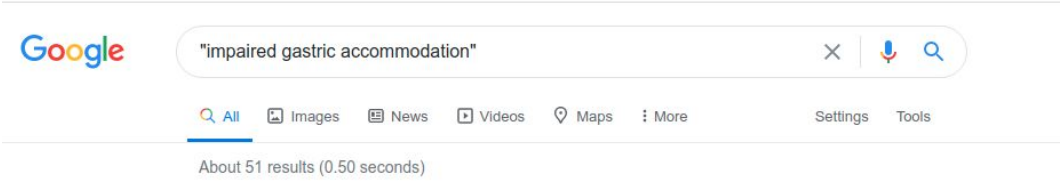
Impaired Gastric Accommodation (IGA): Patient-to-Patient Notes[1] [2]



1) INTRODUCTION

Although IGA is associated with as many as 40% of cases of functional dyspepsia (FD), and has been the subject of medical research, information on the condition, in general, is relatively sparse. At the time of authoring these notes, for instance, an exact match search on Google for "impaired gastric accommodation" yielded only 51 results— almost all of them medical journal articles intended for gastroenterologists and other medical practitioners.

The purpose of these notes, authored by a patient diagnosed with IGA (post-cholecystectomy), is to summarize *some* of the information known about this disorder for other patients who might be interested in better understanding the nature of their diagnosis. The author assembled these notes with other patients in mind because, as mentioned, at the time of writing, there was an almost total paucity of patient-oriented information available on this subject.

These notes merely represent the author's best attempt to piece together and understand the limited publicly accessible information about the condition and should not be relied upon for the diagnosis of treatment of any medical condition, including IGA. Patients should bring their concerns and questions about IGA or any other medical condition to their doctor — although the clinical studies footnoted here might prove useful for initiating discussions. Furthermore, the author does not warrant the information summarized in this document to be accurate and patients should not rely upon it in any way when making treatment decisions with their medical practitioners.

These notes, in particular, might be of value in those interested in learning what treatment options are available; learning about diagnostic techniques available in a non-clinical (medical research) setting; and learning what treatment options are currently available and which are in the pipeline, subject to the continuation of ongoing clinical trials. These notes will be reviewed and updated periodically as information changes and as more knowledge and clinical trials become available on open sources. This version has neither been peer reviewed nor reviewed by a practicing doctor.

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[2] V 1.0

2) DEFINITIONS AND PATHOPHYSIOLOGY

In order to understand the pathophysiology[3] of IGA, some definitions are in order:

- **Gastric accommodation** is the term used to describe the ↓ **reduction in gastric tone** and the increase in **compliance** ↑ that follows ingesting a meal (or liquids).
  Gastric accommodation is an automatic (autonomic) reflex which is mediated by the vagal nerve[4].
    - The vagal nerve contributes to many functions of the autonomic nervous system (ANS) including those related to digestion.
    - According to an article in *Gut*[5], "the accommodation reflex consists of a vagovagal reflex pathway, resulting in activation of non-adrenergic, non-cholinergic nerves, including an important nitrergic component."
    - Damage to the vagus nerve can result from a variety of conditions — ranging from abdominal surgeries to diabetes mellitus (DM)[6].
    - Medical conditions that can occur as a result of damage to the vagus nerve include gastroparesis (delayed emptying of the stomach).

In individuals with healthy gastric accommodation, gastric tone is reduced and compliance is increased following a meal. This is an automatic vagal reflex. In other words (and as it goes without saying!), people don't need to "remember" to "relax their stomach" following the ingestion of a meal in order for the food and liquid ingested to be "accepted" and for it to move as intended down through their digestive tract. Under normal conditions, this happens automatically and no symptoms result from the operation of this reflex.

- The exact definition of **gastric tone i**s subject to some debate[7], but is generally understood to be, in simple terms, sustained muscular contractions of the gastric wall. Therefore, when gastric tone is reduced through a vagal-initiated response after a meal is ingested, this means that the stomach's musculature naturally relaxes in order to

[3] "The disordered physiological processes associated with disease or injury" (Oxford)

[4] Amiriani T, Javadi H, Raiatnavaz T, et al. Assessment of Gastric Accommodation in Patients with Functional Dyspepsia by 99mTc-Pertechtenate Single Photon Emission Computed Tomography Imaging: Practical but not Widely Accepted. Fonksiyonel Dispepsisi Olan Hastalarda Gastrik Akomodasyonun 99mTc-Perteknetat SPECT Görüntüleme ile Değerlendirilmesi: Pratik Ancak Yaygın Kabul Görmüş Değil. *Mol Imaging Radionucl Ther*. 2015;24(3):105-109. doi:10.4274/mirt.36854

[5] *Sub*

[6] Whether gallbladder removal (cholecystectomy) can result in vagus-mediated digestive diseases, including gastroparesis, is somewhat controversial. Anecdotal evidence from many patients suggests this to be the case. Many surgeons, however, point out that the vagus nerve is not approached during laparoscopic gallbladder removal and strongly assert that the development of conditions like gastroparesis as a direct consequence of surgery is impossible. It is the author's strongly-held opinion that such damage *is* possible and that cholecystectomy *can* result in impaired gastric accommodation and conditions associated with it.

[7] Gastric Tone and the Pyloric Sphincteric Cylinder. The Pyloric Sphincteric Cylinder in Health and Disease, A.D. Keet. Accessed online.

"make room" for the food and liquid to be ingested by the organ. This results in increased:

- **Gastric compliance**: gastric compliance, in simple terms, means the stomach relaxing and expanding to "receive" food and liquids. A definition used in a clinical study took 'gastric compliance' to be: "the slope of the best-fit straight line of each subject's gastric volume vs. gastric pressure"[8]

Besterne brings those definitions together[9]:

> "Gastric accommodation is influenced by the reduction of tone in the fundus (adaptive relaxation). This increases the ability to relax and hold food that arrives without any serious increase of cavity pressure. This is known as adaptability or "compliance" (receptive relaxation)."

By automatically relaxing and expanding to receive food, the stomach can easily "accept" the food ingested without causing the eater uncomfortable feelings of pressure or causing the person eating the meal to feel uncomfortable full during or after eating the meal. Additionally, as Berghe *et al* explain[10], when functioning correctly, the gastric accommodation reflex allows the stomach to pass on food to the duodenum at a pace that approximates its absorptive capacity:

> "...gastric accommodation allows the stomach to retain food and to regulate passage to the duodenum at a rate that matches the duodenal absorptive capacity "

Other terms which can be used to describe impaired gastric accommodation, and which may be useful for patients interested in finding additional informational resources on the subject, include:

- 'Impaired accommodation'
- 'Impaired accommodation reflex'
- 'Disordered gastric accommodation'
- 'Dysaccommodation of the stomach'

In fact, it would appear as if there is no universally agreed upon way to describe the symptoms that results from disruptions to this system — so casting a wide net by using several search terms is advisable.

Normal gastric accommodation is an important part of healthy digestion. Conversely, impaired accommodation is very closely associated with functional dyspepsia (FD). In fact, impairments

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[8] Zimmerli EJ, Walsh BT, Guss JL, Devlin MJ, Kissileff HR. Gastric compliance in bulimia nervosa. Physiol Behav. 2006 Feb 28;87(2):441-6. doi: 10.1016/j.physbeh.2005.11.010. Epub 2005 Dec 22. PMID: 16376390.

[9] Bestene, Jaime. (2010). Visceral sensitivity and functional dyspepsia: Or much more than this?. Revista Colombiana de Gastroenterologia. 25. 316-320.

[10] Contribution of different triggers to the gastric accommodation reflex in humans
Pieter Vanden Berghe, Pieter Janssen, Sebastien Kindt, Rita Vos, and Jan Tack
American Journal of Physiology-Gastrointestinal and Liver Physiology 2009 297:5, G902-G906

in gastric accommodation have been found in 40% of FD patients[11]. According to Kindt and Tack writing in *Gut*, the official journal of the British Society of Gastroenterology[12], impaired accommodation "has been described in several upper gastrointestinal disorders" besides FD — including diabetic gastropathy and postfundoplication syndrome.

[11] Kindt S, Tack J. Impaired gastric accommodation and its role in dyspepsia. Gut. 2006;55(12):1685-1691. doi:10.1136/gut.2005.085365
[12] *Ibid.*

3) DIAGNOSIS

Several different diagnostic tools are available to measure the gastric accommodation reflex in humans, although these are generally only available in the research setting — or in tertiary centers of excellence for gastroenterology patients, such as centers specializing in diagnosing, treating, and researching functional dyspepsia (FD).

1) Barostatic evaluation

Kindt and Tack[13] describe barostatic evaluation of the accommodation reflex as the "gold standard" diagnostic test for impaired accommodation. According to the authors the test "allows the evaluation of pressure changes under isovolumetric or volume changes under isobaric conditions."

The authors describe the test methodology as follows:

> "A highly compliant polyethylene balloon is introduced through the mouth into the gastric fundus and connected to an electronic barostat device. Thereafter, the balloon is gradually inflated to overcome the intra-abdominal pressure, which is usually defined as the lowest pressure needed to induce a minimal volume of 30 ml, or the occurrence of respiratory variation on the volume measurement. The pressure at this level is called the minimal distending pressure. A minimal distending pressure with an additional 2 mm Hg is generally accepted as the optimal baseline pressure for the measurement of changes in volume, including meal-induced gastric accommodation. Under isobaric conditions, the volume increase in the balloon after meal ingestion directly reflects gastric relaxation and provides a measure for meal-induced accommodation. By using the same device, information can be acquired about gastric sensitivity and compliance in the same session."

However, as the authors note:

> "The invasive nature of the barostat procedure has limited its use to research facilities and has prompted the development of more patient-friendly instruments."

Additionally:

> "Some concern about possible bias in the measurements owing to the presence of the bag in the stomach and the complex geometry of the stomach have been expressed."

[13] *Ibid. Gut*.

2) Gastric Emptying Studies

The standard test for diagnosis gastroparesis — gastric emptying scintigraphy — can also be used to help clinicians understand how food is being processed by the stomach and to thereby identify where accommodation deficits might be occurring. According to the authors[14]:

> "It has been proposed to divide the area of interest [in the gastric emptying test] into a distal and proximal gastric segment, to assess regional gastric emptying. Studies on patients with functional dyspepsia using this technique showed redistribution of the meal to the distal stomach, at the expense of the usual accumulation in the proximal stomach.It has been suggested that this redistribution reflects, and is a consequence of, impaired accommodation of the proximal stomach."

Transabdominal Ultrasound

According to Kindt and Tack:

> "Transabdominal ultrasound of the stomach has also been proposed as a non-invasive and largely available alternative to the barostat for the measurement of gastric accommodation. For this purpose, consecutive ultrasound sections at two levels of the stomach are obtained, both during fasting and postprandially [after a meal]."

Summary:

Due to its invasive nature, barostatic evaluation of stomach accommodation, the gold standard for diagnosing impaired accommodation, remains largely only available in research settings and in tertiary referral centers specializing in functional dyspepsia.

[14] *Ibid*

4) SYMPTOMS

Most studies which have looked at patient populations suffering from functional dyspepsia (FD) have identified some degree of impaired gastric accommodation.

Symptoms which can result from IGA include:

- Postprandial fullness (feeling uncomfortably full after eating or drinking)
- Early satiety (feeling full after eating only a small amount of food)
- Weight loss

TREATMENT OPTIONS

Several treatment options have been suggested in the medical literature. Some of these parallel recommendations commonly made to gastroparesis patients:

- Eating small meals less often

Writing in 2006, Kindt and Tack stated that: "no pharmacological treatment of established efficacy is currently available for patients with impaired gastric accommodation." Nitric oxide (NO) donors (agonists / nitric vasodilators) have been suggested — although their effect is generally short lived and major side effects, like headaches, are commonplace.

In experimental trials, sildenafil (Viagra) has been tried with favorable results. Conversely, NO agonists have been found to inhibit gastric accommodation. Although, as above, the use of NO agonists and antagonists to modulate gastric accommodation brings with it side effects[15].

Additionally:

- When assessing the potential of buspirone for the treatment of functional dyspepsia, Tack *et al* found[16] that the drug significantly increased gastric accommodation relative to placebo.
- Severo *et al*[17] found that moderate exercises may increase gastric accommodation. The study assessed gastric accommodation using a questionnaire-based drink test.

[15] Di Stefano M, Miceli E, Mazzocchi S, Tana P, Corazza GR. The role of gastric accommodation in the pathophysiology of functional dyspepsia. Eur Rev Med Pharmacol Sci. 2005 Sep-Oct;9(5 Suppl 1):23-8. PMID: 16457126.

[16] Tack, Jan & Janssen, Pieter & Masaoka, Tatsuhiro & Farré, Ricard & Oudenhove, Lukas. (2012). Efficacy of Buspirone, a Fundus-Relaxing Drug, in Patients With Functional Dyspepsia. Clinical gastroenterology and hepatology : the official clinical practice journal of the American Gastroenterological Association. 10. 1239-45. 10.1016/j.cgh.2012.06.036.

[17] Severo, Juliana & Oliveira, Raísa & Castro, Lúcia & Victor, Pedro & Costa, Lara & Santos, Dos & Tolentino, Moisés. (2020). Moderate exercise increases gastric accommodation in healthy men and women. Nutricion Clinica y Dietetica Hospitalaria. 39. 75-79. 10.12873/393tolentino.

- Tegaserod[18], a 5-HT_4 agonist, has been shown to increase gastric accommodation
- Triptans, including sumatriptan, may be of use in treating IGA[19]
- Acotiamide directly enhances postprandial gastric accommodation.[20] This medication is approved for use in Japan.

Anecdotally, patients have reported trialling, with their doctors:

- Nitric vasodilators and anti-anginals (nicorandil, nitroglycerine)
- Sildenafil / Viagra
- PDE inhibitors

As well as medications for functional dyspepsia and prokinetics:

- Domperidone
- Amitriptyline

Natural interventions that may help to some extent include

- Breathing exercises with vagal biofeedback[21]
- Transcutaneous electroaccupunture[22]
- Reducing anxiety generally. Acute and ongoing anxiety are both associated with impaired gastric accommodation[23].

[18] Al-Aghbar, Mohamed N.A. PhD The Effect of Tegaserod on Gastric Accommodation and Gastric Emptying in Patients with Functional Dyspepsia and Comparison with Domperidone, American Journal of Gastroenterology: September 2007 - Volume 102 - Issue - p S156
[19] Moro E, Crema F, De Ponti F, Frigo G. Triptans and gastric accommodation: pharmacological and therapeutic aspects. Dig Liver Dis. 2004 Jan;36(1):85-92. doi: 10.1016/j.dld.2003.09.012. PMID: 14971822.
[20] Kusunoki H, Haruma K, Manabe N, Imamura H, Kamada T, Shiotani A, Hata J, Sugioka H, Saito Y, Kato H, Tack J. Therapeutic efficacy of acotiamide in patients with functional dyspepsia based on enhanced postprandial gastric accommodation and emptying: randomized controlled study evaluation by real-time ultrasonography. Neurogastroenterol Motil. 2012 Jun;24(6):540-5, e250-1. doi: 10.1111/j.1365-2982.2012.01897.x. Epub 2012 Mar 4. PMID: 22385472.
[21] Hjelland IE, Svebak S, Berstad A, Flatabø G, Hausken T. Breathing exercises with vagal biofeedback may benefit patients with functional dyspepsia. Scand J Gastroenterol. 2007 Sep;42(9):1054-62. doi: 10.1080/00365520701259208. PMID: 17710670.
[22] Xu F, Tan Y, Huang Z, Zhang N, Xu Y, Yin J. Ameliorating Effect of Transcutaneous Electroacupuncture on Impaired Gastric Accommodation in Patients with Postprandial Distress Syndrome-Predominant Functional Dyspepsia: A Pilot Study. Evid Based Complement Alternat Med. 2015;2015:168252. doi: 10.1155/2015/168252. Epub 2015 May 3. PMID: 26064155; PMCID: PMC4433673.
[23] Ly, Huynh Giao & Weltens, Nathalie & Tack, Jan & Oudenhove, Lukas. (2015). Acute Anxiety and Anxiety Disorders Are Associated With Impaired Gastric Accommodation in Patients With Functional Dyspepsia. Clinical gastroenterology and hepatology: the official clinical practice journal of the American Gastroenterological Association. 13. 10.1016/j.cgh.2015.03.032.

- Ingesting bitter substances[24]. Taste receptors play an important role in regulating digestion and preliminary evidence suggests that administering bitter-tasting compounds could increase gastric accommodation.
- Ingesting products containing fennel. Animal evidence from Japan[25] suggests that anethole, which is found in the essential oils of anise and fennel, could improve gastric accommodation

[24] Harada Y, Koseki J, Sekine H, Fujitsuka N, Kobayashi H. Role of Bitter Taste Receptors in Regulating Gastric Accommodation in Guinea Pigs. J Pharmacol Exp Ther. 2019 Jun;369(3):466-472. doi: 10.1124/jpet.118.256008. Epub 2019 Apr 9. PMID: 30967403.
[25] Asano T, Aida S, Suemasu S, Mizushima T. Anethole restores delayed gastric emptying and impaired gastric accommodation in rodents. Biochem Biophys Res Commun. 2016 Mar 25;472(1):125-30. doi: 10.1016/j.bbrc.2016.02.078. Epub 2016 Feb 23. PMID: 26915803.

5) SUMMARY

- Impaired gastric accommodation results from the stomach's inability to expand (lose tone) to accommodate food and liquids.
- It has been found in as many as 40% of patients with functional dyspepsia and is believed to contribute to some of the disease's symptomatology, particularly early satiety and postprandial fullness.
- The accommodation reflex is automatic and is mediated by the vagus nerve.
    - Therefore, many disease processes which can result in damage to the vagal nerve — or iatrogenic causes like abdominal surgeries — can contribute to patients developing IGA.
- The gold standard for diagnosis involves inflating a balloon in the stomach and measuring how the stomach expands when food is introduced. This is called barostatic evaluation. Other diagnostic approaches exist. The problem with the barostatic method is essentially its invasive nature. This has meant that its use has been relegated to research facilities and tertiary referral institutionions.
- Currently, there is no widely accepted standard pharmacotherapy regime for treating IG — nor any gold standard agents for treating the symptoms it can produce..
- Nitric oxide (NO) donors have been proposed as a target but have an adverse side effect profile. Some drugs such as buspirone and acotiamide have also been found to improve gastric accommodation.
- Additionally, vagal-focused biofeedback and acupuncture may help.
- Many recommend that those suffering from the effects of IGA should eat smaller more frequent meals and try to keep their anxiety within manageable levels.