Effect of nitric oxide synthase inhibitors on ovum transport and oviductal smooth muscle activity in the rat oviduct

S. Perez Martinez, M. Viggiano, A. M. Franchi, M. B. Herrero, M. E. Ortiz, M. F. Gimeno, M. Villalón

Abstract

The effect of the inhibition of nitric oxide synthase (NOS) on ovum transport and oviductal motility in rats was investigated. Three different NOS inhibitors were injected into the ovarian bursa at oestrus or day 3 of pregnancy. Oviducts and uteri were flushed 24 h later and the presence of ova was recorded. In oestrous and pregnant rats, treatment resulted in accelerated egg transport, as shown by a decrease in the number of ova present in the oviducts. In cyclic rats, intrabursal injection of 1 mg kg-1 of either N-monomethyl-L-arginine (L-NMMA) or N omega nitro-L-arginine methyl ester (L-NAME) elicited a 30% reduction in the number of ova present in the oviducts, whereas in pregnant animals, the same dose of L-NMMA produced a reduction of 40%. Simultaneous administration of the NO donor spermine NONOate (5 mg kg-1) completely reversed the effect of L-NMMA. Tubal motility was assessed by microsphere displacement analysis within the oviduct. Surrogate ova were transferred to the oviductal lumen at oestrus and 24 h later the effect of intraoviductal injection of 1 microgram L-NMMA or vehicle was assessed. The microspheres in the isthmus showed an oscillating motion, and periods in which movement was not detectable. However, L-NMMA treatment produced a 3.6-fold increase in the maximum instant velocities and a significant reduction in the resting periods of the microspheres compared with the control group ($P < 0.001$). These results provide evidence that NO inhibition increases tubal motility that results in accelerated ovum transport, and indicate that NO could act as a paracrine signal between different layers of the oviductal wall, providing a role for endogenous NO in regulation of tubal function.