

## [2P]60 社会行動

2024年7月25日(木) 12:50 ~ 13:50 ポスター会場 (マリンメッセ福岡 B館)

### [2P-229] 単独での長期自発運動がラットの共感的行動と共感関連神経系の反応性に及ぼす影響

\*丸山 拓実<sup>1</sup>、森岡 文<sup>1</sup>、久保田 夏子<sup>1,2</sup>、北 一郎<sup>1</sup> (1. 東京都立大学大学院人間健康科学研究科、2. 東京国際大学)

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Empathy is the ability to share and understand the emotional states of others, and essential for successful social interaction and group formation. Exercise and physical activity may be considered as one of the strategies to effectively enhance or develop the ability of empathy, because these are known to induce various plastic changes in the brain and improve brain functions. However, most studies have investigated the effects of group-exercise, but not solo exercise, on various brain function. Thus, it remains unclear how solo exercise affects empathic response and responsiveness of empathy-related neurons. Here, we compared the effects of long-term voluntary exercise alone and the group-exercise on empathic behavior (emotional contagion) and the responsiveness of empathy-related neurons in the rats exposed to anxious conspecific. Male rats (Wistar/ST, 6wk old) were divided into four groups (S-Ex: solo exercise, G-Ex: group exercise, S-nEx: individual rearing without exercise, G-nEx: group rearing without exercise / these called "observer"). Rats in Ex group (i.e., S-Ex and G-Ex) were individually or group housed in the cage with running wheel for 4 weeks, while rats in nEx group (i.e., S-nEx and G-nEx) were individually or group housed in a normal cage. After 4 weeks of rearing, observer rats in each group were faced for 20 min to unfamiliar rats demonstrating freezing behavior due to contextual fear conditioning, and the freezing time of the observer rats was measured for 20 min to evaluate empathic behavior. We then removed the observer's brain and assessed neuronal activity of empathy-related neurons, including oxytocin (OXT) neurons and CRF neurons in the hypothalamic paraventricular nucleus (PVN), as well as neurons in the central nucleus of the amygdala (CeA) using c-Fos immunohistochemistry. Freezing times for observers in both Ex groups were significantly longer than those in their respective nEx groups, although the freezing time in S-Ex was significantly shorter than that in G-EX. Neuronal activity of the empathy-related neurons in Ex groups was higher than those in nEx groups, although group exercise tended to enhance the neuronal activity compared to solo exercise. These results suggest that long-term exercise, even if solo exercise without social interaction, could promote empathic response to unfamiliar others via increased responsiveness of empathy-related neurons.