An Evolving Landscape: GLP-1 Receptor Agonists and Their Perioperative Implications for the Anesthesia Care Team

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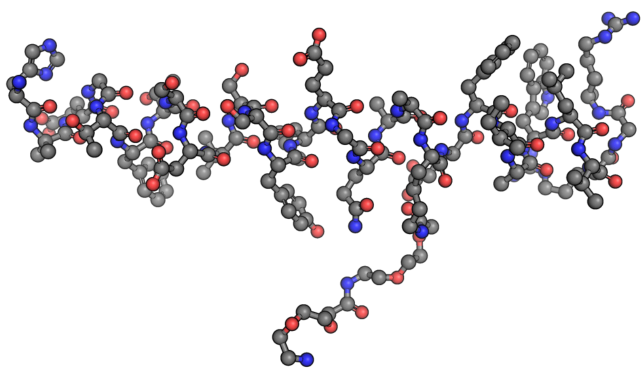
ABSTRACT

Glucagon-like peptide-1 (GLP-1) receptor agonists, including semaglutide, tirzepatide, liraglutide, and dulaglutide, have rapidly emerged as widely prescribed therapies for the management of type II diabetes mellitus and obesity, with expanding research identifying potential therapeutic applications across cardiovascular, hepatic, and renal systems. As the prevalence of GLP-1 use continues to grow across the broader patient population, so too does the frequency with which surgical patients present to the operative suite with a history of GLP-1 use, creating important perioperative considerations for anesthesia care teams. Paramount concerns are the aspiration risks associated with delayed gastric emptying and retained gastric contents, as well as the intraoperative management of glycemic control in diabetic patients who have paused their anti-diabetic therapy prior to surgery. This paper provides an overview of GLP-1 medications, including their mechanism of action, physiological effects across multiple organ systems, and the current state of perioperative guidance provided by the American Society of Anesthesiologists. Additionally, this paper explores the specific implications for anesthesia technologists, examining how their role in equipment preparation, protocol readiness, and situational awareness must adapt in response to the growing prevalence of GLP-1 use. As the evidence base surrounding perioperative GLP-1 management continues to develop, preparedness and clinical awareness among all members of the anesthesia care team remain essential to ensuring safe patient outcomes.

INTRODUCTION

Glucagon-like peptide-1 (GLP-1) medications, namely semaglutide, tirzepatide, liraglutide, and dulaglutide, have emerged as novel therapies for the treatment of type II diabetes mellitus and obesity (Beam et al., 2023; Maiz et al., 2025a). As the societal and cultural impacts of these medications continue to expand, alongside ongoing research into their broader implications across the spectrum of medicine, significant considerations remain regarding their perioperative management and the role of the anesthesia care team in providing safe patient care for surgical patients with a history of GLP-1 use (Maiz et al., 2025). Primary concerns for anesthesia care teams are in the airway management considerations of patients on GLP-1s and the intraoperative management of patients using GLP-1s namely, in the management of patients' glucose levels (Beam et al., 2023). The purpose of this paper is to provide an overview of GLP-1 medications, including their mechanism of action, physiological considerations, and emerging research related to their expanding role in medicine. Additionally, this article explores how anesthesia technologists should adapt their patient care practices in response to the growing prevalence of GLP-1 use as ongoing research continues to identify potential therapeutic applications beyond the established treatment of type II diabetes mellitus and obesity management.



Structure of semaglutide found in its complex with glucagon-like peptide-1receptor and Gs protein. The linker joining peptide and octadecanedioic acid is partially modelled and data could not define a position for the octadecanedioic acid moiety itself. PDB: 7KI0

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WHAT ARE GLP-1S AND HOW DO THEY WORK?

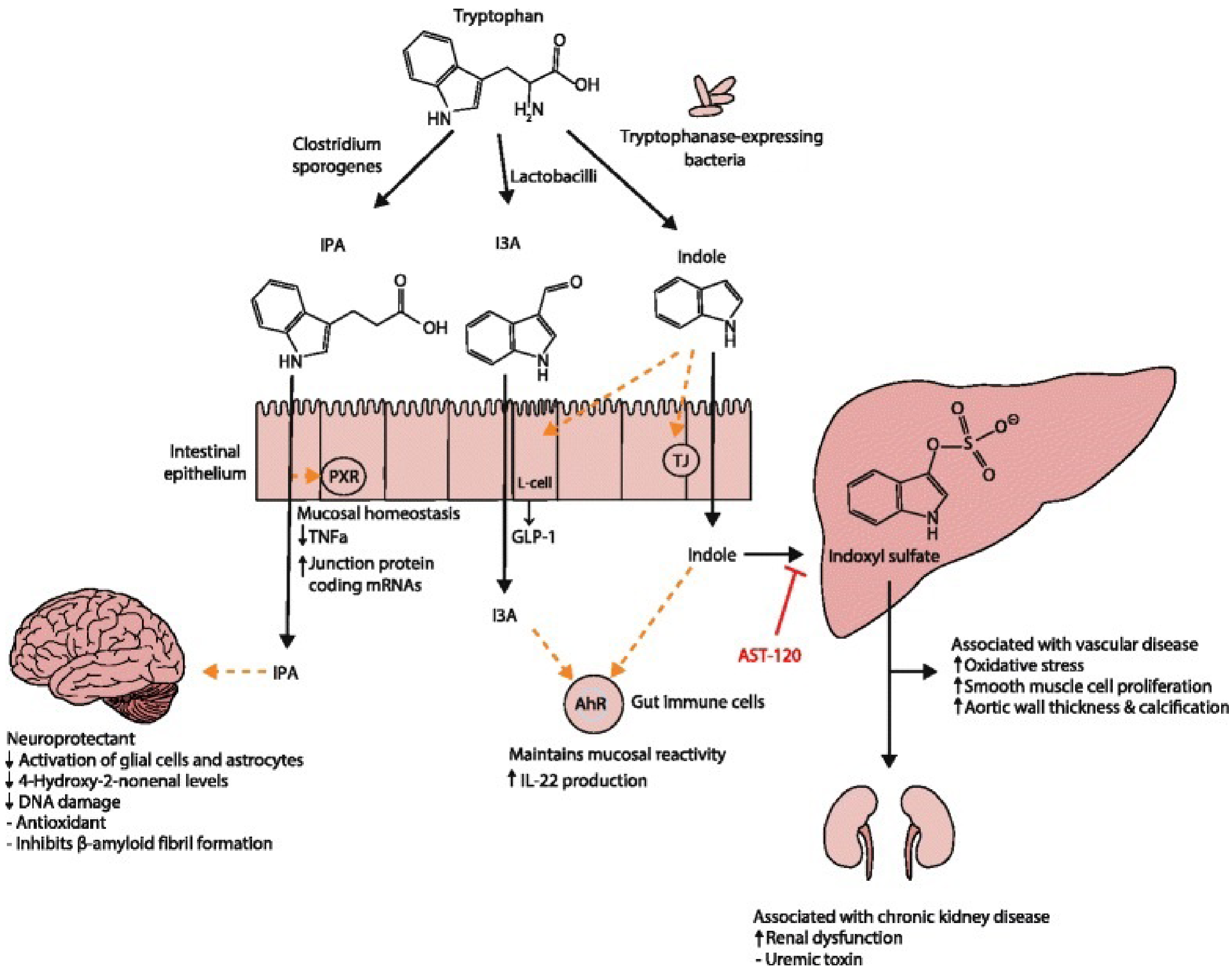
GLP-1s are peptide hormones expressed as short-chain peptides. Peptides themselves are short chains of amino acids, and biochemically, GLP-1 consists of either 30 or 31 amino acids linked together by peptide bonds (Au et al., 2025; Holst, 2007). GLP-1s are endogenous incretin hormones, meaning they are naturally produced within the body and secreted primarily within the gastrointestinal tract following food consumption. The physiological purpose of GLP-1 secretion is to lower blood glucose levels through stimulation of insulin secretion from the pancreas in a glucose-dependent manner (Au et al., 2025). Additionally, GLP-1 activity contributes to the transmission of satiety signals, promoting feelings of fullness following food intake (Holst, 2007). These combined physiological effects are a primary reason GLP-1 medications have become widely adopted in the treatment of type II diabetes mellitus and obesity, as they assist in both glycemic regulation and appetite suppression (Moiz et al., 2025b).

Exogenous GLP-1 agonist medications seek to replicate the physiological function of endogenous GLP-1 by acting on the same receptor systems throughout the body. However, one of the primary differences between endogenous GLP-1 and pharmacologically derived GLP-1 agonists is their duration of activity and systemic clearance. Endogenous GLP-1 has an extremely short half-life, often being cleared from circulation within approximately two minutes, whereas pharmacologic GLP-1 receptor agonists possess half-lives measured in days due to structural modifications that resist enzymatic degradation and prolong circulation time (Peri et al., 2025). For example, semaglutide has an approximate half-life of 160 hours, while tirzepatide possesses an approximate half-life of 116 hours (Peri et al., 2025).

GLP-1 medications and endogenous GLP-1 hormones exert their physiological effects by binding to GLP-1 receptors located throughout multiple organ systems within the body. These medications function as receptor agonists, meaning they imitate the action of the endogenous hormone by binding to and activating the same receptor sites (Moiz et al., 2025a). Due to their prolonged half-lives, GLP-1 receptor agonists are capable of maintaining sustained receptor activation far longer than endogenous GLP-1, resulting in prolonged physiologic effects related to insulin secretion, glucagon suppression, delayed gastric emptying, and appetite regulation (Moiz et al., 2025a; Moiz et al., 2025b; Peri et al., 2025).

Further, research has demonstrated that the impacts of GLP-1 go beyond the abovementioned benefits. Research is now exploring its cardiovascular, renal, and hepatic implications to mention a few (Moiz et al., 2025b; Peri et al., 2025). For cardiovascular usage, GLP-1 receptors throughout the cardiovascular system are now thought to improve a patient's heart health beyond the natural indirect benefits that are derived from weight loss, but rather through patient's interaction with the cardiovascular system. Benefits being explored are "improvements in endothelial function, modulation of atherosclerotic plaque stability, reductions in blood pressure, and decreases in epicardial fat volume" (Galli et al., 2025).

As it relates to hepatic and renal applications, GLP-1 receptor agonists have demonstrated significant physiological and metabolic benefits beyond glycemic control alone. Hepatically, GLP-1 receptor agonist administration has been associated with increased gluconeogenesis and glycogenolysis regulation, reduced hepatic lipid



This diagram shows the metabolism of tryptophan to indole and indole derivatives in the colonic lumen. Clostridium sporogenes metabolizes indole into 3-indolepropionic acid (IPA), a highly potent neuroprotective antioxidant. In the intestine, IPA binds to pregnane X receptors (PXR) in intestinal cells, thereby facilitating mucosal homeostasis and barrier function. Following absorption and distribution to the brain, IPA confers a neuroprotective effect against cerebral ischemia and Alzheimer's disease. Lactobacillus species metabolize indole into indole-3-aldehyde (I3A) which acts on the aryl hydrocarbon receptor (AhR) in intestinal immune cells, in turn increasing interleukin-22 (IL-22) production. AhR activation markedly affects in gut immunity by supporting epithelial barrier function, increasing immune tolerance to commensal microbiota, and protecting against pathogenic infections. Indole itself acts as a glucagon-like peptide-1 (GLP-1) secretagogue in intestinal L cells and as a ligand for AhR. Indole can also be metabolized by the liver to indoxyl sulfate, a compound that is detrimental to human health in high concentrations. Accumulation of indoxyl sulfate in blood plasma is toxic and associated with vascular disease and renal dysfunction. AST-120 (activated charcoal), an intestinal sorbent that is taken by mouth, adsorbs indole, in turn decreasing the concentration of indoxyl sulfate in blood plasma.

Credit: Zhang LS, Davies SS (21 April 2016)

accumulation, improved mitochondrial turnover and function, and reductions in oxidative stress (Beam et al., 2023; Newsome & Ambery, 2023). In practical terms, the prolonged half-life engineered into pharmacologic GLP-1 receptor agonists allows sustained receptor activation that may reduce hepatic fat accumulation and potentially reverse steatohepatitis through improvements in metabolic regulation and cellular energy utilization. These medications additionally appear to improve hepatic glucose metabolism while enhancing the removal of dysfunctional mitochondria and stimulating the development of healthier mitochondrial populations, contributing to improved overall hepatic function (Newsome & Ambery, 2023).

Renally, GLP-1 receptor agonists have also demonstrated protective physiological effects. Similar to their hepatic actions in reducing oxidative stress and inflammation, GLP-1 receptor agonists are believed to improve renal hemodynamics through agonist activity at GLP-1 receptor sites located within renal tissues, contributing to reductions in inflammatory signaling and fibrotic renal tissue remodeling (Neuen et al., 2024). Physiologically, GLP-1 receptor agonists additionally promote natriuresis, the excretion of sodium, and diuresis, the production of urine, which assists in fluid and sodium regulation while helping reduce intraglomerular pressure within the kidneys (Neuen et al., 2024). Collectively, these effects suggest GLP-1 receptor agonists may possess significant therapeutic implications in the management of chronic kidney disease and metabolic-associated liver disease alongside their established roles in diabetes and obesity management (Neuen et al., 2024; Peri et al., 2025). As research continues, it is imperative that healthcare providers understand the emerging trends, and within anesthesia how to manage patients in these medications.

ANESTHETIC CONSIDERATIONS FOR THE ANESTHESIA CARE TEAM

While these medications demonstrate significant benefits for patients with obesity and diabetes, alongside emerging evidence suggesting multimodal therapeutic effects across several organ systems, they also present several important considerations and potential complications for anesthesia providers and perioperative care teams responsible for maintaining safe patient care (Beam et al., 2023; Joshi et al., 2023). Of note, case reports and work conducted by the American Society of Anesthesiologists (ASA) have identified several primary perioperative considerations related to GLP-1 receptor agonist use. Chief among these concerns is airway management and aspiration risk associated with delayed gastric emptying, as well as the intraoperative management of blood glucose levels and maintenance of physiologic glucose regulation throughout the perioperative period (Beam et al., 2023; Joshi et al., 2023).

As mentioned previously, GLP-1's initial pharmacological therapy revolved around the treatment of Diabetes Mellitus Type II and subsequent weight loss (Moiz et al., 2025a). Mechanistically, the weight-loss benefit is achieved by slowing gastric emptying and reducing peristalsis, the contractile process of smooth muscle in the gastrointestinal tract responsible for moving food material through the body for digestion (Beam, Hunter, & Guevara, 2023; Moiz et al., 2025a; Moiz et al., 2025b; Peri et al., 2025). For anesthesia care teams, however, this presents several complications, namely the potential risk of pulmonary aspiration of gastric contents into the airway (Beam et al., 2023). In a 2023 article published by the Anesthesia Patient Safety Foundation (APSF), Beam et al. presented two cases of patients on GLP-1 medications requiring anesthetic care. In both cases, the patients followed NPO fasting guidelines prior to receiving anesthesia; however, each patient still had particulate food matter present in the gastric system.

In one case, the patient had stopped taking their GLP-1 medication seven days prior to surgery and had followed NPO fasting guidelines for over 18 hours; however, a gastric ultrasound still found "solid gastric contents," demonstrating concerns that despite fasting and cessation of medication for a week, agonist activity at the GLP-1 receptor site was still occurring and presenting an aspiration risk for the patient. In the second case presentation, it was noted that the anesthetic was uneventful during induction and maintenance, but on emergence, the patient produced large volumes of gastric content that required suctioning.

For this reason, the ASA Task Force provided guidance on what care teams should be doing regarding pulmonary aspiration risks related to the use of GLP-1 medications (Joshi et al., 2023). It is recommended that patients on daily dosing cease the medication one day prior to surgery and that those on a weekly dose regimen pause the medication for at least one week prior to surgery (Joshi et al., 2023). Further, it is recommended that during preoperative consultation and evaluation, providers perform a more focused assessment of the patient's gastrointestinal system, especially in situations where the patient indicates symptoms of nausea, fullness, or bloating, with the recommendation that the anesthesia care team initiate a full-stomach protocol for induction and intraoperative management of anesthesia (Joshi et al., 2023).

For the anesthesia technologist, it is essential to understand protocols for patients presenting with symptoms of a full stomach secondary to potential retained gastric contents elicited from GLP-1 use, including the use of rapid sequence induction and intubation, as this provides a safer induction process by guarding against aspiration pneumonitis through intubating the patient while airway reflexes remain intact (Pardo, 2023). The technologist, therefore, should be familiar with the primary medications used, namely succinylcholine as the primary short-term depolarizing paralytic agent and hypnotic sedative agents such as propofol (Butterworth et al., 2022; Pardo, 2023). In this case, the technologist should be situationally aware that the sequencing of these medications will occur in close timing to one another, necessitating the application of cricoid pressure via the Sellick's maneuver and assuring an appropriate seal is maintained, tasks the technologist needs to be prepared to demonstrate effectively as the provider transitions from an accelerated intravenous induction into intubation (Butterworth et al., 2022). Beyond the airway management techniques recommended by the ASA Task Force and APSF, it is also noted that care teams may deploy gastric ultrasound prior to induction to assess for a full stomach, meaning the anesthesia technologist should anticipate that any full-stomach induction protocol involving a patient on a GLP-1 medication may require ultrasound preparation for point-of-care assessment (Joshi et al., 2023).

Autoinjector with Trulicity (0.75mg) by Lilly (Dulaglutid)

Credit: Raimond Spekking (August 2021)

As it relates to intraoperative concerns for managing patients beyond aspiration and regurgitation of gastric contents, there is also the matter of glucose management, specifically in situations where patients using the medication for Diabetes Mellitus management need to pause injections prior to surgery. For the clinician, it is recommended that the patient receive consultation from an endocrinologist prior to anesthesia delivery as a measure to avoid hyperglycemic events (Joshi et al., 2023). As research continues to emerge, literature is also indicating that the ASA recommendations of pausing one cycle of medication administration may not suffice. A 2026 systematic literature review by Merhavy et al. found that pausing medication between three and five half-life cycles may be more beneficial; however, the counterbalance is that management of the patient's glycemic control becomes a more pressing concern. Therefore, for the anesthesia technologist, it is prudent to be aware of the intraoperative risks associated with glycemic control, necessitating the need to have glucometers readily available, as well as insulin available for management of diabetic patients who have paused their anti-diabetic therapy (Joshi et al., 2023; Merhavy et al., 2026).

CONCLUSIONS

As GLP-1 receptor agonists continue to gain prevalence across the broader patient population, their implications for perioperative care will only become more pressing for anesthesia care teams to navigate. The evidence presented throughout this paper underscores that while the pharmacologic benefits of GLP-1 medications are well-established and expanding, their perioperative risks including delayed gastric emptying, retained gastric contents, and the compounding challenges of glycemic management in diabetic patients who pause therapy demand a proactive and informed approach from every member of the care team. For the anesthesia technologist, this means going beyond equipment preparation and developing a working understanding of the physiologic and pharmacologic landscape these patients bring into the operative suite. As Merhavy et al. (2026) noted, the current evidence base remains varied and largely consensus-driven, meaning the burden of safe, individualized patient care falls squarely on the clinical judgment of the provider and the readiness of the team supporting them. Until high-quality, evidence-based guidelines are established, anesthesia technologists must remain vigilant, anticipate full-stomach protocols, ensure gastric ultrasound resources are readily available, and have glucometers and insulin accessible for patients whose anti-diabetic therapy has been withheld, because in this evolving landscape, preparedness is the standard of care.

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To test your knowledge on this issue's article, provide correct answers to the following questions on the form below. Follow the instructions carefully.

1. GLP-1 receptor agonists were originally developed primarily for the treatment of which of the following conditions?
A) Chronic kidney disease and hepatic steatosis
B) Cardiovascular disease and hypertension
C) Type II diabetes mellitus and obesity
D) Gastroesophageal reflux disease and gastroparesis

2. Which of the following best describes the mechanism by which endogenous GLP-1 lowers blood glucose levels?
A) It stimulates glucagon release from the pancreas in a glucose-dependent manner
B) It stimulates insulin secretion from the pancreas in a glucose-dependent manner
C) It accelerates gastric emptying to reduce postprandial glucose absorption
D) It directly inhibits hepatic glucose production independent of insulin

3. A key pharmacologic difference between endogenous GLP-1 and pharmacologic GLP-1 receptor agonists is their half-life. Approximately how long is the half-life of semaglutide?
A) 2 minutes
B) 24 hours
C) 116 hours
D) 160 hours

4. According to the ASA Task Force guidance, patients on a weekly GLP-1 dosing regimen should pause their medication for at least how long prior to surgery?
A) 24 hours
B) 3 days
C) 1 week
D) 3 to 5 half-life cycles

5. In the case reports presented by Beam et al. (2023), what was the primary perioperative safety concern identified in patients taking GLP-1 medications who had followed NPO fasting guidelines?
A) Intraoperative hypoglycemia due to continued insulin secretion
B) Retained solid gastric contents despite appropriate fasting
C) Prolonged neuromuscular blockade from GLP-1 receptor interactions
D) Hemodynamic instability secondary to reduced glucagon activity

6. Which of the following induction techniques is recommended for patients presenting with a full stomach secondary to GLP-1 use, and what is its primary benefit?
A) Inhalation induction, because it allows for a slower and more controlled onset
B) Total intravenous anesthesia, because it reduces the risk of postoperative nausea
C) Rapid sequence induction and intubation, because it secures the airway while reflexes remain intact
D) Awake fiberoptic intubation, because it eliminates the need for paralytic agents

7. The Sellick maneuver, or cricoid pressure, is referenced in this article in the context of rapid sequence induction. What is the primary purpose of this technique?
A) To facilitate laryngoscopy by improving vocal cord
B) To compress the esophagus and reduce the risk of passive regurgitation during induction
C) To increase tidal volume during mask ventilation prior to intubation
D) To prevent laryngospasm during emergence from anesthesia

8. According to the systematic review by Merhavy et al. (2026), pausing GLP-1 medications for how many half-life cycles was found to be more beneficial in reducing residual gastric contents?
A) One half-life cycle, consistent with current ASA guidance
B) Two half-life cycles prior to elective procedures
C) Three to five half-life cycles prior to surgery
D) Six or more half-life cycles for patients with confounding comorbidities

9. When a diabetic patient has paused their GLP-1 anti-diabetic therapy prior to surgery, which of the following represents the most important preparation responsibility for the anesthesia technologist?
A) Ensuring a nasogastric tube is available for gastric decompression
B) Confirming the patient received endocrinology consultation preoperatively
C) Having glucometers and insulin readily available for intraoperative glycemic management
D) Preparing a propofol infusion for total intravenous anesthesia maintenance

10. Beyond their established roles in diabetes and obesity management, GLP-1 receptor agonists are being investigated for therapeutic benefits in which of the following organ systems?
A) Pulmonary, neurological, and musculoskeletal systems
B) Cardiovascular, hepatic, and renal systems
C) Hematologic, endocrine, and reproductive systems
D) Dermatologic, gastrointestinal, and lymphatic systems

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1. A B C D	6. A B C D
2. A B C D	7. A B C D
3. A B C D	8. A B C D
4. A B C D	9. A B C D
5. A B C D	10. A B C D

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