



Fully Automated Monitoring System of Health Status in Daily Life

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● Research Topics

It is important to obtain information for detecting the diseases in its early stage and for keeping the health of the daily life. For this purpose, it is desirable to measure physiological and vital signs without attaching any biological sensors to the body during the measurement. Therefore, fully automated measurement is needed, and any procedures and operations of the subjects are not required so that data acquisition is made in a non-conscious manner.

The "Welfare Techno House" (WTH) is an advanced and experimental house for research development to evaluate the devices, instruments and systems for welfare and home health care. In the WTH, three automated monitoring systems are installed as below.

1) Monitoring in lavatory: A measuring platform for body and excreta weight that was installed with highly accurate load sensors, was placed on the floor adjacent to the toilet bowl. It also supported the toilet seat so that the load sensors can detected the total body weight whether the subject is standing or sitting on the seat.

2) Monitoring in bathtub: ECG was obtained from three Ag/AgCl plate electrodes attached to the bath wall. The subject relaxed in the bathtub so that the hot water covered both shoulders.

3) Monitoring in bed: ECG was obtained during sleep by placing the conductive textile electrodes in bed. The textile electrodes are placed on the pillow

and the lower part of the bed sheet where the feet are positioned.

The body and excreta weights were successfully measured in a non-conscious and automatic manner. The excreta weight is determined by the difference of the body weight change during urination between starting and finishing points of urination. Body weight changes during urination in young and elderly subjects were compared. A tendency was observed that, compared to young subjects, the period of urination was longer and the urine weights were less in elderly subjects.

ECG signal detected by the bathtub electrodes was clearly recorded in spite of some movements of body in hot water. Comparison of the ECG recorded with bathtub electrodes between young and elderly subjects shows that the heart rate was relatively higher and the amplitude of ECG was smaller in elderly than those of the young.

The ECG was successfully obtained during sleep by the textile electrodes. However, in some cases, the waveform became difficult to recognize by movement and artifacts of subject. In one night of ECG recording in bed, the ratio of the period having recognizable ECG waveforms was approximately 80 to 90 percent of the total sleeping period in both elderly and young subjects.

The three monitoring systems described above are integrated by a PC and the determination of the start and the end point of measurements in the entire procedure and the data storage are performed automatically without any operation.

● Results in Collaboration with Society

Joint Research with other institutions, including industrial private sector institutions is expected.