

gastrography (EGG) simultaneously with ultrasonography, and studied the relationship between EGG and actual gastric contraction. Method: Antropyloric movement was recorded in a control group of 7 healthy subjects and in an electroacupuncture group of 7 healthy subjects. We measured the period/cross-section/amplitude of the gastric antrum from ultrasonographic imaging, and read the peak frequency from EGG. Results: The period of antropyloric contraction was shortened significantly by electroacupuncture ( $p < 0.05$ ). Neither the contractile amplitude index nor the change in the cross-section of the gastric antrum differed between the two groups. In several cases, antropyloric contraction frequency did not coincide with the EGG peak frequency. Conclusion: Electroacupuncture on zusanli (stomach-36) strengthened gastric movement by quickening the period of antropyloric contraction. EGG frequency does not precisely reflect actual post prandial gastric contraction.

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## #9

### Effect of microbubble bathing on hemodynamic change and thermoregulatory function

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We studied the effect of microbubbles (50–100  $\mu\text{m}$  in diameter) in bathing on human hemodynamic and thermoregulatory function. The subjects were 9 healthy swim-suited women in their 30s who provided informed consent. After 10 min of rest, they bathed in normal water (NW), microbubbles (MB), or water with dissolved bath powder (BP) for 15 min, then rested for 30 min. The subjects' tympanic temperature (Tty), skin temperature (Tsk), skin heat flow (SHF) detected by a heat flow sensor, heart rate (HR) detected by electrocardiography, and skin blood flow (SBF) detected by a laser Doppler flowmeter were monitored throughout the experiment. Tty decreased slightly just after MB bathing, but increased under all conditions, and was significantly lower in BP than in the other conditions. SHF in MB was significantly higher than in NW. The high frequency (HF) component of HR variability (0.15–0.4 Hz) rose significantly higher than the resting level at 10 min after bathing, while the ratio of LF to HF (LF/HF) decreased compared to the resting level. The theoretical simulation of microbubbles heat conductance showed that the insulation of microbubbles was disregarded. SHF was higher in MB than in NW, and the Tty increase in MB was lower than in NW. The improvement in thermal conductance after

MB bathing appeared to be due to enhanced SHF in MB more than in NW. We concluded that microbubble bathing provides more comfort and relaxation than the other bathing conditions tested.

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## #10

### Levels of thermal sweating and superficial sensation in patients with localized spinal lesions: A study of the preganglionic segmental innervation responsible for thermal sweating

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To elucidate the innervation of sweat glands by spinal preganglionic segments, we performed a colorimetric thermal sweat test in 26 patients with localized spinal cord lesions excluding the cervical cord. In 22 patients, sweat volume was recorded mainly on the forearm and the leg with a capacitance hygrometer. Thermal sudomotor levels (TSL), determined according to the closest sensory dermatome level, were compared with superficial sensation levels (SSL).

In 2 out of 3 patients with SSL at T3 or T4, the TSL corresponded roughly to the SSL, while the other patient sweated from the face to C4 level on one side and exhibited anhidrosis in other parts the body. Four patients with SSL at T5 to T8 had TSL at 0–6 segments below the SSL. Nineteen patients with SSL below T9 exhibited a large variation of TSLs: some had TSLs in the same dermatome as SSLs, and two patients exhibited generalized discoloration. In seven of these 19 patients, the sweat volume of the leg was within the normal range, and two of them exhibited focal hyperhidrosis in the lumbosacral region. In three of the patients SSL was symmetrical, but TSL was asymmetrical. Anhidrosis of the upper extremity was seen in one patient with SSL at T3.

These results together with a literature review suggested the following: 1) the skin area innervated by each preganglionic segment is wider than the corresponding sensory dermatome, 2) the areas innervated by the upper thoracic, the lower thoracic and the lumbar segments differ considerably from the corresponding sensory dermatomes, and 3) the precise segmental sudomotor innervation of the lumbosacral region remains to be clarified.

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