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Insulin Chewing Gum: New Target Found for Diabetic Patients Therapies

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Abstract

Diabetes patients cannot produce insulin properly which has required to convert sugar, starches, and other food source into energy. Scientists have been looking for simple and effective ways to deliver insulin into the blood stream. The most common one is taking insulin pill orally. However research shows that insulin has easily broken down by the digestive system. This problem is solved by using chewing gum insulin. These can be done by binding insulin with vitamin B12. The vitamin B12 is protected with haptocorrin which has salivary protein. Once haptocorrin reaches the intestines, another chemical pathway takes over to help vitamin B12 pass into the bloodstream. Binding of insulin molecules to vitamin B12 makes the insulin hitch a ride on this protected supply chain. The insulin could ride all the way into the bloodstream, where it has released to do its work. Chewing gum also causes stimulation of brain which leads to increased release of insulin. Finding simpler ways to deliver insulin into the blood stream has one important avenue for tackling the diabetes epidemic that has sweeping the developed world. Body has specific mechanisms for protecting and absorbing valuable molecules that would usually be damaged by conditions in the gut. Chewing gum would be a better delivery method in humans.

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Introduction

Man has a habit of chewing the chewing gum since ancient times. Today it has one of the most popular dosage form, used for delivering the many active components. The first medical chewing gum was introduced in market in 1928 consisting of aspirin an analgesic drug. However, chewing gum did not gain acceptance as a reliable drug delivery system until 1978, when nicotine chewing gum became available in 1980. Most of the chewing gum has used for smoking cessation (containing the nicotine) and also used for oral and dental hygiene (consisting of fluoride and carbamide etc) [1]. Today, medical chewing gum meets the same high-quality standards as tablets and can be formulated to obtain different release profiles of active substances, thus enabling distinct patient group targeting [2,3]. It can be taken discreetly without water and allows for local and systemic delivery.

It can be employed for treatment of diseases of the oral cavity and throat, e.g. for caries prevention, or it can release drugs that can be absorbed through oral mucosa directly into the systemic circulation. In addition, drug that is not absorbed by the oral cavity membranes can be dissolved in the saliva before swallowing, thus leading to a more rapid onset of action. The majority of chewing gum delivery systems today are manufactured using conventional gum processes. The gum base has softened or melted and placed in a kettle mixer where

sweeteners, syrups, active ingredients and other excipients have added at a defined time. The gum is then sent to a series of rollers that form it into a thin, wide ribbon. During this process, a light coating of finely powdered sugar or sugar substitute has added to keep the gum from sticking and to enhance the flavors. Finally, the gum is cut to the desired size and cooled at a carefully controlled temperature and humidity. The need for and value of in vitro drug release testing has well established for a range of dosage forms, however, standard dissolution apparatus is not suitable for monitoring release of drug from chewing gums as the action of chewing is essential, by providing a renewable surface for drug release after chewing action.

The release of substances from chewing gums during mastication can be studied by employing a panel of tasters and chew-out studies. During the mastication process, the medication contained within the gum product should be released into the saliva and is either absorbed through the oral mucosa or swallowed and absorbed through the gastrointestinal tract. The chewed gum can then be removed and analyzed for the residual drug substance while pharmacokinetics can be determined from blood samples. Disadvantages of chew-out studies include the requirement for human volunteers, Lack of chew control and variations in the flow and composition of subjects' saliva. A number of devices to mimic the chewing action have been reported [4-6]. In 2000, the European Pharmacopoeia published a monograph describing a suitable apparatus for studying the in vitro release of drug substances from chewing gum [7].

Why we use Chewing Gum as A Drug Delivery System?

Easy for administration without water promotes higher patient compliance, Children and for patients who find swallowing tablets difficult are obvious, fast onset of action, less side effects, Effective on Dry mouth, Local therapy.

Mechanism of Action

Past studies have shown that the digestive system breaks down an insulin pill taken orally, and that any surviving enzyme has not easily absorbed into the bloodstream from the gut. Mammals have a transport mechanism for the absorption and cellular uptake of the relatively large Vitamin B12 molecule which relies upon complexing to a naturally occurring transport protein known as Intrinsic Factor such as haptocorrin chewing anything produces saliva, which triggers the release of insulin. Combination of chewing gum with insulin and vitamin B12 has given during mastication process which leads to production of saliva which containing haptocorrin protein which coat the vitamin B12 and act as intrinsic factor for absorption of vitamin B12 coating insulin into blood stream vitamin B12 protect the insulin from digestive enzyme. Active substances like chromium, guaran and caffeine has proved to be efficient in treating obesity. Chromium has claimed to reduce craving for food due to an improved blood-glucose balance. Caffeine and guaran stimulate lipolysis and have a thermo genic effect (increased energy expenditure) and reduce feeling of hunger [8,9].

Conclusion

Chewing gum has an excellent drug delivery system for self-medication, as it has convenient and can be administered discreetly with-out water. It offers removal of needles fear from the patient. Chewing gum helps to give insulin orally for diabetics and tackle the degradation of insulin by digestive enzyme without adding digestive enzyme inhibitor. It helps to reduce the cost of therapy & improve the brain boost power, concentration & smoking cessation. The release of insulin leads to an increased heart rate and sends glucose and oxygen to our brain. The glucose and oxygen in our brain helps improve concentration, focus, and learning. An insulin chewing gum can offer a significant solution to the breaking down of orally-taken insulin by the digestive system.

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