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SELF-STUDY TEST

Gastrointestinal Nuclear Medicine

Questions are taken from the *Nuclear Medicine Self-Study Program I*, published by The Society of Nuclear Medicine

DIRECTIONS

The following items consist of lettered headings followed by a list of numbered phrases or statements. For each numbered phrase or statement, select the *one* lettered heading that is most closely associated with it. *Each lettered heading may be selected once, more than once, or not at all.* Answers may be found on page 1352.

For each pair of glycine-1-^{14}C-cholic acid breath tests and fecal fat excretion results shown in Figures 1–4, and items 1–4, select the most appropriate interpretation (options A–E). (Normal fecal fat is < 6.0 g/24 hr)

A. normal subject
B. pancreatic insufficiency
C. ileal resection
D. bacterial overgrowth in small bowel
E. fish tapeworm infestation

1. Figure 1
2. Figure 2
3. Figure 3
4. Figure 4

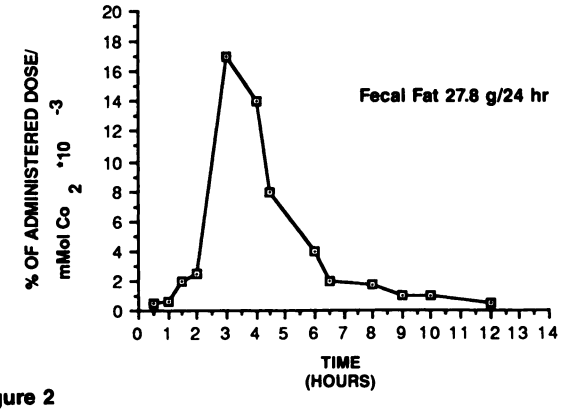

Figure 2

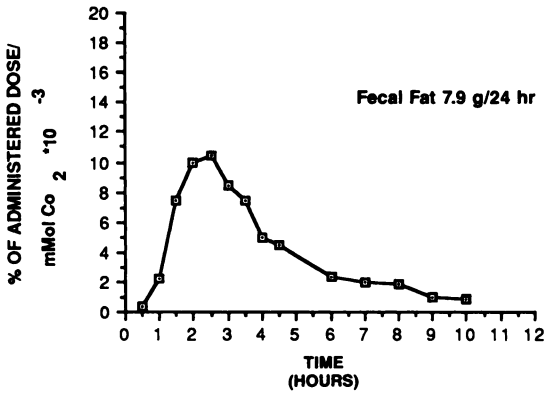

Figure 1

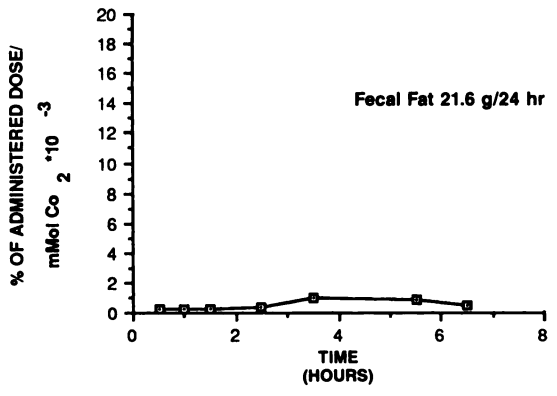

Figure 3

(continued on p. 1352)

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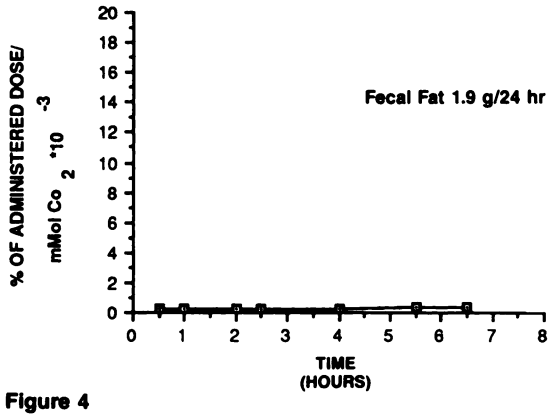

Figure 4

Several modifications of the imaging technique for identifying ectopic gastric mucosa have been proposed. For each of the following scintigraphic results (items 5–7), select the intervention most likely to produce it (options A–E).

A. nasogastric suction
B. pretreatment with perchlorate
C. pretreatment with cimetidine
D. pretreatment with pentagastrin and glucagon
E. pretreatment with pentagastrin

5. No change in ^{99m}Tc uptake by ectopic gastric mucosa and reduction of abdominal background activity
6. Increased ^{99m}Tc uptake by ectopic gastric mucosa and reduced release of ^{99m}Tc into the bowel
7. Increased ^{99m}Tc uptake by ectopic gastric mucosa and reduced translocation of tracer

SELF-STUDY TEST
Gastrointestinal Nuclear Medicine
ANSWERS

ITEMS 1–4: Bile Salt Breath Testing in Patients with Malabsorption

ANSWERS: 1, D; 2, C; 3, B; 4, A

The curves in Figures 1–4 are adapted from similar data reported by Sherr et al. Control subjects with normal absorptive function (24-hr fecal fat < 6.0 g) show only a mild increase in $^{14}CO_2$ excretion 4–6 hr after food intake, with a mean total $^{14}CO_2$ excretion of 2.2% ± 0.6% of the administered dose. The results in Figure 4 are those of a normal subject. Patients with pancreatic insufficiency have increased fecal fat excretion, but no increase in bile salt breakdown (Fig. 3). Patients with bacterial overgrowth in the small intestine have $^{14}CO_2$ curves similar to those of patients with ileal resection with a rapid early rise in $^{14}CO_2$ exhalation. In the studies performed by Sherr et al., the mean total $^{14}CO_2$ excretion in 6 hr (31.4% ± 4.6%) and peak excretion (18.8% ± 2.6%) tended to be higher for patients with ileal resection than for those with bacterial overgrowth. Fat content is also higher (27.8 g) with resection compared with the patients with bacterial overgrowth. Hence, the results shown in Figure 2 are more characteristic of patients with ileal resection, and those in Figure 1 are more typical of patients with bacterial overgrowth syndromes.

Patients with fish tapeworm (*Diphyllobothrium latum*) infestation develop vitamin B_{12} deficiency because of competition by the parasite for vitamin B_{12} in ingested food. The bile-salt breath test would be normal in this disorder, although fecal fat excretion could be increased if secondary malabsorption developed due to the effects of vitamin B_{12} deficiency on the intestinal mucosa itself. However, these tests cannot be used to confirm the diagnosis of fish tapeworm infestation.

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ITEM 5–7: Interventions in Meckel's Diverticulum Scintigraphy

ANSWERS: 5, A; 6, C; 7, D

Several different interventions have been proposed to enhance imaging of ectopic gastric mucosa. Nasogastric suction has been utilized to enhance imaging by removing secreted ^{99m}Tc activity from the stomach and reducing the background activity. Perchlorate decreases uptake of [^{99m}Tc]pertechnetate by gastric mucosa and will reduce the sensitivity of [^{99m}Tc]pertechnetate scanning for detecting ectopic gastric mucosa. Cimetidine has been shown to enhance imaging of ectopic gastric mucosa by causing a continued accumulation of [^{99m}Tc]pertechnetate in gastric mucosa and by reducing the release of tracer into the surrounding bowel. Animal studies have shown that pentagastrin will cause increased uptake of [^{99m}Tc]pertechnetate by gastric mucosa but, when used alone, there is also increased accumulation of tracer in the small bowel, and this may impair scintigraphic detection of ectopic gastric mucosa. When used in conjunction with the antiperistaltic agent, glucagon, the translocation of tracer into the small bowel is reduced and imaging for ectopic gastric mucosa is enhanced.

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