Inhibitory effect of SB216763, a selective glycogen synthase kinase-3 inhibitor, on morphine-induced Straub's tail reaction in mice

Junichi Kitanaka¹, Nobue Kitanaka¹, Utau Horie¹, Yumi Kawasaki¹, Takashi Sakamoto¹, Junya Yashiro¹, Koh-ichi Tanaka², Kento Igarashi^{2,3}, Kazuo Tomita^{2,3}, Ami Shiimoto⁴, Kaname Watabe⁴, Kiyoshi Nakano⁴, Hitoshi Takahashi⁴, Nobuyoshi Nishiyama², Tomoaki Sato³, Motohiko Takemura¹

¹Dept. Pharmacol., Hyogo Col. Med., ²Div. Pharmacol., Dept. Pharm., Sch. Pharm., Hyogo Univ. Health Sci.,

³Dept. Applied Pharmacol., Grad. Sch. Med. & Dent. Sci., Kagoshima Univ., ⁴Muromachi Kikai, Co., Ltd.

Background: Straub's tail reaction (STR) is a dorsiflexion of the tail that is often vertical to the orientation of the body or curling back over the animal. The phenomenon is thought to be mediated by activation of the opioid receptors because opioid receptor antagonists such as naloxone block the phenomenon. The endpoint of the STR can be identified easier than that of locomotor activity, but behavioral measures of STR can only be achieved by skilled observers. **Methods:** In this presentation, we investigated the measures of STR by using newly modified, infrared beam sensor-based automated apparatus. The positive tail response was considered as a persistent elevation of the tail at an angle more than 45°. **Results:** Mice treated with a single injection of morphine (30 mg/kg) showed a significant STR with a plateau level at a time point of 20 min after morphine challenge. Pretreatment of mice with a selective glycogen synthase kinase-3 inhibitor SB216763 (0.5 mg/kg) significantly inhibited morphine-induced STR and attenuated the time of STR duration. Horizontal locomotor activity was also attenuated by SB216763. It is of interest to note that mice showing the STR did not exhibit rearing, a search phase of exploratory behavior. **Conclusions:** Although the underlying mechanism is not clear, this data suggests that the inhibitory effect of SB216763 on morphine-induced STR may depend on the blockade of the glycogen synthase kinase-3 signaling pathway. Our measurement system is a useful tool for investigating the excitatory effects of morphine in experimental animals.