

## Development of a new method for small bowel transit study

Guang-Uei HUNG,\* Chien-Chung TSAI\*\*,\*\* and Wan-Yu LIN\*\*\*\*

\*Department of Nuclear Medicine, Changhua Christian Hospital, Changhua, Taiwan

\*\*Department of Radiology, Tainan Municipal Hospital, Tainan, Taiwan

\*\*\*Department of Radiology, Tian-Sheng Memorial Hospital, PinTung, Taiwan

\*\*\*\*Department of Nuclear Medicine, Taichung Veterans General Hospital, Taichung, Taiwan

**Background and Purpose:** Currently, most studies combine the small bowel transit examination with gastric emptying time examination. There are significant drawbacks to this method. The radiotracer does not enter the small intestine in a bolus and the starting time for transit in the duodenum is difficult to define. This makes the result unreliable. In this study, we used a commercial enteric capsule containing radioactive charcoal to solve these problems. **Materials and Methods:** Activated charcoal powder was mixed with Tc-99m pertechnetate and loaded to the enteric capsule which can resist gastric acid and dissolve only in the small intestine. *In-vitro* stability experiment was performed by immersing these capsules in a colorless phosphate buffer of variable pH which mimicked the condition in stomach and small intestine. In addition, ten healthy Chinese volunteers were included for *in-vivo* experiment. Anterior and posterior views of abdomen were obtained at regular 30-minute intervals until the eighth hour after administration of the radioactive enteric capsule. Small bowel transit time was calculated. **Results:** The enteric capsule remained intact for at least 480 minutes in the solution mimicking gastric content (pH = 3.0) and disrupted at a mean duration of 227.2 minutes at a pH of 6.8 and at a mean duration of 212.4 minutes at a pH of 7.4 in the solution mimicking pancreaticobiliary secretions. In nine of ten volunteers, the small bowel transit time was between 30 to 270 minutes with a mean transit time of 140 min. In one volunteer, we failed to detect the exact time of small bowel transit because the capsule remained in the stomach throughout the study for up to 8 hours. **Conclusions:** We consider activated charcoal labeled with Tc-99m pertechnetate using an enteric capsule as the carrier to be a potential radioactive marker for small bowel transit study.

**Key words:** Tc-99m pertechnetate, enteric capsule, small bowel transit, activated charcoal