Topics

# Influence of Negative Air Ions on Drivers

Kiyomi Sakakibara, Research-Domain 17

Negative air ions are observed at a high concentration level in places such as near a waterfall and in a forest. Some studies have demonstrated that negative air ions have positive effects on human performance and mood[1, 2]. The purpose of the present study was to investigate the influence of negative air ions on a driver's mental stress and fatigue.

Two kinds of driving-task loading, produced by a simple driving simulator (**Fig. 1**), have been conducted for this purpose. Sensory evaluation of mental strain and fatigue, adrenaline in the urine and driving performance were observed. Adrenaline in the urine is a biochemical index of fatigue. Driving-task 1 was the task that required continuous mental strain. Subjects were required to drive as exactly as possible on a circular course at a steady high speed of 120 km/hr for 50 minutes. Six male subjects participated in the experiment of driving-task 1.

In driving-task 2, subjects were required to perform two tasks. The primary task was to drive at a steady speed of 40 km/hr for 60 minutes. For the secondary task three light emission diodes (LED) were located on the left side, right side and upper center of the CRT display. Two hand-switches were placed on the left side and on the right side of the steering wheel. A foot-switch was put in the position of the accelerator pedal. The secondary task was to push the corresponding switch as fast as possible when one of the three LEDs was turned on. Fourteen male subjects participated in the experiment of driving-task 2.

Both for driving-task 1 and driving-task 2, every subject underwent two repetitions of the experiment, and the data observed in the negative air ion environment, 10,000 ions/cm$^3$, were compared with that observed in a natural air environment (control).

As a result of driving-task 1, there was no difference between the negative ion condition and the control condition in sensory evaluation. However, the adrenaline level after driving was lower under the negative ion condition than that under the control condition (**Fig. 2**). In driving-task 2, there was also no difference in sensory evaluation. The adrenaline level after driving was also lower under the negative ion condition. In addition, misses in detecting the lighted LEDs during 10 minutes from the beginning was decreased for 57 % of the subjects under the negative ion condition (**Fig. 3**). These results show that negative air ions can improve fatigue and cognition of the drivers.

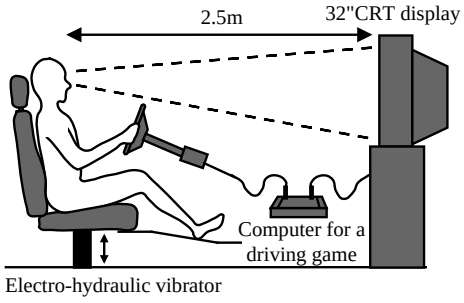


**Fig. 1** Driving simulator for the driving-task loading.

## References

1) Hawkins, L. H. and Barker, T. : "Air ions and Human Performance", Ergonomics, 21-4(1978), 273-278
2) Tom, G., Poole, M. F., Galla, J. and Berrier, J. : "The Influence of Negative air Ions on Human Performance and Mood", Human Factors, **23**-5(1981), 633-636

(Report received on Dec. 19, 2001)

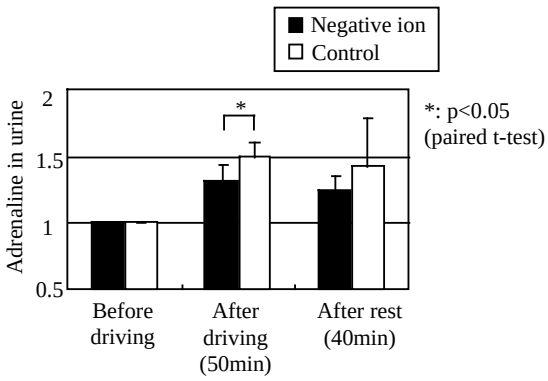


**Fig. 2** Adrenaline levels in the urine (mean with SEM) in driving-task 1 loading.

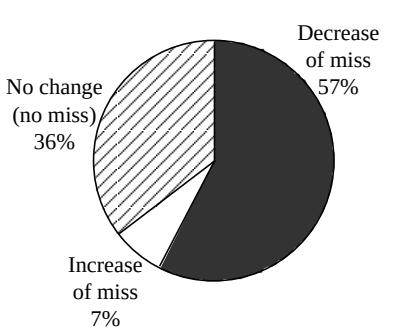


**Fig. 3** Effect of negative ions on miss of detecting lighted LED during 10 minutes from the beginning in driving-task 2 loading.