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Establishment of meteoropathy model mice

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Changes in barometric pressure, humidity or other weather phenomena sometimes induces pain symptoms in the patient with arthritis, chronic pain, or headache. However, there is no highly valid model animals focusing on weather-related pain. Here, to establish meteoropathy model mice, we investigated the relationship between barometric pressure fluctuation and the changes in headache-related factors. To reproduce the changes of weather, we made a climatic chamber that can change atmospheric pressure and measured the change in cerebral blood flow by using the implantable CMOS imaging device for detecting hemodynamic signal in freely moving mice. During the low atmospheric pressure periods, implantable CMOS imaging device detected the CBF increase in both male and female C57BL/6J mice. Although CBF gradually recovered to the basal level after barometric pressure was return to the previous level, there was no differences in the CBF changes between male and female mice. However, the number of delta-FosB-positive cells, which indicates neuronal activity, in the primary somatosensory cortex was higher in female than in male mice. Although barometric pressure fluctuation did not change the expression level of AQP4 mRNA in both male and female mice, it increased the expression level of AQP4 protein in female, but not, male mice. These results indicate that female rather than male mice, is highly valid meteoropathy model animals.