

NUS-25 The role of nitric oxide on regeneration of paraventricular nucleus and supraoptic nucleus following hypophysectomy

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Introduction: The mammalian neurohypophyseal system exhibits a high degree of structural plasticity and recovery of neuroendocrine function following a broad array of physiological and anatomical manipulations. This study investigates the role of nitric oxide (NO) on neuronal regeneration of paraventricular nucleus (PVN) and supraoptic nucleus (SON) in developing and adult rats.

Methods: NOS expression and neural regeneration on the floor of the third ventricular were detected by using nitric oxide synthase (NOS) histochemistry and scanning electronic microscope (SEM).

Results: Preliminary results have shown that the role of nitric oxide on regeneration of PVN and SON in developing rats seems different from that in the adult. Instead of that the process of regeneration is invariably accompanied by the up-regulation of NOS in the adult, there was no significant increase of NOS activity in SON and PVN neuronal perikarya and neurites in the adjacent median eminence in PN 7, PN 14 and PN 21 rats following hypophysectomy. Despite the fact, large complexes of apparent neurites remained upon the floor of the third cerebral ventricle by SEM in PN 7, PN 14, PN 21 rats by 4 weeks posthypophysectomy as in the adult. It has been also demonstrated that neural regeneration is more robust in the adult than in developing rats by SEM. Most interestingly, we found that the entire process of neurohypophyseal temporary introduction of the antagonist of NOS, L-NAME at 25 or 50 mg/kg per day for ten days immediately after surgery, which is nearly similar in the adult rats those received continuous administration of the NOS inhibitor for 4 weeks after hypophysectomy.

Conclusions: This data suggests that NO is a critical initiator for the process of regeneration and regrowth of magnocellular (SON/PVN) axons into the median eminence regeneration in the adult. Our further study aims at investigating the mechanisms.

*The source of funding is from RGC.