

# Dexmedetomidine alleviates acute postoperative anxiety in rats by suppressing the NF- $\kappa$ B pathway

Si-Wei Wei, Lei Wu, Zhen Xiang, Er-You Yu and Zhen Du\*

Department of Anesthesiology, Hunan Children' Hospital, 86 Ziyuan Road, Changsha City, Hunan, China

**Abstract:** Although the evidence suggests that surgical procedures caused a complex and systemic inflammatory response that can effect the central nervous system and lead to changes in mood and behavior, rarely understood about the role of acute inflammation in promoting acute anxiety postoperatively. This study was designed to explore the possible mechanism of dexmedetomidine (DEX,  $\alpha_2$ -adrenergic receptor agonist) for reducing acute postoperative anxiety in rats exposed to hernia repair surgery, which may be related to the activation of nuclear factor kappa B (NF- $\kappa$ B) and downstream signal pathway in the hippocampus. Experiments were conducted with rat, the elevated plus-maze and open field test were performed to evaluate anxiety-like behavior. Inhibit DEX with Atipamezole (AT,  $\alpha_2$ -adrenergic receptor antagonist) and inhibit NF- $\kappa$ B with Pyrrolidinedithiocarbamate (PDTC, inhibit phosphorylation of I $\kappa$ B, prevent the activation of NF- $\kappa$ B), the level of interleukin-6 (IL-6), IL-1 $\beta$ , IL-10 and Tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ); the nuclear translocation of NF- $\kappa$ B in the hippocampus and anxiety-like behavior were measured. Rats exhibited anxiety-like behavior at 6h and 12h after surgery. Preoperative administration of DEX significantly alleviated postoperative anxiety-like behavior. DEX premedication significantly inhibited the postoperative inflammatory response and NF- $\kappa$ B nuclear translocation increased in the hippocampus. Inhibited the nuclear translocation of NF- $\kappa$ B alleviate acute postoperative anxiety. These findings are the first to show that acute postoperative anxiety may be related to NF- $\kappa$ B nuclear translocation in the hippocampus in rats, which can be alleviated by DEX premedication.

**Keywords:** NF- $\kappa$ B nuclear translocation, Acute postoperative anxiety, Inflammation, Rats, Dexmedetomidine

\*Corresponding author: e-mail: hnsetyymzktg@163.com