

# In vivo blockade of ovarian sympathetic activity by Neosaxitoxin prevents polycystic ovary in rats

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## Abstract

A high sympathetic tone is observed in the development and maintenance of the polycystic ovary (PCO) phenotype in rats. Neosaxitoxin (NeoSTX) specifically blocks neuronal voltage-dependent Na<sup>+</sup> channels, and we studied the capacity of NeoSTX administered into the ovary to block sympathetic nerves and PCO phenotype that is induced by estradiol valerate (EV). The toxin was administered with a minipump inserted into the bursal cavity using two protocols: (1) the same day as EV administration and (2) 30 days after EV to block the final step of cyst development and maintenance of the condition. We studied the estrous cycling activity, follicular morphology, steroid plasma levels, and norepinephrine concentration. NeoSTX administered together with EV decreased NA intraovarian levels that were induced by EV, increased the number of corpora lutea, decreased the number of follicular cyst found after EV administration, and decreased the previously increased testosterone plasma levels induced by the PCO phenotype. Estrous cycling activity also recovered. NeoSTX applied after 30 days of EV administration showed near recovery of ovary function, suggesting that there is a specific window in which follicular development could be protected from cystic development. In addition, plasma testosterone levels decreased while those of progesterone increased. Our data strongly suggest that chronic inhibition of sympathetic nerves by a locally applied long-lasting toxin is a new tool to manage the polycystic phenotype in the rat and could be applied to other mammals depending on sympathetic nerve activity.

## Keywords

**Author Keywords:** [polycystic ovary syndrome](#); [Neosaxitoxin](#); [norepinephrine](#); [ovulation](#)

**KeyWords Plus:** [NERVE GROWTH-FACTOR](#); [ACTING PAIN BLOCKER](#); [ADRENERGIC-INNERVATION](#); [TESTOSTERONE](#); [ACUPUNCTURE](#); [STIMULATION](#); [INVOLVEMENT](#); [STORAGE](#); [STRESS](#); [TOXINS](#)

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