated by numerous researches, which was undertaken in the 80's and 90's. Three types of NO synthase were involved in synthesizing NO and they are identified in different tissues and cells including macrophage, endothelial cells and even tumor cells. In the late 90's, we undertook a number of researches for elucidating the effect of NO on embryo development, since developmentally arrested bovine embryos contained large amount of NO metabolites in their cytoplasm. Subsequently, we found that the addition of a spontaneous NO donor to culture medium markedly inhibited embryo development and that its inhibitory role was independent of embryonic genome activation. Research was focused to find a way to prevent the inhibitory action of NO on embryo development and demonstrated that the addition of hemoglobin, a NO scavenger, to embryo culture medium greatly stimulated *in vitro*-development of bovine and mouse embryos. Based on these research outcomes, we developed a NO action-free culture system for embryos and other tissues. The efficacy of such system has

subsequently been confirmed by achieving the high rates of preimplantation development and blastocyst formation in the NO action-free culture of mouse and bovine embryo. In this article, we briefly introduced the nature of NO and our research outcomes on the role of NO in embryo development.