

## Effects of bathing on concentration of minerals in sea water

Tomihiko Shimizu, *Joetsu University of Education*

Mitsuo Kosaka, *Nagasaki University*

Kazutaka Fujishima, *Kyushu University*

### Summary

The purpose of the present study was to compare thermal responses of the body between bathing in warm sea water and further to examine effects of concentration of chemical components in sea water affect thermal responses of the body when bathing in warm sea water. The thermal responses were based on the examination of taking rectal, skin, and mean body temperatures in bathing and recovery on land. Eight healthy men were the subjects in this experiment, and they were in average  $19.8 \pm 1.0$  in age,  $169.2 \pm 5.0$ cms in height,  $57.1 \pm 3.1$ kgs in weight, and  $14.0 \pm 2.6\%$  in fat. The subjects bathed in sea water and fresh water for 15 minutes and took recovery on land for 60 minutes respectively. The experiment was tested under water temperature at  $38.5^\circ\text{C}$  during bathing. The conditions of concentration of chemical components in sea water were 7, 3.5, 1, 0%.

For all the subjects, the rectal temperature increased during bathing and decreased gradually during recovery on land. Bathing in sea water statistically showed significant increases of rectal temperature at 15 minutes during bathing. It was constantly higher at  $7 > 3.5 > 1 > 0\%$ . The mean skin temperature showed a continuous increase during bathing and showed a rapid decrease during 5 minutes in recovery on land, and a gradual decrease after then. No statistically significant differences were detected in the mean skin temperature between 7, 3.5, 1 and 0%. The mean body temperature also showed a continuous increase during bathing and showed a rapid decrease during the 10 minutes in recovery on land, and a gradual decrease after then. In bathing in sea water the mean body temperature statistically showed significant increases during bathing.