## STUDY ON ORAL ADMINISTRATION OF INSULIN - LOADED PLGA NANOPARTICLES

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Abstract The current treatment option fortype 1 diabetic patients is daily subcutaneous injection of insulin,which causes poor patient compliance and is rather expensive Previously, several strategies were used to improve oral insulin absorption. Among these strategies, nanoparticles (NPs) may represent the most promising approach. Protein drugs encapsulated in nanoparticles are protected from enzymatic degradation in the GI tract. Moreover, the permeability of protein drugs through the mucus or epithelial cell barrier is enhanced due to the greater surface-area-to-volume ratio of nanoparticles or the modification of nanoparticles' surface properties. Polylactide-co-glycoside (PLGA) is approved by the U.S. FDA and has been proven to be safe for clinical applications. PLGA nanoparticles have gained numerous popularities in drug delivery. Controlled release can be achieved by using PLGA NPs to protect effectively encapsulated protein drugs from enzymatic degradation in the GI tract.

Key words:Insulin,oral administration,PLGA,nanoparticles

There are 415 million adults were living with diabetes in 2015 andthis number isexpected to increase to around 642 million or one inten adults by 2040, according to a report from International DiabetesFederation (IDF). It has become one of the most lethal diseases insome counties, especially in the developing countries. Insulin iscommonlyused to treat diabetes.

Subcutaneous injection has been the main route of administration of diabetes, but long-term injection of insulin to patients with inconvenience and pain, greatly reducing the patient's compliance. Oral administration is an ideal mode of administration because it eliminates pain and trauma associated with injection. However, insulin is a protein biological macromolecule drugs, oral administration need to overcome the physiological barriers, enzyme disorders and physical and chemical stability. To date, different strategies have been used to improve the absorption of oral insulin, in which the polylactic acid-glycolic acid copolymer (PLGA) approved by the US FDA has good biosafety and compatibility and has been obtained in drug delivery systems A wide range of applications.

Objective Protein peptide drug oral delivery system has a good patient compliance, but the protein bio-macromolecule oral administration of drugs need to overcome the enzyme degradation and transmembrane transport difficulties lead to low bioavailability problems. .Controlled release can be achieved by using PLGA NPs to protect effectively encapsulated protein drugs from enzymatic degradation in the GI tract.

Materialsandmethods Preparationofnanoparticlesusinginsulinandbiodegradablematerials PLGA. Evaluationofthetoxicityof nanoparticles from the cellular level, the use of diabetic rats to evaluate the degree of hypoglycemia of nanoparticles.

Results and discussion Insulin is commonly used to treat diabetes. Oral delivery has become the most desirable method of insulin administration because of its convenience and good patient compliance. More importantly, the physiological mechanism of insulin secretion is mimicked by oral administration. In particular, insulin absorbed in the intestine can go directly to the liver, the main target organ of insulin, through the portal vein, and high exposure via the peripheral circulation can be avoided. Consequently, oral delivery of insulin results in fewer side effects. However, the oral bioavailability of protein/peptide therapeutics such as insulin is very poor, mainly due to the following three barriers:

There are many difficulties in oral administration, mainly in: 1) peptides, protein drugs molecular weight, and often in the form of polymers exist, not easy through the gastrointestinal mucosa; 2) protein in the gastrointestinal tract esily degraded by enzymes and gastric acid to cause damage, resulting in lowbioavailability, generally less than 2%. Nanotechnology can improve the oral absorption of protein drugs, the drug contained in the nanoparticles, can protect the protein in the gastrointestinal tract degradation and destruction, and can improve the absorption of drugs.

In summary, insulin nanoparticles have a certain hypoglycemic effect and sustained release effect, is a good application prospect of oral protein delivery vector.

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