Policy Statement

Measurement of gastrointestinal transit times, including gastric emptying and colonic transit times, using an ingestible pH and pressure capsule is considered investigational for the evaluation of suspected gastroparesis, constipation, or other gastrointestinal motility disorders.

Policy Guidelines

There is a CPT category I code specific to this procedure:

- **91112**: Gastrointestinal transit and pressure measurement, stomach through colon, wireless capsule, with interpretation and report

Description

An ingestible pH and pressure-sensing capsule (SmartPill GI Monitoring System) measures pH, pressure, and temperature changes to signify the passage of the capsule through portions of the gastrointestinal tract. It is proposed as a means of evaluating gastric emptying for diagnosis of gastroparesis, and colonic transit times for the diagnosis of slow-transit constipation.

Related Policies

- Esophageal pH Monitoring
- Wireless Capsule Endoscopy to Diagnose Disorders of the Small Bowel, Esophagus, and Colon

Benefit Application

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program [FEP]) prohibits plans from denying Food and Drug Administration (FDA)-approved technologies as investigational. In these instances, plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.

Regulatory Status

In 2006, an ingestible capsule (SmartPill® GI Monitoring System; Given Imaging) was cleared for marketing by the U.S. Food and Drug Administration through the 510(k) process, for evaluation of delayed gastric emptying. Gastric emptying is signaled when the pH monitor in the capsule indicates a change in pH from the acidic environment of the stomach to the alkaline environment of the small intestine. For example, an increase of 2 or more pH units usually indicates gastric emptying, and a subsequent decrease of 1 or more pH units usually indicates a passage to the ileocecal junction. While SmartPill® does not measure 50% emptying time, it can be correlated with scintigraphically measured 50% emptying time. The capsule also measures pressure and temperature during its transit through the entire gastrointestinal tract, allowing
calculations of total gastrointestinal tract transit time. In 2009, the Food and Drug Administration expanded the use of the SmartPill® to determine colonic transit time for the evaluation of chronic constipation and to differentiate between slow- and normal-transit constipation. When colonic transit time cannot be determined, small and large bowel transit times combined can be used instead. The SmartPill® is not for use in pediatric patients.

**Rationale**

**Background**

**Gastroparesis and Constipation**

Gastroparesis is a chronic disorder characterized by delayed gastric emptying in the absence of mechanical obstruction. Symptoms of gastroparesis are often nonspecific and may mimic other gastrointestinal tract disorders. It can be caused by many conditions; most commonly it is idiopathic, diabetic, or postsurgical.

Constipation is a chronic disorder involving infrequent bowel movements, a sensation of obstruction, and incomplete evacuation. Many medical conditions can cause constipation, such as mechanical obstruction, metabolic conditions, myopathies, and neuropathies. Diagnostic testing for constipation can aid in distinguishing between 2 categories of disorders, slow-transit constipation and pelvic floor dysfunction.

**Diagnosis**

Gastric emptying scintigraphy is considered the reference standard for diagnosing gastroparesis. The patient ingests a radionuclide-labeled standard meal and subsequent imaging is performed at 0, 1, 2, and 4 hours postprandially, to measure how much of the meal has passed beyond the stomach. A typical threshold to indicate abnormal gastric emptying is more than 10% of the meal remaining at 4 hours after ingestion.

Standard tests used in the evaluation of constipation include ingestion of radiopaque markers and colonic transit scintigraphy. In the radiopaque markers test, small markers are ingested over one or several days, and abdominal radiographs are performed at 4 and/or 7 days. The number of remaining markers correlates with the colonic transit time. In colonic transit scintigraphy, a radio-labeled meal is ingested, followed by scintigraphic imaging at several time intervals. The location of the scintigraphic signals correlates with colonic transit times.

**Literature Review**

Evidence reviews assess whether a medical test is clinically useful. A useful test provides information to make a clinical management decision that improves the net health outcome. That is, the balance of benefits and harms is better when the test is used to manage the condition than when another test or no test is used to manage the condition.

The first step in assessing a medical test is to formulate the clinical context and purpose of the test. The test must be technically reliable, clinically valid, and clinically useful for that purpose. Evidence reviews assess the evidence on whether a test is clinically valid and clinically useful. Technical reliability is outside the scope of these reviews, and credible information on technical reliability is available from other sources.

**Wireless pH And Pressure Capsules**

**Clinical Context and Test Purpose**

The purpose of diagnostic testing with an ingestible pH and pressure capsule in patients who have suspected disorders of gastric emptying or have suspected slow-transit constipation is to inform a decision whether to proceed to appropriate treatment.

The question addressed in this evidence review is: Does diagnostic testing with an ingestible pH and pressure capsule improve the net health outcome in individuals with suspected disorders of gastric emptying or with suspected slow-transit constipation?
The following PICOTS were used to select literature to inform this review.

**Patients**
The relevant populations of interest are individuals with suspected disorders of gastric emptying or with suspected slow-transit constipation.

**Interventions**
The test being considered is diagnostic testing with an ingestible pH and pressure capsule.

**Comparators**
The following tests are currently being used to diagnose suspected disorders of gastric emptying or slow-transit constipation: scintigraphy and radiopaque markers.

Although scintigraphy is considered the reference standard for evaluating gastric emptying, several issues complicate its use as a reference test. Until recently, there has been a lack of test standardization. Significant day-to-day variability in the rate of gastric emptying has also been noted.

Due to a lack of standardization and small sample sizes referenced in published studies, the capability of the gastric emptying test to discriminate between healthy individuals and those with known gastroparesis is uncertain. In a study by Tougas et al (2000), 123 healthy subjects were assessed to determine the normal period required for nearly complete evacuation of a standardized meal from the stomach. The authors suggested that the threshold of normality for gastric retention at 4 hours is 10% meal retention. The cutoff point was set to include 95% of normal persons. However, it appears to be unknown if this same threshold adequately identifies persons who would otherwise be classified as having gastroparesis and who are candidates or responders to treatment.

**Outcomes**
The general outcomes of interest are reductions in gastrointestinal discomfort and pain and improvements in quality of life.

**Timing**
Comparisons between the ingestible capsule and scintigraphy could be done concurrently.

**Setting**
Testing with an ingestible pH and pressure capsule is administered by a gastroenterologist generally in the outpatient setting.

**Technically Reliable**
Assessment of technical reliability focuses on specific tests and operators and requires review of unpublished and often proprietary information. Review of specific tests, operators, and unpublished data are outside the scope of this evidence review and alternative sources exist. This evidence review focuses on the clinical validity and clinical utility.

**Clinically Valid**
A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

**Gastric Emptying**

**Systematic Reviews**
A few published studies have evaluated the ingestible capsule in relation to another diagnostic measure of gastric emptying. A systematic review of 12 studies on the ingestible capsule was conducted by Stein et al (2013) for the Agency for Healthcare Research and Quality (AHRQ; see Table 1). Studies that included only healthy participants were excluded from the review; instead, AHRQ looked for studies with comparison groups consisting of healthy, asymptomatic...
(ie, without symptoms of gastroparesis or constipation) participants as controls. Among these studies, 5 were only available as meeting presentations, and the overall strength of evidence favoring the ingestible capsule was low. Diagnostic accuracy with the ingestible capsule was considered comparable to gastric scintigraphy in 7 studies, 3 of which were in abstracts only. There was a moderate correlation between the ingestible capsule and gastric emptying scintigraphy on transit data and device agreement in 5 studies.

### Table 1. Characteristics and Results of Systematic Reviews

<table>
<thead>
<tr>
<th>Study</th>
<th>Studies Included</th>
<th>Study Populations Included</th>
<th>Study Designs Included</th>
<th>Study Reference Standards Included</th>
<th>Sens, %</th>
<th>Spec, %</th>
<th>SOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stein et al</td>
<td>12</td>
<td>Patients with gastroparesis or constipation or healthy controls</td>
<td>7 studies were prospective, 5 of 7 were multicenter</td>
<td>Scintigraphy</td>
<td>59-86</td>
<td>64-81</td>
<td>Low</td>
</tr>
</tbody>
</table>

Sens: sensitivity; SOE: strength of evidence; Spec: specificity.

### Diagnostic Studies

A study by Green et al (2013) assessed SmartPill and gastric emptying scintigraphy in 22 pediatric patients with severe upper gastrointestinal (GI) symptoms. Of 20 evaluable patients who had both tests, 9 patients had delayed gastric emptying identified by scintigraphy. SmartPill was 100% sensitive and 50% specific for delayed gastric emptying. Patients also underwent antroduodenal manometry to detect motor abnormalities. SmartPill identified motor abnormalities in 17 patients compared with 10 detected by antroduodenal manometry. However, because there does not appear to be a reference standard for motor abnormalities, it cannot be determined whether SmartPill is more sensitive or whether it has a higher false-positive rate for detection of motor abnormalities.

### Section Summary: Clinical Validity for Gastric Emptying

The data present several shortcomings on the use of the SmartPill in diagnosing gastroparesis; as a result, the diagnostic accuracy is not well defined. The current reference test (gastric emptying scintigraphy) is an imperfect criterion standard, and this creates difficulties in defining the sensitivity and specificity of SmartPill. Studies included healthy asymptomatic subjects as part of a control group. Although there was a moderate correlation between SmartPill gastric emptying time and scintigraphy, scintigraphy itself has limited reliability. Although the areas under the curve between SmartPill and scintigraphy are similar, the modest correlation between the 2 tests indicates that there are often discordant results.

### Constipation

Few studies have evaluated the use of SmartPill for assessing colonic transit times. In the systematic review by Stein et al (2013) conducted for AHRQ, the strength of evidence in available studies on the ingestible capsule was found to be low overall. No studies were identified that compared the SmartPill to colonic scintigraphy. Accuracy of the ingestible capsule in diagnosing slow-transit constipation was similar to tests using radiopaque markers. A moderate correlation between colonic transit times with the ingestible capsule and tests with radiopaque markers was shown in 5 studies (r range, 0.69-0.71).

### Section Summary: Clinical Validity for Constipation

Although the studies included in the AHRQ systematic review showed moderate correlations between SmartPill and other methods for assessing colonic transit times, they should be interpreted cautiously. The diagnostic capability of SmartPill for detecting slow-transit constipation is unknown.

### Clinically Useful

A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive
correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

**Direct Evidence**
Direct evidence of clinical utility is provided by studies that have compared health outcomes for patients managed with and without the test. Because these are intervention studies, the preferred evidence would be from randomized controlled trials. No randomized controlled trials were identified.

**Gastric Emptying and Constipation**
The 2013 AHRQ review found that there was a lack of evidence on the clinical utility of testing with the ingestible capsule. The review found 3 studies, including 1 abstract, on management changes following use of the SmartPill. Kuo et al (2011) and Rao et al (2011) reported that wireless motility capsule testing resulted in a new diagnosis in about 50% of patients. Due to the limited data, AHRQ reviewers considered the evidence insufficient to determine the impact of testing results of the ingestible capsule on treatment and management decisions.

**Chain of Evidence**
Indirect evidence on clinical utility rests on clinical validity. If the evidence is insufficient to demonstrate test performance, no inferences can be made about clinical utility. Because the clinical validity of an ingestible pH and pressure capsule has not been established, a chain of evidence supporting the clinical utility of the device cannot be constructed.

**Section Summary: Clinically Useful**
Evidence on the clinical utility of a wireless pressure capsule is very limited, consisting of 3 retrospective analyses describing outcomes of patients undergoing testing with SmartPill. These studies lacked control subjects diagnosed without the test or with alternative tests. This evidence is insufficient to determine the clinical utility of SmartPill for either indication; higher quality studies are still needed to measure the impact of SmartPill on patient management and improved health outcomes.

**Summary of Evidence**
For individuals who have suspected disorders of gastric emptying or suspected slow-transit constipation who receive diagnostic testing with an ingestible pH and pressure capsule, the evidence includes studies of test characteristics and case series of patients who have undergone the test. Relevant outcomes are test validity, other performance measures, symptoms, functional outcomes, and health status measures. The available studies have provided some comparative data on the SmartPill ingestible pH plus pressure-sensing capsule and other techniques for measuring gastric emptying. This evidence primarily consists of assessments of concordance with available tests. Because the available tests (e.g., gastric emptying scintigraphy) are imperfect criterion standards, it is not possible to determine the true sensitivity and specificity of SmartPill. The results of the concordance studies have revealed a moderate correlation with alternative tests, but have provided only limited additional data on the true accuracy of the test in clinical care. Evaluation of cases with discordant results would be of particular value and, ideally, these studies should be linked to therapeutic decisions and to meaningful clinical outcomes. The evidence to date on the clinical utility of testing is lacking, consisting of a small number of retrospective studies. It is not possible to determine whether there is net improvement in health outcomes using SmartPill vs standard diagnostic tests. The evidence is insufficient to determine the effects of the technology on health outcomes.

**Supplemental Information**

**Practice Guidelines and Position Statements**

**American and European Neurogastroenterology and Motility Societies**
The American and European Neurogastroenterology and Motility Societies issued a position paper on the evaluation gastrointestinal transit in 2011. In it, the wireless motility capsule was
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recommended by consensus for assessing gastric emptying and small bowel, colonic, and whole-gut transit times in patients with suspected gastroparesis or gastrointestinal dysmotility in multiple regions. However, the position paper noted that the clinical utility of identifying delays in small bowel transit times is unknown.

American Gastroenterological Association
The American Gastroenterological Association’s 2013 guidelines on gastroparesis diagnosis and treatment indicated wireless motility capsule testing requires validation before it can be considered as an alternative to scintigraphy for diagnosing gastroparesis. Gastric emptying scintigraphy was considered the best-accepted method to test for delays in gastric emptying.

U.S. Preventive Services Task Force Recommendations
Not applicable.

Medicare National Coverage
There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

Ongoing and Unpublished Clinical Trials
Some currently unpublished trials that might influence this review are listed in Table 2.

Table 2. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
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<tr>
<td>Unpublished</td>
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<td></td>
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<tr>
<td>NCT02022826a</td>
<td>Clinical Management With SmartPill Motility Monitoring System and Validation of the SmartPill Five Hour Cutoff in Patients With Symptoms of Gastroparesis</td>
<td>167</td>
<td>Dec 2016 (terminated)</td>
</tr>
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</table>

NCT: national clinical trial.
a Denotes industry-sponsored or cosponsored trial.

References


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**Documentation for Clinical Review**

- No records required

**Coding**

This Policy relates only to the services or supplies described herein. Benefits may vary according to product design; therefore, contract language should be reviewed before applying the terms of the Policy. Inclusion or exclusion of codes does not constitute or imply member coverage or provider reimbursement.

**IE**

The following services may be considered investigational.

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPT®</td>
<td>91112</td>
<td>Gastrointestinal transit and pressure measurement, stomach through colon, wireless capsule, with interpretation and report</td>
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<tr>
<td>HCPCS</td>
<td>None</td>
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<tr>
<td>ICD-10 Procedure</td>
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**Policy History**

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Action</th>
<th>Reason</th>
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<tbody>
<tr>
<td>04/02/2010</td>
<td>New Policy Adoption</td>
<td>Medical Policy Committee</td>
</tr>
<tr>
<td>01/21/2011</td>
<td>Coding Update</td>
<td>Administrative Review</td>
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<tr>
<td>02/22/2013</td>
<td>Coding Update</td>
<td>Administrative Review</td>
</tr>
<tr>
<td>03/29/2013</td>
<td>Policy revision with position change</td>
<td>Medical Policy Committee</td>
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<tr>
<td>06/30/2015</td>
<td>Policy revision without position change</td>
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<td>01/01/2019</td>
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**Definitions of Decision Determinations**

**Medically Necessary:** A treatment, procedure, or drug is medically necessary only when it has been established as safe and effective for the particular symptoms or diagnosis, is not investigational or experimental, is not being provided primarily for the convenience of the patient or the provider, and is provided at the most appropriate level to treat the condition.
Investigational/Experimental: A treatment, procedure, or drug is investigational when it has not been recognized as safe and effective for use in treating the particular condition in accordance with generally accepted professional medical standards. This includes services where approval by the federal or state governmental is required prior to use, but has not yet been granted.

Split Evaluation: Blue Shield of California/Blue Shield of California Life & Health Insurance Company (Blue Shield) policy review can result in a split evaluation, where a treatment, procedure, or drug will be considered to be investigational for certain indications or conditions, but will be deemed safe and effective for other indications or conditions, and therefore potentially medically necessary in those instances.

Prior Authorization Requirements (as applicable to your plan)

Within five days before the actual date of service, the provider must confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should be directed to the Prior Authorization Department. Please call (800) 541-6652 or visit the provider portal at www.blueshieldca.com/provider.

Disclaimer: This medical policy is a guide in evaluating the medical necessity of a particular service or treatment. Blue Shield of California may consider published peer-reviewed scientific literature, national guidelines, and local standards of practice in developing its medical policy. Federal and state law, as well as contract language, including definitions and specific contract provisions/exclusions, take precedence over medical policy and must be considered first in determining covered services. Member contracts may differ in their benefits. Blue Shield reserves the right to review and update policies as appropriate.