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Chapter 1 : Current Views on Hypoglycemia and Glucagon - Europe PMC Article - Europe PMC

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May 2nd, Glucagon Kit for Severe Hypoglycemia Emergencies Most of us understand the importance of insulin in controlling our blood glucose BG levels. When our BG levels get too high, we can bring them down by injecting insulin. Insulin is made in and secreted by the beta cells in the pancreas. Glucagon is made in and secreted by the alpha cells in the pancreas. In nondiabetics and people with type 2 diabetes or early type 1 diabetes, glucagon automatically gets secreted when BG levels get too low. But people with longstanding type 1 diabetes often stop producing much glucagon and need glucagon shots to bring up a serious low. Insulin and glucagon are like the accelerator and brake on your car. If you have almost no insulin, you might be able to have normal BG levels if you also had almost no glucagon. In fact, they often secrete even more glucagon than they would in a nondiabetic. Most diabetes researchers focus on beta cells and insulin production, but some are studying the alpha cells and glucagon production as well. These researchers infused rats with a lot of glucose for 10 days. After initial high BG levels, the rats adapted and maintained normal BG levels for 4 days. Instead, their glucagon levels increased fivefold. Thus endogenous glucose production, production of glucose by the liver, was what was making the BG levels go up. And infusing them with anti-glucagon antibodies made their BG levels return to normal. The authors conclude that glucotoxicity may first manifest as alpha cell malfunction, before any deficit in beta cells and insulin secretion is seen. This is a new way of looking at how diabetes proceeds. The authors also found that the protein GLT1 glial glutamate transporter 1 could protect the beta cells, and they are working on finding other beta-cell-protective compounds. Neither of these discoveries will result in an instant cure for type 2 diabetes. The first was done in rodents, and the second was done in isolated human cells. But is it possible people are looking in the wrong places? Focusing on the alpha cells is one such approach.

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Chapter 2 : Ready-to-Use Glucagon Rescue Pen Under FDA Review for Severe Hypoglycemia Tx - MPR

Conference: Current views on hypoglycemia and glucagon (proceeding of the Serono Symposia, At European Symposium on Hypoglycemia 2nd, Rome, ,, Volume:volume 30,,ISSN Academic Press.

They can suggest ways to avoid low blood glucose in the future. Many people tend to want to eat as much as they can until they feel better. This can cause blood glucose levels to shoot way up. Using the step-wise approach of the " Rule" can help you avoid this, preventing high blood glucose levels. Young children usually need less than 15 grams of carbs to fix a low blood glucose level: Infants may need 6 grams, toddlers may need 8 grams, and small children may need 10 grams. This needs to be individualized for the patient, so discuss the amount needed with your diabetes team. When treating a low, the choice of carbohydrate source is important. Complex carbohydrates, or foods that contain fats along with carbs like chocolate can slow the absorption of glucose and should not be used to treat an emergency low. Treating Severe Hypoglycemia Glucagon is a hormone produced in the pancreas that stimulates your liver to release stored glucose into your bloodstream when your blood glucose levels are too low. Injectable glucagon is used to treat someone with diabetes when their blood glucose is too low to treat using the rule. Glucagon kits are available by prescription. Speak with your doctor about whether you should buy a glucagon kit and how and when to use it. The people you are in frequent contact with for example, friends, family members, and coworkers should be instructed on how to give you glucagon to treat severe hypoglycemia. Steps for treating a person with symptoms keeping them from being able to treat themselves. Inject glucagon into the buttock, arm, or thigh, following the instructions in the kit. When the person regains consciousness usually in minutes , they may experience nausea and vomiting. If you have needed glucagon, let your doctor know so you can discuss ways to prevent severe hypoglycemia in the future. If someone is unconscious and glucagon is not available or someone does not know how to use it, call immediately. Inject insulin it will lower their blood glucose even more Provide food or fluids they can choke Causes of Low Blood Glucose Low blood glucose is common for people with type 1 diabetes and can occur in people with type 2 diabetes taking insulin or certain medications. If you add in lows without symptoms and the ones that happen overnight, the number would likely be higher. Insulin Too much insulin is a definite cause of low blood glucose. Insulin pumps may also reduce the risk for low blood glucose. Accidentally injecting the wrong insulin type, too much insulin, or injecting directly into the muscle instead of the just under the skin , can cause low blood glucose. Food What you eat can cause blood glucose, including: Not enough carbohydrates Eating foods with less carbohydrate than usual without reducing the amount of insulin taken. Timing of insulin based on whether your carbs are from liquids versus solids can affect blood glucose levels. Liquids are absorbed much faster than solids, so timing the insulin dose to the absorption of glucose from foods can be tricky. The composition of the meal—how much fat, protein, and fiber are present—can also affect the absorption of carbohydrates. Physical Activity Exercise has many benefits. The tricky thing for people with type 1 diabetes is that it can lower blood glucose in both the short- and long-term. Nearly half of children in a type 1 diabetes study who exercised an hour during the day experienced a low blood glucose reaction overnight. The intensity, duration, and timing of exercise can all affect the risk for going low. Medical IDs Many people with diabetes, particularly those who use insulin, should have a medical ID with them at all times. Medical IDs are usually worn as a bracelet or a necklace. As unpleasant as they may be, the symptoms of low blood glucose are useful. These symptoms tell you that your blood glucose is low and you need to take action to bring it back into a safe range. But, many people have blood glucose readings below this level and feel no symptoms. This is called hypoglycemia unawareness. Hypoglycemia unawareness puts the person at increased risk for severe low blood glucose reactions when they need someone to help them recover. People with hypoglycemia unawareness are also less likely to be awakened from sleep when hypoglycemia occurs at night. People with hypoglycemia unawareness need to take extra care to check blood glucose frequently. This is especially important prior to and during critical tasks

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such as driving. A continuous glucose monitor can sound an alarm when blood glucose levels are low or start to fall. This can be a big help for people with hypoglycemia unawareness. Hypoglycemia unawareness occurs more frequently in those who: Frequently have low blood glucose episodes which can cause you to stop sensing the early warning signs of hypoglycemia Have had diabetes for a long time Tightly control their diabetes which increases your chances of having low blood glucose reactions If you think you have hypoglycemia unawareness, speak with your health care provider. This helps your body re-learn how to react to low blood glucose levels. This may mean increasing your target blood glucose level a new target that needs to be worked out with your diabetes care team. It may even result in a higher A1C level, but regaining the ability to feel symptoms of lows is worth the temporary rise in blood glucose levels. This can happen when your blood glucose levels are very high and start to go down quickly. If this is happening, discuss treatment with your diabetes care team. Your best bet is to practice good diabetes management and learn to detect hypoglycemia so you can treat it early—before it gets worse. Monitoring blood glucose, with either a meter or a continuous glucose monitor CGM , is the tried and true method for preventing hypoglycemia. Studies consistently show that the more a person checks blood glucose, the lower his or her risk of hypoglycemia. This is because you can see when blood glucose levels are dropping and can treat it before it gets too low. If you can, check often! Together, you can review all your data to figure out the cause of the lows. Your provider may be able to help prevent low blood glucose by adjusting the timing of insulin dosing, exercise, and meals or snacks. Changing insulin doses or the types of food you eat may also do the trick. These are the ones that make me feel weak, shaky, nervous, not want to talk to anyone, and give me a ravenous need to eat everything around me until I feel better. I hate this feeling. I do like that he will bring me a juice box or something to treat at night. It helps to have a little bit of the burden shared by someone else. Strand, MD, is a pain management specialist, a mother of two, and was a member of the first two-woman team to win The Amazing Race. Usually I notice it with a shift of my head. It will feel like things move slightly slower than they should. How much insulin did I take? I can feel my heart beating out of my chest, and it becomes difficult to hear and see. Check blood sugar level, get sugar. I start rummaging through my purse, hoping for some random piece of candy, something, anything, that can bring my levels up. I need someone to help me, but in this intense moment of fear, my brain becomes incapacitated and all logical ideas are gone. The only way to move past the fear is to robot-like move forward. Get up and go find something or someone to help. This experience never gets easier. After 16 years of this, I still struggle to hold back the tears and shame and to fight for myself in that moment. It all seems so simple: Every diabetic has their story or stories These are the moments that make us brave. These are the moments where we must have a stronger sense in us to live and fight for it than to let go and let the dizzying wheel take us away. These are the moments that no matter how much you love a diabetic, you will never truly understand. No one sees the chemical, hormonal, emotional scars. So brave, yes, but for so many reasons others may never understand. Their advice, support, and practical tips will help you fit insulin into your lifestyle.

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Chapter 3 : Glucagon - FDA prescribing information, side effects and uses

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

View All Glucagon Description Glucagon for Injection is a polypeptide hormone identical to human Glucagon that increases blood glucose and relaxes smooth muscle of the gastrointestinal tract. Glucagon is synthesized in a special non-pathogenic laboratory strain of *Escherichia coli* bacteria that has been genetically altered by the addition of the gene for Glucagon. The primary sequence of Glucagon is shown below. Crystalline Glucagon is a white to off-white powder. Glucagon is available for use intravenously, intramuscularly, or subcutaneously in a kit that contains a vial of sterile Glucagon and a syringe of sterile diluent. Hydrochloric acid may have been added during manufacture to adjust the pH of the Glucagon. Glucagon - Clinical Pharmacology Glucagon increases blood glucose concentration and is used in the treatment of severe hypoglycemia. Glucagon acts only on liver glycogen, converting it to glucose. Glucagon administered through a parenteral route relaxes smooth muscle of the stomach, duodenum, small bowel, and colon. Pharmacokinetics Glucagon has been studied following intramuscular, subcutaneous, and intravenous administration in adult volunteers. Administration of the intravenous Glucagon showed dose proportionality of the pharmacokinetics between 0. Maximum plasma concentrations of 7. With intramuscular dosing, maximum plasma concentrations of 6. Glucagon is extensively degraded in liver, kidney, and plasma. Urinary excretion of intact Glucagon has not been measured. Glucagon is indicated as a treatment for severe hypoglycemia low blood sugar which may occur in patients with diabetes mellitus. For use as a diagnostic aid: Glucagon is indicated as a diagnostic aid in the radiologic examination of the stomach, duodenum, small bowel, and colon when diminished intestinal motility would be advantageous. Glucagon is as effective for this examination as are the anticholinergic drugs. However, as use of Glucagon in combination with anticholinergic drugs may result in increased side effects, the use of Glucagon in combination with anticholinergic drugs is not recommended. Contraindications Glucagon is contraindicated in patients with known hypersensitivity to it or in patients with known pheochromocytoma. Warnings Glucagon should be administered cautiously to patients with a history suggestive of insulinoma, pheochromocytoma, or both. A patient developing symptoms of hypoglycemia after a dose of Glucagon should be given glucose orally, intravenously, or by gavage, whichever is most appropriate. Exogenous Glucagon also stimulates the release of catecholamines. In the presence of pheochromocytoma, Glucagon can cause the tumor to release catecholamines, which may result in a sudden and marked increase in blood pressure. Generalized allergic reactions, including urticaria, respiratory distress, and hypotension, have been reported in patients who received Glucagon by injection. Necrolytic migratory erythema NME, a skin rash commonly associated with Glucagonomas Glucagon-producing tumors and characterized by scaly, pruritic erythematous plaques, bullae, and erosions, has been reported postmarketing following continuous Glucagon infusion. NME lesions may affect the face, groin, perineum and legs or be more widespread. In the reported cases NME resolved with discontinuation of the Glucagon, and treatment with corticosteroids was not effective. Should NME occur, consider whether the benefits of continuous Glucagon infusion outweigh the risks. Precautions General Glucagon is effective in treating hypoglycemia only if sufficient liver glycogen is present. Because Glucagon is of little or no help in states of starvation, adrenal insufficiency, or chronic hypoglycemia, hypoglycemia in these conditions should be treated with glucose. Information for Patients Refer patients and family members to the attached Information for the User for instructions describing the method of preparing and injecting Glucagon. Advise the patient and family members to become familiar with the technique of preparing Glucagon before an emergency arises. Patients and family members should be informed of the following measures to prevent hypoglycemic reactions due to insulin: Reasonable uniformity from day to day with regard to diet, insulin, and exercise. Careful

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adjustment of the insulin program so that the type or types of insulin, dose, and time or times of administration are suited to the individual patient. Frequent testing of the blood or urine for glucose so that a change in insulin requirements can be foreseen. Routine carrying of sugar, candy, or other readily absorbable carbohydrate by the patient so that it may be taken at the first warning of an oncoming reaction. To prevent severe hypoglycemia, patients and family members should be informed of the symptoms of mild hypoglycemia and how to treat it appropriately. Family members should be informed to arouse the patient as quickly as possible because prolonged hypoglycemia may result in damage to the central nervous system. Glucagon or intravenous glucose should awaken the patient sufficiently so that oral carbohydrates may be taken. Patients should be advised to inform their physician when hypoglycemic reactions occur so that the treatment regimen may be adjusted if necessary. Laboratory Tests Blood glucose determinations should be obtained to follow the patient with hypoglycemia until patient is asymptomatic. Carcinogenesis, Mutagenesis, Impairment of Fertility Because Glucagon is usually given in a single dose and has a very short half-life, no studies have been done regarding carcinogenesis. In a series of studies examining effects on the bacterial mutagenesis Ames assay, it was determined that an increase in colony counts was related to technical difficulties in running this assay with peptides and was not due to mutagenic activities of the Glucagon. Pregnancy Reproduction studies have not been performed with recombinant Glucagon. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed. Nursing Mothers It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when Glucagon is administered to a nursing woman. If the drug is excreted in human milk during its short half-life, it will be hydrolyzed and absorbed like any other polypeptide. Glucagon is not active when taken orally because it is destroyed in the gastrointestinal tract before it can be absorbed. Pediatric Use For the treatment of severe hypoglycemia: The use of Glucagon in pediatric patients has been reported to be safe and effective. Effectiveness has not been established in pediatric patients. Other reported clinical experience has not identified differences in responses between the elderly and younger patients. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy. Adverse Reactions Side effects may include nausea and vomiting. These reactions may also occur with hypoglycemia. Overdosage Signs and Symptoms If overdosage occurs, nausea, vomiting, gastric hypotonicity, and diarrhea would be expected without causing consequential toxicity. Intravenous administration of Glucagon has been shown to have positive inotropic and chronotropic effects. A transient increase in both blood pressure and pulse rate may occur following the administration of Glucagon. The increase in blood pressure and pulse rate may require therapy in patients with pheochromocytoma or coronary artery disease. When Glucagon was given in large doses to patients with cardiac disease, investigators reported a positive inotropic effect. These investigators administered Glucagon in doses of 0. Side effects included nausea, vomiting, and decreasing serum potassium concentration. Serum potassium concentration could be maintained within normal limits with supplemental potassium. Because Glucagon is a polypeptide, it would be rapidly destroyed in the gastrointestinal tract if it were to be accidentally ingested. Treatment To obtain up-to-date information about the treatment of overdose, a good resource is your certified Regional Poison Control Center. In managing overdosage, consider the possibility of multiple drug overdoses, interaction among drugs, and unusual drug kinetics in your patient. In view of the extremely short half-life of Glucagon and its prompt destruction and excretion, the treatment of overdosage is symptomatic, primarily for nausea, vomiting, and possible hypokalemia. Forced diuresis, peritoneal dialysis, hemodialysis, or charcoal hemoperfusion have not been established as beneficial for an overdose of Glucagon. The diluent is provided for use only in the preparation of Glucagon for parenteral injection and for no other use. Reconstituted Glucagon should be used immediately. Discard any unused portion. Reconstituted Glucagon solutions should be used only if they are clear and of a water-like consistency. Parenteral drug

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products should be inspected visually for particulate matter and discoloration prior to administration. Directions for Treatment of Severe Hypoglycemia: Severe hypoglycemia should be treated initially with intravenous glucose, if possible. If parenteral glucose can not be used, dissolve the lyophilized Glucagon using the accompanying diluting solution and use immediately. If the response is delayed, there is no contraindication to the administration of an additional dose of Glucagon; however, in view of the deleterious effects of cerebral hypoglycemia emergency aid should be sought so that parenteral glucose can be given. After the patient responds, supplemental carbohydrate should be given to restore liver glycogen and to prevent secondary hypoglycemia. Directions for Use as a Diagnostic Aid: Dissolve the lyophilized Glucagon using the accompanying diluting solution and use immediately. The doses in the following table may be administered for relaxation of the stomach, duodenum, and small bowel, depending on the onset and duration of effect required for the examination. Since the stomach is less sensitive to the effect of Glucagon, 0.

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Chapter 4 : Hypoglycemia - Wikipedia

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List of causes of hypoglycemia The most common cause of hypoglycemia is medications used to treat diabetes mellitus such as insulin , sulfonylureas , and biguanides. Serious illness[edit] Serious illness may result in low blood sugar. Hospitalized persons, especially in intensive care units or those prevented from eating, can develop hypoglycemia from a variety of circumstances related to the care of their primary disease. Hypoglycemia in these circumstances is often multifactorial or caused by the healthcare. Once identified, these types of hypoglycemia are readily reversed and prevented, and the underlying disease becomes the primary problem. A limited amount of glucose can be derived from glycogen stored in astrocytes , but it is consumed within minutes. For most practical purposes, the brain is dependent on a continual supply of glucose diffusing from the blood into the interstitial tissue within the central nervous system and into the neurons themselves. Therefore, if the amount of glucose supplied by the blood falls, the brain is one of the first organs affected. Seizures may occur as the glucose falls further. These brain effects are collectively referred to as neuroglycopenia. The importance of an adequate supply of glucose to the brain is apparent from the number of nervous, hormonal and metabolic responses to a falling glucose level. Most of these are defensive or adaptive, tending to raise the blood sugar by glycogenolysis and gluconeogenesis or provide alternative fuels. If the blood sugar level falls too low, the liver converts a storage of glycogen into glucose and releases it into the bloodstream, to prevent the person going into a diabetic coma , for a short time. Brief or mild hypoglycemia produces no lasting effects on the brain, though it can temporarily alter brain responses to additional hypoglycemia. Prolonged, severe hypoglycemia can produce lasting damage of a wide range. This can include impairment of cognitive function, motor control, or even consciousness. The likelihood of permanent brain damage from any given instance of severe hypoglycemia is difficult to estimate and depends on a multitude of factors such as age, recent blood and brain glucose experience, concurrent problems such as hypoxia , and availability of alternative fuels. It has been frequently found that those type 1 diabetics found "dead in bed" in the morning after suspected severe hypoglycemia had some underlying coronary pathology that led to an induced fatal heart attack. The individuals failed to respond to the audible alarms produced by the monitors which may have been "alarming" for many hours. In diabetics a level below 3. This is usually conducted in the hospital, and the duration depends on the age of the patient and response to the fast. The purpose of the fast is to determine whether the person can maintain his or her blood glucose as long as normal, and can respond to fasting with the appropriate metabolic changes. At the end of the fast the insulin should be nearly undetectable and ketosis should be fully established. Despite its unpleasantness and expense, a diagnostic fast may be the only effective way to confirm or refute a number of serious forms of hypoglycemia, especially those involving excessive insulin. The precise level of glucose considered low enough to define hypoglycemia is dependent on 1 the measurement method, 2 the age of the person, 3 presence or absence of effects, and 4 the purpose of the definition. While there is no disagreement as to the normal range of blood sugar, debate continues as to what degree of hypoglycemia warrants medical evaluation or treatment, or can cause harm. This leads people to use different "cutoff levels" of glucose in different contexts and for different purposes. Because of all the variations, the Endocrine Society recommends that a diagnosis of hypoglycemia as a problem for an individual be based on the combination of a low glucose level and evidence of adverse effects. The circumstances of hypoglycemia provide most of the clues to diagnosis. Circumstances include the age of the person, time of day, time since last meal, previous episodes, nutritional status, physical and mental development, drugs or toxins especially insulin or other diabetes drugs , diseases of other organ systems, family history, and response to treatment. When hypoglycemia occurs repeatedly, a record or "diary" of the spells over several months, noting the circumstances of each spell time of day, relation to last meal, nature of last meal, response to

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carbohydrate, and so forth may be useful in recognizing the nature and cause of the hypoglycemia. Method of measurement[edit] Blood glucose levels discussed in this article are venous plasma or serum levels measured by standard, automated glucose oxidase methods used in medical laboratories. For clinical purposes, plasma and serum levels are similar enough to be interchangeable. Arterial plasma or serum levels are slightly higher than venous levels, and capillary levels are typically in between. Two other factors significantly affect glucose measurement: The disparity between venous and whole blood concentrations is greater when the hematocrit is high, as in newborn infants, or adults with polycythemia. The normal range of newborn blood sugars continues to be debated. Diabetic hypoglycemia represents a special case with respect to the relationship of measured glucose and hypoglycemic symptoms for several reasons. First, although home glucose meter readings are often misleading, the probability that a low reading, whether accompanied by symptoms or not, represents real hypoglycemia is much higher in a person who takes insulin than in someone who does not. Not all tests are checked on every patient. A "basic version" would include insulin, cortisol, and electrolytes, with C-peptide and drug screen for adults and growth hormone in children. The value of additional specific tests depends on the most likely diagnoses for an individual patient, based on the circumstances described above. Many of these levels change within minutes, especially if glucose is given, and there is no value in measuring them after the hypoglycemia is reversed. Others, especially those lower in the list, remain abnormal even after hypoglycemia is reversed, and can be usefully measured even if a critical specimen is missed. Part of the value of the critical sample may simply be the proof that the symptoms are indeed due to hypoglycemia. More often, measurement of certain hormones and metabolites at the time of hypoglycemia indicates which organs and body systems are responding appropriately and which are functioning abnormally. For example, when the blood glucose is low, hormones which raise the glucose should be rising and insulin secretion should be completely suppressed.

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Chapter 5 : Low Blood Glucose (Hypoglycemia) | NIDDK

Glucagon and insulin, another kind of hormone, should work as a team to keep your blood sugar in balance. The cells in your pancreas that make glucagon are similar to cells that make insulin.

The findings are important because the number of bariatric surgeries is going up and physicians do not have adequate tools to treat this condition. Current treatments for post-bariatric hypoglycemia, including a special diet and medications, have their limitations. In recent years, however, a number of innovative advances have opened the door to a new approach. It is used to treat severe hypoglycemia in patients with diabetes. The components of this novel system include a continuous glucose monitor CGM , which is a sensor that checks glucose values every five minutes; an investigational form of glucagon that can be delivered rapidly and precisely through a pump; and a mobile platform pAPS that hosts a novel hypoglycemia prediction algorithm developed by the research team from Harvard John A. Laguna Sanz, PhD, from the Harvard team. In this preliminary study, the research team tested the system on seven participants diagnosed with post-bariatric hypoglycemia. After the delivery system was placed on the participants, they were given a high carbohydrate liquid meal to induce severe hypoglycemia and were then monitored for many hours. Investigators used what is called an open system. It beeped when participants were at high risk for hypoglycemia. At that point, an investigator would administer a dose of glucagon. Over the course of the study, progressive changes were made to the computer algorithm and the glucagon dosage in order to fine tune the approach. Corrections were made by using earlier hypoglycemia alarms or larger glucagon doses. The system is feasible and safe, according to investigators. The single-dose glucagon used in the study was well-tolerated. It raised serum glucagon yet did not provoke increased insulin. This prediction system successfully alerted investigators to impending hypoglycemia, and as the algorithm was refined throughout the study, the amount of time participants experienced hypoglycemia decreased significantly. Consequently they can become incapacitated and have difficulty treating themselves once they do recognize that they are not feeling well. Currently the research team is conducting a randomized, double-blind placebo-controlled trial of this system, which aims to show whether the closed loop system can prevent hypoglycemia. The results from this trial should be available in June Other study authors include Kristen M. Fowler, Emilie Cloutier, Allison B.

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Chapter 6 : Treatment of severe diabetic hypoglycemia with glucagon: an underutilized therapeutic approach

Hypoglycemia. Hypoglycemia is diagnosed when blood glucose levels fall to abnormally low levels. Under normal conditions, the body maintains a very narrow range of blood glucose levels despite wide variations in food intake and energy expenditure (Braunwald DE et al).

Fast or irregular heart beat
Unable to eat or drink
Seizures or convulsions
jerky movements
Unconsciousness

Some symptoms of hypoglycemia during sleep are crying out or having nightmares sweating enough to make your pajamas or sheets damp feeling tired, irritable, or confused after waking up

What causes hypoglycemia in diabetes? Hypoglycemia can be a side effect of insulin or other types of diabetes medicines that help your body make more insulin. Two types of diabetes pills can cause hypoglycemia: Ask your health care team if your diabetes medicine can cause hypoglycemia. If you take insulin or some other diabetes medicines, your blood glucose level can drop too low. What other factors contribute to hypoglycemia in diabetes? The following factors can make hypoglycemia more likely: Not eating enough carbohydrates carbs When you eat foods containing carbohydrates , your digestive system breaks down the sugars and starches into glucose. Glucose then enters your bloodstream and raises your blood glucose level. Skipping or delaying a meal If you skip or delay a meal, your blood glucose could drop too low. Increasing physical activity Increasing your physical activity level beyond your normal routine can lower your blood glucose level for up to 24 hours after the activity. The effects of alcohol can also keep you from feeling the symptoms of hypoglycemia, which may lead to severe hypoglycemia. How can I prevent hypoglycemia if I have diabetes? If you are taking insulin, a sulfonylurea, or a meglitinide, using your diabetes management plan and working with your health care team to adjust your plan as needed can help you prevent hypoglycemia. The following actions can also help prevent hypoglycemia: Check blood glucose levels Knowing your blood glucose level can help you decide how much medicine to take, what food to eat, and how physically active to be. To find out your blood glucose level, check yourself with a blood glucose meter as often as your doctor advises. If you have had hypoglycemia without feeling any symptoms, you may need to check your blood glucose more often so you know when you need to treat your hypoglycemia or take steps to prevent it. Be sure to check your blood glucose before you drive. If you have hypoglycemia unawareness or have hypoglycemia often, ask your health care provider about a continuous glucose monitor CGM. A CGM checks your blood glucose level at regular times throughout the day and night. CGMs can tell you if your blood glucose is falling quickly and sound an alarm if your blood glucose falls too low. CGM alarms can wake you up if you have hypoglycemia during sleep. Eat regular meals and snacks Your meal plan is key to preventing hypoglycemia. Eat regular meals and snacks with the correct amount of carbohydrates to help keep your blood glucose level from going too low. Be physically active safely Physical activity can lower your blood glucose during the activity and for hours afterward. To help prevent hypoglycemia, you may need to check your blood glucose before, during, and after physical activity and adjust your medicine or carbohydrate intake. For example, you might eat a snack before being physically active or decrease your insulin dose as directed by your health care provider to keep your blood glucose from dropping too low. Work with your health care team Tell your health care team if you have had hypoglycemia. Your health care team may adjust your diabetes medicines or other aspects of your management plan. Learn about balancing your medicines, eating plan, and physical activity to prevent hypoglycemia. Ask if you should have a glucagon emergency kit to carry with you at all times. You can help prevent hypoglycemia by working with your health care team. How do I treat hypoglycemia? If you begin to feel one or more hypoglycemia symptoms, check your blood glucose. If your blood glucose level is below your target or less than 70, eat or drink 15 grams of carbohydrates right away. If your glucose level is still low, eat or drink another 15 grams of glucose or carbohydrates. Check your blood glucose again after another 15 minutes. Repeat these steps until your glucose level is back to normal. If your next meal is more than 1 hour away, have a snack to keep your blood glucose level in your target range. Try crackers or a piece of fruit.

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Apple, grape, or cranberry juice are good options. If your blood glucose is below your target, take 15 grams of glucose or carbohydrates right away. Treating hypoglycemia if you take acarbose or miglitol If you take acarbose or miglitol along with diabetes medicines that can cause hypoglycemia, you will need to take glucose tablets or glucose gel if your blood glucose level is too low. Someone will need to give you a glucagon injection if you have severe hypoglycemia. An injection of glucagon will quickly raise your blood glucose level. Talk with your health care provider about when and how to use a glucagon emergency kit. If you are likely to have severe hypoglycemia, teach your family, friends, and coworkers when and how to give you a glucagon injection. If you have hypoglycemia often or have had severe hypoglycemia, you should wear a medical alert bracelet or pendant. A medical alert ID tells other people that you have diabetes and need care right away. Getting prompt care can help prevent the serious problems that hypoglycemia can cause. The NIDDK translates and disseminates research findings through its clearinghouses and education programs to increase knowledge and understanding about health and disease among patients, health professionals, and the public.

Chapter 7 : Understanding Glucagon in People with Diabetes – Diabetes Daily

RESEARCH DESIGN AND METHODS Hyperinsulinemic hypoglycemic clamp studies were performed in all participants. The glucagon response to both hypoglycemia and arginine was measured, as well as epinephrine, cortisol, and growth hormone responses to hypoglycemia.

Chapter 8 : Hypoglycemia - Low Blood Glucose (Blood Sugar): American Diabetes Association®

Glucagon can be administered intramuscularly in patients and its use should be expanded to include EMTs so that episodes of severe hypoglycemia can be more easily treated, ultimately resulting in.