

Eating Activated Charcoal Reduces Excessive Gas

BY SHERRY BOSCHERT
San Francisco Bureau

LAKE TAHOE, CALIF. — Ingesting six capsules of activated charcoal twice a day is the best treatment option for patients with excessive flatus not caused by an underlying treatable condition, Dr. Nirmal S. Mann said at a meeting on gastroenterology and hepatology sponsored by the University of California, Davis.

People normally pass flatus a mean of 15

times per day. Those whose bowels release gas more often or in larger quantities than normal may become socially embarrassed by the sound and smell, start shunning social gatherings, or even develop marital problems, said Dr. Mann, of UC-Davis.

Dietary modifications may help, such as avoiding excessive ingestion of beans, cabbage, starch, or complex carbohydrates, which are more likely to cause gas. The over-the-counter product Beano, containing α -galactosidase derived from *As-*

pergillus niger, claims to reduce flatus but does not help, he said.

Lactase-deficient patients should avoid ingesting lactose. One lactose-intolerant patient who passed flatus 134 times in 24 hours solved the problem by restricting lactose in the diet. The small intestine has a limited capacity to absorb fructose, so patients with excessive gas should avoid high-fructose tropical fruits, such as dates and mangoes, in favor of such low-fructose fruits as cantaloupe.

Artificial sweeteners used in some chewing gum and soft drinks generate more gas, including sorbitol, mannitol, and xylitol. Advise diabetic patients, who are more likely to use these products, to look at product labels if they're complaining of flatus, he suggested. Sucrose deficiency, a congenital disease, may be the cause of excessive flatus. Consider this diagnosis, especially in children, and treat it with sacrosidase, Dr. Mann added.

Another underlying cause of excessive flatus—small bowel bacterial overgrowth—occurs in about 35% of patients with inflammatory bowel disease. Hydrogen breath tests can detect this problem, which can be treated with antibiotics. For patients who do not fit into any of the categories above, oral activated charcoal is the best short-term treatment option, Dr. Mann said. He and his associates gave activated charcoal to six patients with excessive flatus and six control patients; they measured the number of times the patients passed flatus in 8 hours, the amount of gas with each release, and bloating scores. All parameters decreased in both groups with treatment.

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"Five out of six patients came back thanking me profusely" for reducing flatus, he said. The sixth patient had only a marginal response, so activated charcoal doesn't work every time.

Airtight undergarments containing a charcoal-lined cushion also have been marketed. A recent study found that the cushion made no difference, but the airtight construction contained the smell, if not the sound, of flatus.

"These may not be comfortable [for] sleeping, but if you're trying to avoid a divorce, I think it is a small price to pay," Dr. Mann said.

Another purported treatment, simethicone, is an organopolysiloxane that produced contradictory results in trials and probably is ineffective. "I think it just breaks up the bubbles and has no value at all" for reducing flatus, he said.

In the long term, ingesting probiotics may be the most promising strategy for the average patient with excessive flatus. Probiotics may replace bacteria in the gut with bacteria that produce less-odiferous gases. In patients with lactose malabsorption, prolonged use of lactulose changes the growth of bacteria and reduces malodorous flatus.

Bismuth compounds have been used to control odor from flatus but lead to black-colored stool. "This causes confusion, so I don't recommend that," he said.

Studies in dogs suggest that zinc acetate might be helpful, but there are no data in humans. *Yucca schidigera* also has been studied in dogs but may cause bleeding problems.

AMITIZA™

(lubiprostone) soft gelatin capsules

BRIEF SUMMARY OF PRESCRIBING INFORMATION—
Please see package insert for complete prescribing information 720-03565

AMITIZA™
(lubiprostone)
Soft Gelatin Capsules

INDICATIONS AND USAGE

AMITIZA™ is indicated for the treatment of chronic idiopathic constipation in the adult population.

CONTRAINDICATIONS

AMITIZA™ is contraindicated in those patients with a known hypersensitivity to the drug or any of its excipients, and in patients with a history of mechanical gastrointestinal obstruction.

WARNINGS

Patients with symptoms suggestive of mechanical gastrointestinal obstruction should be evaluated prior to initiating AMITIZA™ treatment.

The safety of AMITIZA™ in pregnancy has not been evaluated in humans. In guinea pigs, lubiprostone has been shown to have the potential to cause fetal loss. AMITIZA™ should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Women who could become pregnant should have a negative pregnancy test prior to beginning therapy with AMITIZA™ and should be capable of complying with effective contraceptive measures (see **Teratogenic Effects: Pregnancy Category C**).

PRECAUTIONS

Patient Information:

AMITIZA™ may cause nausea. If this occurs, concomitant administration of food with AMITIZA™ may reduce symptoms of nausea. AMITIZA™ should not be administered to patients that have severe diarrhea. Patients should be aware of the possible occurrence of diarrhea during treatment. If the diarrhea becomes severe consult your physician.

Drug Interactions:

Based upon the results of *in vitro* human microsome studies, there is low likelihood of drug-drug interactions. *In vitro* studies using human liver microsomes indicate that cytochrome P450 isoenzymes are not involved in the metabolism of lubiprostone. Further *in vitro* studies indicate microsomal carbonyl reductase may be involved in the extensive biotransformation of lubiprostone to M3. Additionally, *in vitro* studies in human liver microsomes demonstrate that lubiprostone does not inhibit cytochrome P450 isoforms 3A4, 2D6, 1A2, 2A6, 2B6, 2C9, 2C19, or 2E1, and *in vitro* studies in primary cultures of human hepatocytes show no induction of the cytochrome P450 isoforms 1A2, 2B6, 2C9, and 3A4. No additional drug-drug interaction studies have been performed. Based on the available information, no protein binding-mediated drug interactions of clinical significance are anticipated.

Carcinogenesis, Mutagenesis, Impairment of Fertility:

Two 2-year oral (gavage) carcinogenicity studies (one in Crl:B6C3F1 mice and one in Sprague-Dawley rats) were conducted with lubiprostone. In the 2-year carcinogenicity study in mice, lubiprostone doses of 25, 75, 200, and 500 mcg/kg/day (approximately 2, 6, 17, and 42 times the recommended human dose, respectively, based on body surface area) were used. In the 2-year rat carcinogenicity study, lubiprostone doses of 20, 100, and 400 mcg/kg/day (approximately 3, 17, and 68 times the recommended human dose, respectively, based on body surface area) were used. In the mouse carcinogenicity study, there was no significant increase in any tumor incidences. There was a significant increase in the incidence of interstitial cell adenoma of the testes in male rats at the 400 mcg/kg/day dose. In female rats, treatment with lubiprostone produced hepato-cellular adenoma at the 400 mcg/kg/day dose.

Lubiprostone was not genotoxic in the *in vitro* Ames reverse mutation assay, the *in vitro* mouse lymphoma (L5178Y TK+/-) forward mutation assay, the *in vitro* Chinese hamster lung (CHL/IU) chromosomal aberration assay, and the *in vivo* mouse bone marrow micronucleus assay.

Lubiprostone, at oral doses of up to 1000 mcg/kg/day, had no effect on the fertility and reproductive function of male and female rats. The 1000 mcg/kg/day dose in rats is approximately 166 times the recommended human dose of 48 mcg/day, based on the body surface area.

Teratogenic Effects: Pregnancy Category C:

Teratology studies with lubiprostone have been conducted in rats at oral doses up to 2000 mcg/kg/day (approximately

332 times the recommended human dose, based on body surface area), and in rabbits at oral doses of up to 100 mcg/kg/day (approximately 33 times the recommended human dose, based on body surface area). Lubiprostone was not teratogenic in rats and rabbits. In guinea pigs, lubiprostone caused fetal loss at repeated doses of 10 and 25 mcg/kg/day (approximately 2 and 6 times the human dose, respectively, based on body surface area) administered on days 40 to 53 of gestation.

There are no adequate and well-controlled studies in pregnant women. However, during clinical testing of AMITIZA™ at 24 mcg BID, four women became pregnant. Per protocol, AMITIZA™ was discontinued upon pregnancy detection. Three of the four women delivered healthy babies. The fourth woman was monitored for 1 month following discontinuation of study drug, at which time the pregnancy was progressing as expected; the patient was subsequently lost to follow-up.

AMITIZA™ should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. If a woman is or becomes pregnant while taking the drug, the patient should be apprised of the potential hazard to the fetus.

Nursing Mothers:

It is not known whether lubiprostone is excreted in human milk. Because many drugs are excreted in human milk and because of the potential for serious adverse reactions in nursing infants from lubiprostone, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

Pediatric Use:

AMITIZA™ has not been studied in pediatric patients.

ADVERSE REACTIONS

In clinical trials, 1429 patients received AMITIZA™ 24 mcg BID or placebo. Table 1 presents data for the adverse experiences that were reported in at least 1% of patients who received AMITIZA™ and that occurred more frequently on study drug than placebo. It should be noted that the placebo data presented are from short-term exposure (≤ 4 weeks) whereas the AMITIZA™ data are cumulative data that were collected over 3- or 4-week, 6-month, and 12-month observational periods and that some conditions are common among otherwise healthy patients over a 6- and 12-month observational period.

Table 1. Adverse Events Reported for Patients Treated with AMITIZA™

System/Adverse Experience	Placebo n = 316 %	AMITIZA™ 24 mcg QD n = 29 %	AMITIZA™ 24 mcg BID n = 112 %	AMITIZA™ Any Active Dose* n = 135 %
Gastrointestinal disorders				
Nausea	5.1	17.2	31.1	30.8
Diarrhea	0.9	10.3	13.2	13.2
Abdominal distension	2.3	0.0	7.1	6.8
Abdominal pain	3.8	3.4	6.7	6.6
Flatulence	1.9	3.4	6.1	5.9
Vomiting	0.9	0.0	4.8	4.4
Loose stools	0.3	0.0	3.4	3.2
Dyspepsia	1.3	0.0	2.9	2.7
Abdominal pain upper	1.9	0.0	2.2	2.1
Abdominal pain lower	0.6	0.0	1.9	1.8
Gastroesophageal reflux disease	0.6	0.0	1.8	1.7
Abdominal discomfort	0.0	3.4	1.5	1.5
Dry mouth	0.3	0.0	1.5	1.4
Constipation	0.6	0.0	1.1	1.0
Stomach discomfort	0.3	0.0	1.1	1.0
Infections and infestations				
Sinusitis	1.6	0.0	4.9	4.8
Urinary tract infections	1.9	3.4	4.4	4.3
Upper respiratory tract infection	0.9	0.0	3.7	3.6
Nasopharyngitis	2.2	0.0	2.9	2.7
Influenza	0.6	0.0	2.0	1.9
Bronchitis	0.3	3.4	1.6	1.7
Gastroenteritis viral	0.0	3.4	1.0	1.0
Viral infection	0.3	3.4	0.5	0.6
Nervous system disorders				
Headache	6.6	3.4	13.2	13.0
Dizziness	1.5	3.4	4.4	4.0
Phosphenia	0.0	3.4	0.5	0.6
General disorders and site administration conditions				
Edema peripheral	0.3	0.0	3.8	3.6
Fatigue	1.9	0.0	2.9	2.8
Chest discomfort	0.0	3.4	1.6	1.6
Chest pain	0.0	0.0	1.1	1.0
Furrows	0.3	0.0	1.1	1.0
Musculoskeletal and connective tissue disorders				
Arthralgia	0.3	0.0	3.1	3.0
Back pain	0.9	3.4	2.3	2.3
Pain in extremity	0.0	3.4	1.9	1.9
Muscle cramp	0.0	0.0	1.0	0.9
Respiratory, thoracic, and mediastinal disorders				
Dyspnea	0.0	3.4	2.4	2.5
Pharyngolaryngeal pain	2.2	0.0	1.7	1.6
Cough	0.6	0.0	1.6	1.5
Investigations				
Weight increased	0.0	0.0	1.0	0.9
Psychiatric disorders				
Depression	0.0	0.0	1.4	1.4
Anxiety	0.3	0.0	1.4	1.4
Insomnia	0.6	0.0	1.4	1.4
Vascular disorders				
Hypertension	0.0	0.0	1.0	0.9

*Includes patients dosed at 24 mcg QD, 24 mcg BID, and 24 mcg TID

AMITIZA™-induced Nausea:

Among constipated patients, 31.1% of those receiving AMITIZA™ 24 mcg BID reported nausea. Of those patients, 3.4% reported severe nausea and 8.7% discontinued treatment due to



nausea. It should be noted that the incidence of nausea increased in a dose-dependent manner with the lowest overall incidence for nausea seen at the 24 mcg QD dose (17.2%). Further analysis of nausea has shown that long-term exposure to AMITIZA™ does not appear to place patients at elevated risk for experiencing nausea. In the open-label, long-term studies, patients were allowed to titrate the dose of AMITIZA™ down to 24 mcg QD from 24 mcg BID if experiencing nausea. It should also be noted that nausea decreased when AMITIZA™ was administered with food and that, across all dose groups, the rate of nausea was substantially lower among constipated men (13.2%) and constipated elderly patients (18.6%) when compared to the overall rate (30.9%). No patients in the trials were hospitalized due to nausea.

AMITIZA™-induced Diarrhea:

Among constipated patients, 13.2% of those receiving AMITIZA™ 24 mcg BID reported diarrhea. Of those patients, 3.4% reported severe diarrhea and 2.2% discontinued treatment due to diarrhea. The incidence of diarrhea did not appear to be dose-dependent. No serious adverse events were reported for electrolyte imbalance in the six clinical trials and no clinically significant changes were seen in serum electrolyte levels while patients were receiving AMITIZA™.

Other Adverse Events:

The following list of adverse events include those that were considered by the investigator to be possibly related to AMITIZA™ and reported more frequently ($>0.2\%$) on AMITIZA™ than placebo and those that lead to discontinuation more frequently ($\geq 0.2\%$) on AMITIZA™ than placebo. Although the events reported occurred during treatment with AMITIZA™, they were not necessarily attributed to dosing of AMITIZA™:

- **Gastrointestinal disorders:** watery stools, fecal incontinence, abnormal bowel sounds, frequent bowel movements, retching
- **Nervous system disorders:** syncope, tremor, dysgeusia, paraesthesia
- **General disorders and administration site conditions:** rigors, pain, asthenia, malaise, edema
- **Respiratory, thoracic, and mediastinal disorders:** asthma, painful respiration, throat tightness
- **Skin and subcutaneous tissue disorders:** hyperhidrosis, urticaria, rash
- **Psychiatric disorders:** nervousness
- **Vascular disorders:** flushing, palpitations
- **Metabolism and nutrition disorders:** decreased appetite
- **Ear and labyrinth disorders:** vertigo

Overdosage:

There have been two confirmed reports of overdosage with AMITIZA™. The first report involved a 3-year-old child who accidentally ingested 7 to 8 capsules of 24 mcg of AMITIZA™ and fully recovered. The second report was a study subject who self-administered a total of 96 mcg AMITIZA™ per day for 8 days. The subject experienced no adverse events during this time. Additionally, in a definitive Phase 1 cardiac repolarization study, 51 patients administered a single oral dose of 144 mcg of AMITIZA™, which is 6 times the normal single administration dose. Thirty-nine (39) of the 51 patients experienced an adverse event. The adverse events reported in $>1\%$ of this group included the following: nausea (45.1%), vomiting (27.5%), diarrhea (25.5%), dizziness (17.6%), loose or watery stools (13.7%), headache (11.8%), retching (7.8%), abdominal pain (5.9%), flushing or hot flush (5.9%), dyspnea (3.9%), pallor (3.9%), stomach discomfort (3.9%), syncope (3.9%), upper abdominal pain (2.0%), anorexia (2.0%), asthenia (2.0%), chest discomfort (2.0%), dry mouth (2.0%), hyperhidrosis (2.0%), skin irritation (2.0%), and vasovagal episode (2.0%).

DOSAGE AND ADMINISTRATION

The recommended dosage for AMITIZA™ is 24 mcg taken twice daily (BID) orally with food. Physicians and patients should periodically assess the need for continued therapy.

MARKETED BY:

Sucampo Pharmaceuticals, Inc.
Bethesda, MD 20814
and
Takeda Pharmaceuticals America, Inc.
Deerfield, IL 60015

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