

ACID-RESISTANT AND SUSTAINED-RELEASE ORAL CRYSTAL BALL CONTAINING PROBIOTICS

BACKGROUND OF THE INVENTION

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1. Field of the Invention

The present invention relates to an acid-resistant and sustained-release oral crystal ball containing probiotics which has a multilayer wrapped structure to improve stability and environmental tolerance, e.g. acid resistance, bile salt resistance and pancreatic juice resistance in the digestive tract and can be mass-produced at low cost.

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2. Description of Related Art

15 The stability of probiotics is easily affected by the external environment, so probiotic products usually have a short shelf life. Furthermore, after probiotics are taken orally, their activities are destroyed by gastric acid, bile salts and pancreatic juice in the digestive tract. As a result, probiotics ingested cannot effectively exert the expected effects.

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In order to solve the abovementioned problems, many manufacturers use encapsulating technique to process probiotic products. The conventional method for preparing a final product comprises the steps of conducting a crushing or sieving processing after probiotics are encapsulated and freeze-dried, which reduces the integrity of the encapsulated structure and the protection of probiotics. Furthermore, the currently developed spore probiotics are restricted by spore formation and cannot be universally applied to all probiotic strains. Additionally, products that use microencapsulation to encapsulate crystal balls and dropping pills (e.g. seamless capsules) have the disadvantages of high manufacturing cost and the like due to the particular process technique and manufacturing machines used.

SUMMARY OF THE INVENTION

In view of the above-mentioned problems, the object of the present invention is to provide an acid-resistant and sustained-release oral crystal ball containing probiotics which has a multilayer wrapped structure to improve stability and environmental tolerance, e.g. acid resistance, bile salt resistance

and pancreatic juice resistance in the digestive tract and can be mass-produced at low cost.

The acid-resistant and sustained-release oral crystal ball containing probiotics comprises a spherical core for
5 accommodating probiotics; a protection layer wrapped around the spherical core for providing probiotics nutrients to prolong and maintain the probiotic activity; a sustained-release layer wrapped around the protection layer for slow release of the spherical core; a bile salt and pancreatic juice resistant layer
10 wrapped around the sustained-release layer for isolating the spherical core from outside and resisting to bile salt and pancreatic juice; an acid-resistant layer wrapped around the bile salt and pancreatic juice resistant layer for protecting probiotics from gastric acid damage to improve the survival rate and
15 availability of probiotics in the gastrointestinal tract; and an insulation layer wrapped around the acid-resistant layer for protecting the crystal ball from the external environment.

The order of setting the layers of the present invention is based on the order in which the crystal ball contacts the digestive
20 fluid after entering the human digestive system. Therefore, the present invention can effectively protect the spherical core

containing probiotics from the external environment to improve the stability of storage, and reduce the influence of temperature, pH value, moisture, oxidation or other substances on probiotics.

5 Additionally, the multilayer wrapped structure allows slow and controlled release of probiotics in the digestive tract and avoids the loss of activity of probiotics due to gastric acid, bile salts and pancreatic juice, which increase the survival rate and availability of probiotics in the intestines.

Therefore, the present invention ensures that probiotics in
10 the oral crystal ball successfully pass through the stomach, intestines and the like, and improves the survival time of probiotics in the intestines, so as to effectively provide health care for the intestines.

15 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a stereogram showing an acid-resistant and sustained-release oral crystal ball containing probiotics according to the present invention;

FIG. 2 is a sectional view showing an acid-resistant and sustained-release oral crystal ball containing probiotics according to the present invention.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, an exemplary embodiment of the present invention will be described in detail with reference to the
10 accompanying drawings.

As showed in FIG. 1 and FIG. 2, an aid-resistant and sustained-release oral crystal ball containing probiotics is disclosed herein. It comprises a spherical core (1) for accommodating probiotics, a protection layer (2) wrapped around
15 the spherical core (1), a sustained-release layer (3) wrapped around the protection layer (2), a bile salt and pancreatic juice resistant layer (4) wrapped around the sustained-release layer (3), an acid-resistant layer (5) wrapped around the bile salt and pancreatic juice resistant layer (4), and an insulation layer (6)
20 wrapped around the acid-resistant layer (5).

The spherical core (1) accommodates one kind of probiotic or a combination of many kinds of probiotics and is made of one or several substances, e.g. including but not limited to the group consisting of trehalose, lactose, sucrose, inulin, anhydrous
 5 glucose, maltodextrin, mannitol, sorbitol, xylitol, erythritol, starch and cellulose. Due to the spherical smooth structure of the spherical core (1), the subsequent wrapping operation can be performed more easily.

The protection layer (2) is wrapped around the spherical
 10 core (1) and made of one or several substances, e.g. including but not limited to the group consisting of fructooligosaccharides, xylooligosaccharides, isomaltooligosaccharides, galactooligosaccharides, raffinose and oligosaccharides, so as to provide probiotics nutrients to prolong and maintain the probiotic
 15 activity.

The sustained-release layer (3) is wrapped around the protection layer (2) and made of one or several substances, e.g. including but not limited to the group consisting of methyl
 cellulose, hydroxypropyl cellulose, hydroxypropyl methyl
 20 cellulose, sodium carboxymethyl cellulose, polymethacrylate, ethylene-vinyl acetate copolymer and ethyl cellulose.

Accordingly, the sustained-release layer (3) has a combination of controlled release film wrapping materials, which can slowly release probiotics accommodated in the spherical core (1).

The bile salt and pancreatic juice resistant layer (4) is
5 wrapped around the sustained-release layer (3) and made of one or several substances, e.g. including but not limited to the group consisting of gum arabic, red algae gum, calcium alginate, sodium alginate, agar, tragacanth gum, carrageenan, pectin, locust bean gum, xanthan gum and gelatin. Accordingly, the bile
10 salt and pancreatic juice resistant layer (4) has a combination of colloidal wrapping materials, which can effectively provide the spherical core (1) from outside and has the effect of resistance to bile salts and pancreatic juice.

The acid-resistant layer (5) is wrapped around the bile salt
15 and pancreatic juice resistant layer (4) and made of one or several substances, e.g. including but not limited to the group consisting of shellac, casein, glycoprotein, whey protein, zein, soy protein, skimmed milk powder, starch acetate, peptide, chitin and chitosan. Accordingly, the acid-resistant layer (5) includes a
20 combination of protein materials, which can protect probiotics

from gastric acid damage and improve the survival rate and availability of probiotics in the gastrointestinal tract.

The insulation layer (6) is wrapped around the acid-resistant layer (5) and made of one or several substances, e.g. including but not limited to the group consisting of hydroxypropyl cellulose, hydroxypropyl methyl cellulose, polyvinylpyrrolidone, polyvinyl alcohol and ethyl cellulose. Furthermore, the insulation layer (6) can be selectively added with one or several water repellent substances, e.g. including but not limited to the group consisting of stearic acid, magnesium stearate, calcium stearate, talcum, silicon dioxide, microcrystalline cellulose and starch. The insulation layer (6) can also be selectively added with colorant, spices or sweetener commonly used in food, e.g. including but not limited to the group consisting of sucralose, neotame, aspartame, saccharin, stevioside, acesulfame potassium and glycyrrhizin, so as to reduce unpleasant taste that may be produced by other layers. Therefore, the insulation layer (6) can protect the crystal ball from the external environment.

According to the structural design of the present invention, the spherical core (1) can be effectively protected and blocked

from the external environment, so it can greatly reduce the effects of temperature, pH value, moisture, oxidation or other substances on probiotics and improve environmental tolerance and stability during storage. Furthermore, the order of setting the
5 layers of the present invention is based on the order in which the crystal ball contacts the digestive fluid after entering the human digestive system. Therefore, the present invention ensures that probiotics in the oral crystal ball successfully pass through the stomach, intestines and the like and is controlled released by
10 various layers with different characteristics so as to avoid the loss of activity due to gastric acid, bile salts and pancreatic juice and increase the survival rate and availability of probiotics in the intestines.

Accordingly, the present invention effectively provides
15 health care for the intestine, changes intestinal flora, inhibits the growth of harmful bacteria, and promotes intestinal peristalsis, helps digestion and smooth bowel movements, and thereby achieves the effects of regulating physiological functions, promoting metabolism, adjusting physical fitness, reducing
20 allergies and the like. Furthermore, the present invention has simple manufacturing process, low manufacturing cost, so it is

easily mass-produced and can be provided for consumers universally.

According to the above description, in comparison with the traditional technique, the present invention has the advantages as
5 following:

1. The order of setting the layers of the present invention is based on the order in which the crystal ball contacts the digestive fluid after entering the human digestive system, which ensures that probiotics in the oral crystal ball successfully pass through
10 the stomach, intestines and the like and improves the survival time of probiotics in the intestines, so as to effectively provide health care for the intestines.

2. The multilayer wrapped structure of the present invention effectively protects the spherical core from the external
15 environment and reduces the influence of temperature, pH value, moisture, oxidation or other substances on probiotics. Therefore, the environmental tolerance and the stability of storage of probiotics are improved.

3. The present has the protection layer for providing
20 probiotics nutrients, the sustained-release layer for slow release of probiotics, the bile salt and pancreatic juice resistant layer for

resisting to bile salt and pancreatic juice, the acid-resistant layer for protecting probiotics from gastric acid damage and the insulation layer for protecting the crystal ball from the external environment, which avoids the loss of activity of probiotics due
5 to gastric acid, bile salts and pancreatic juice, and thus the survival rate and availability of probiotics in the intestines are increased.

4. The present invention has simple manufacturing process, low manufacturing cost, so it is easily mass-produced and can be
10 provided for consumers universally.

WHAT IS CLAIMED IS:

1. An acid-resistant and sustained-release oral crystal ball containing probiotics, comprising:

a spherical core for accommodating probiotics;

5 a protection layer wrapped around the spherical core;

a sustained-release layer wrapped around the protection layer;

a bile salt and pancreatic juice resistant layer wrapped around the sustained-release layer;

10 an acid-resistant layer wrapped around the bile salt and pancreatic juice resistant layer; and

an insulation layer wrapped around the acid-resistant layer.