

## 14. Studies of the Health Effects of a Deep Sea Water Bathing Plant

○Tetsuo SHIMMURA

(Department of Epidemiology and Health Policy,

Graduate School of Medicine and Pharmaceutical Sciences, University of Toyama)

**1. Introduction:** Utilizing the characteristics of deep sea water, "Deep Sea Water Experience Plant THALASSOPIA" was opened in Namerikawa City, Toyama, Japan as the world's first 100% deep sea water bathing plant in 1998, celebrating its 20th anniversary this year. We have studied of the health effects of using deep sea water at the University of Toyama and the Toyama Institute of Health. The aim of this paper is to report the results from our studies and discuss future issues.

**2. Thermal effect of deep sea water bathing:** Nine healthy males sat in warm bath water that consisted of deep sea water, surface sea water and tap water, at 41 degrees C for 6 minutes and rested for 6 minutes thereafter. These were repeated three times, with the sitting position in an empty bath as the control. Skin temperature at the waist and thigh before bathing, immediately after bathing and after rest, at 15 minutes and 30 minutes were measured using thermograph. At all time point, skin temperature after deep sea water bathing was the highest, followed by surface sea water and tap water. This result suggests that deep sea water bathing is more likely to warm a human body as compared with bathing in surface sea water or tap water, and deep sea water bathing has a thermal effect which cools down at a slower rate. In a warm bathing experiment for 9 other late night workers, the participants felt "vigor" after deep sea water bathing in a mood survey and reported "better" in falling asleep in a sleep questionnaire survey.

**3. Diet effect of deep sea water exercise bathing:** We studied the effects of walking exercise bathing for 15 minutes using an underwater treadmill in deep sea water at 34 degrees C for 9 middle-aged and elderly males and

compared with tap water. Compared with tap water bathing, deep sea water bathing caused higher oxygen consumption and deep body temperature, and the movement in deep sea water required more energy than other types of water, and it was therefore considered to be an efficient exercise therapy.

In order to examine effects of long-term continuous exercise bathing at the deep sea water plant, we examined middle-aged obese people. Three months of exercise bathing in deep sea water reduced weight and abdominal circumference, strengthened lower limb muscular strength, and had effects on biochemical indicators such as increase in serum HDL cholesterol and decrease in HbA1c. These results suggest that exercise bathing in deep sea water is effective against metabolic syndrome.

**4. Improvement of QOL and skin condition by deep sea water exercise bathing:** We examined the influence on health-related QOL as a result of long-term continuous exercise bathing using deep sea water. We found that the QOL of obese participants improved. Regarding the influence on the skin, many of the participants indicated that the skin condition improved in a questionnaire survey.

**5. Future issues:** Although we have reported the health effects of using deep sea water, the relation between the effects and the chemical composition of deep sea water have not yet been elucidated. Also, we must study the management aspects of the deep sea water plant. It could be used for health and welfare service including rehabilitation services for disabled people as well as the elderly and the health-related tourism.