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Medicament for treating aseptic inflammations containing anemonin as effective component

Field of the Invention

The present invention relates to the filed of pharmaceuticals, particularly to a medicament for treating aseptic inflammations, its preparation method and the effective component thereof, especially to the use of anemonin for treating aseptic inflammations.

Background of the Invention

In the medical field, inflammations can be distinguished into two groups: bacterial inflammations and aseptic inflammations. Bacterial inflammations have widely been taken seriously because they are likely to lead to the attack of acute diseases. Plenty of anti-bacterial drugs such as antibiotics including penicillin and carbapenems, have been developed as specific clinical medicaments aimed at bacterial inflammations. Prior to this invention, there was no specific, or even established, effective medicament for aseptic inflammations. That is to say, there is a need for medicaments for specifically treating aseptic inflammations in the international medical field. Currently, there are not any pharmaceutical companies which produce specific medicament for aseptic inflammations. Generally, aseptic inflammations include cervical spondylosis, lumbar diseases, periarthritis humeroscapularis, tennis elbow, muscular fascia syndrome, rheumatic arthritis, osteoarthritis, aseptic prostatitis, multiple neuritis, neurodermatitis, tenosynovitis, lumbar muscle strain, ischias, painful heel, migraine, chronic gastritis, early aseptic necrosis of femoral head, bronchial asthma, and other diseases belong to aseptic inflammations as defined in the medical field. Modern medical researches have demonstrated that hyperplastic spurs often stab peripheral soft tissue, then cause inflammatory exudation, edema, accumulation of metabolites and formation of adhesion, which stimulate nerve receptor and cause pain. Degeneration of intervertebral disc, hyperosteogeny, trauma, strain and a series of secondary pathologic variations lead to aseptic inflammations. Edema and adhesion, which are caused by aseptic inflammations around muscle, fascia, ligament, peripheral nerve plexus, joint capsule and vascular wall, compress spinal cord, vertebral artery and nerve root and lead to complex symptoms of cervical and lumbar vertebral which are difficult to treat. Adhesion, calcificated ligament, fascia and myotasis are the main causes of many aseptic inflammatory diseases such as cervical and lumbar vertebral, periarthritis humeroscapularis, muscular fascia syndrome and osteoarthritis, etc. Hundreds millions of people thoughout world are suffering from these diseases caused by aseptic inflammations though they are mostly chronic diseases.

Summary of the invention

Currently, there is no effective medicament for the variety of diseases and stubborn pain caused by aseptic inflammations. The first aspect of the present invention is a medicament for treating aseptic inflammations containing anemonin as its effective component. The compound of anemonin can be obtained by chemical synthesis, or especially from natural materials of Chinese herbs. It is evidenced by clinical tests that a medicament containing this active compound has notable curative effect on stubborn pain and body disorders/ diseases, which are caused by aseptic inflammation. Such medicament can eliminate the aseptic inflammations, edema, adhesion caused by aseptic inflammations, and stubborn pain, complex body disorders caused by aseptic inflammation, edema and adhesion. Consequently, it can rapidly cure varieties of aseptic inflammatory diseases with high efficacy and safety. Furthermore, such medicament is non-toxic nor irritant. The second aspect of the present invention is the use of the compound of anemonin or the natural abstracts containing anemonin for treating aseptic inflammations proposed.

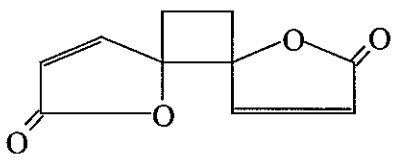
The present invention also provides a pharmaceutical preparation for treating aseptic inflammations containing anemonin as effective component, especially in topical application forms. Topical application provides the best way of administration for treating aseptic inflammations.

The present invention also provides a naturally originated medicament for treating aseptic inflammations containing as effective component the extract liquor of anemonin obtained from natural Chinese herbs.

Finally, the present invention provides a method for preparing a medicament according to the present invention, especially by extracting and preparing anemonin from natural medical plants. With the method according to the present invention, protoanemonin, which has strong toxicity and side effects, in raw material can be turned into non-irritant anemonin, which can then be produced in an industrial scale.

Detailed **description of the invention**

The medicament according to the present invention for treating aseptic inflammations comprises a therapeutically effective amount of anemonin. The chemical structural formula of anemonin is as following:



This compound can be prepared from the extracts from any natural Chinese herb containing ranunculin or protoanemonin. Suitable natural Chinese herbs include *Ranunculaceous* plants and *Graminaceous* plants, etc. *Ranunculaceous* plants include:

Ranunculus japonicus Thunb., Caltha palustris L, Ranunculus sceleratus L., Anemone hupehensis Lem., Pulsatilla chinensis (Bge.) *Regel, Anemone raddeana Regel, Anemone altaica Fisch,Ranunculus Chinensis Regel, anemonin-containing Clematis* including *Clematis chinensis osbeck, Clematis flnetiana Ievi et Vant, Clematis hexapetala Pall, Clematis Manshurica Rupr., Clematis paniculata, Clematis florida, Clematis clasiandra Maxim, Clematis uncinata champ.ex Benth* and *Clematis meyeniana Walp*, as well as *Anemone hupehensis Lem.var.japonic (Thunb.) Bowles et Stearn* etc. *Graminaceous* plants include root of *Imperata cylindrical,* ranunculin-containing plants of *Helleborus (Ranunculaceae), Anemone (Anemoneae), Hepatica (Anemoneae), Ranunculus (Ranunculeae), Bratrachium (Ranunculeae),* and *Aconitum scaposum var. vaginatum (Delphineae).*

It is known from the publications prior to the present invention that each of the above natural herbs contains ranunculin or protoanemonin. It has been shown that natural herbs containing ranunculin or protoanemonin have certain anti-tumor activities in clinical tests. It has a long history and a wide use of fresh Ranunculus japonucus by topical application. Ranunculus japonucus has postive therapeutic effects on many common diseases such as periarthritis humeroscapularis, rheumatic arthritis and ischias. However, protoanemonin is an irritant and toxic. Inflammation will be caused if the skin contacts with these plants for a prolonged period, leading to redness, swelling, blistering etc. As a precursor of anemonin, ranunculin is enzymatically cleaved to remove saccharides and turn into protoanemonin. Though polymerization, protoanemonin is turned into dipolymer anemonin. Some natural herbs per se contain anemonin (mostly are produced during the storage of the herbs). It has been found that anemonin is inhibitory against *staphylococcus*, *streptococcus*, *Bacillus diphtheriae, Mycobacterium tuberculosis*, and *E. coli*, etc. Consequently, before this invention, these herbs containing protoanemonin or anemonin were used as antineoplastic, antiseptic and antiphlogistic drugs in clinic. In traditional Chinese medicine, such plants as *Clematis chinensis* are often used to treat rheumatism, promote circulation and relieve pain.

After a long period of study, the present inventor found that the natural Chinese herbs including the above raw herbs containing protoanemonin are all irritant to human body, whether administered orally or topically. With oral medication, the herbs result in severe gastro-enteritis and intoxication symptoms such as nausea, vomiting and diarrhea, and they even stimulate kidney and cause bloody urine and proteinuria. The herbs cause redness, swelling and blister when contacted with skin. But protoanemonin component exhibits strong antibacterial activity. The above mentioned toxicity and side effects will disappear when water or an organic solvent is added to the raw herbs and the mixture is stored for a prolonged period (optionally with heating), or when ethyl ether, acetone or sulfuric acid is added so as to polymerize two moleculars of protoanemonin into anemonin. The latter compound has exhibited a positive effect on treating varieties of stubborn pains and body disorders induced by aseptic inflammations. Especially when a targeting

trans-dermal formulation is used on the infected and painful sites, the effects will be very significant. It is known in the art that the chemical structure of protoanemonin in raw herbs changes during extraction. That is to say, two molecules of protoanemonin polymerize into non-irritant anemonin. Based on these findings, the present invention proposes a medicament for treating aseptic inflammations containing anemonin as the main active component. Said anemonin can be a product of chemical synthesis, or a extracted product isolated from natural herbs, which is provided in the form of extract liquor of anemonin.

According to the medical classification of inflammations, a partial list of the aseptic inflammations include: cervical spondylosis, lumbar diseases , periarthritis humeroscapularis, tennis elbow, muscular fascia syndrome, rheumatic arthritis, osteoarthritis, aseptic prostatitis, multiple neuritis, neurodermatitis, tenosynovitis, lumbar muscle strain; ischias, painful heel, migraine, stubborn stomach-ache, cancerous pain. bronchial asthma, and early necrosis of femoral head caused by aseptic inflammations, and other diseases belong to aseptic inflammations as defined in the medical field It is worthy to note that stubborn chronic rheumatic arthritis, migraine, stubborn stomach-ache, and bronchial asthma can be cured rapidly with topical use of anemonin extract liquor for three times or even just once. This indicates that aseptic inflammation must be one of the causes of rheumatic arthritis, chronic gastritis, migraine and bronchial asthma.

Prior to the present invention, the treatments for these diseases including conventional analgesics or physical therapeutics such as massage, manipulation and traction when the attack of these diseases occurs. The effects of these conventional treatments, however are temporary. Severe attack may need to be treated by means of an operation. Compared to the prior art, an anemonin extract liquor or medicament formulated with anemonin according to the present invention has notable effects on varieties of aseptic inflammatory diseases. Topical application of the medicament may be sufficient for treating relevant diseases without requiring oral medicine, injection, infusion, operation, acupuncture, massage, manipulation or hospitalization. For example, the relevant diseases can be cured by the application of a wet-compressing with anemonin extract liquor three times. The therapeutic mechanism of the medicament according to the present invention may be that with trans-dermal wet-compressing with anemonin solution on the affected sites, anemonin displays its notable effects of analgesia, anti-inflammation, repercussion, relieving spasm, decomposing adhesion and its strong trans-dermal absorption ability. Such a treatment can remove in a short time the aseptic inflammations, which have been deposited over many years in a muscle, muscle tendon, fascia, joint, synovial bursa, nerve plexus and among vascular walls. It can rapidly remove edema, decompose adhesion, and relieve tendons and calcified ligament. Massive blood enters muscles after the muscles being relaxed, then harmful metabolites such as exudative solution resulted from dilation of blood vessels can be cleared. Once the circulation is improved, the tensile force of a muscle increases. This then relieves even eliminates the

pressure onto nerve roots, the spinal cord and blood vessels caused by the stimulation and press of aseptic inflammations. Then cervical spondylosis, lumbar diseases, periarthritis humeroscapularis, tennis elbow, muscular fascia syndrome, ischias, painful heel, migraine, stubborn stomach-ache, rheumatic arthritis, lumbar muscle strain, osteoarthritis, aseptic prostatitis, pain due to old injury, tenosynovitis, multiple neuritis, cancerous pain and pain caused by other diseases can be cured. The mechanism is the same as that of treating cervical spondylosis, lumbar diseases, and muscular fascia syndrome with operation to relieve pressure and eliminate stimulation. Swelling pain and dysfunction of movement caused by adhesion and calcification of muscle, fascia and ligament were relieved and turned to normal due to the elimination of aseptic inflammations.

The medicament according to the present invention contains anemonin as the active therapeutic component and optionally suitable pharmaceutically acceptable vehicle or excipient. Whether a vehicle or excipient is used and the choice of vehicle or excipient depends on the final dosage form of the medicament. According to conventional pharmaceutical methods, the medicament according to the present invention can be manufactured into preparations suitable for oral administration, injection and topical application. The preparations for topical use include liquid extract, plaster, suppository, liniment, paint and other preparations suitable for the trans-dermal absorption of active components. Anemoninin used in the preparation of the medicament of the present invention may be synthetic, or can be extracted from the mentioned above raw herbs according to previously known methods, e.g., the method as described in Chemistry of Chinese Herbs Components (in Chinese), page 226, published by Science Publishing House (1977). According to this method, preparations for injection, oral or topical use can be prepared with purified anemonin crystal or anemonin extract liquor obtained from ranuculin-containing natural plants (the active component therein is anemonin). Experimental have shown that anemonin is stable. Anemonin functions as a treatment for varieties of aseptic inflammations without being affected by combination with many Chinese herbs and their chemical components. The stability of anemonin is also shown by the fact that the rapid and effective therapeutic effect of anemonin extract liquor on various aseptic inflammations is not reduced under unfavorable conditions such as high temperature, low temperature, molding and decaying.

In a preferred embodiment of the present invention, the medicament for treating aseptic inflammations is naturally originated, which comprises, as the active component, an extract liquor obtained by extracting any natural plants or Chinese herbs containing anemonin or its precursors with an organic solvent, water, animal or vegetable oil, brewage vinegar or an inorganic acid.

In addition to the medthods mentioned above methods for preparing the medicament of the present invention, this invention further provides a method for preparing anemonin extract liquor comprising a step of extracting a natural plant or Chinese herb containing anemonin or its precursor(s) in a sealed container with an organic solvent, water, animal or vegetable oil, brewage vinegar or an inorganic acid. After filtering, clarifying the

extracting mixture, the anemonin extract liquor is obtained.

In the method for preparing anemonin extract liquor according to the present invention, cold-maceration or hot-maceration may be made. The starting materials include *Ranunculaceous* plants such as *Ranunculus japonicus Thunb., Caltha palustris L, Ranunculus sceleratus L., Anemone hupehensis Lem., Pulsatilla chinensis* (Bge.) *Regel, Anemone raddeana Regel, Anemone altaica Fisch, Ranunculus Chinensis Regel,* anemonin-containing *Clematis including Clematis chinensis osbeck, Clematis flnetiana Ievi et Vant, Clematis hexapetala Pall, Clematis Manshurica Rupr., Clematis paniculata, Clematis florida, Clematis clasiandra Maxim, Clematis uncinata champ.ex Benth* and *Clematis meyeniana Walp*, as well as *Anemone hupehensis Lem.var.japonic* (Thunb.) *Bowles et Stearn* etc.; and *Graminaceous* plants such as root of *Imperata cylindrical*, ranunculin-containing plants of *Helleborus (Ranunculaceae), Anemone (Anemoneae), Hepatica (Anemoneae), Ranunculus (Ranunculeae), Bratrachium (Ranunculeae), and Aconitum scaposum var. vaginatum (Delphineae).*Herbal pieces for decoction such as pieces of *Pulsatilla chinensis* (Bge.) *Regel*, pieces of *Clematis chinensis osbeck* etc. Useful organic solvents include ethanol, methanol, propylene glycol, glycerin, chloroform, or mixture thereof. The cold-maceration used in this invention refers to soaking and extracting the raw material with extracting liquid at room temperature to obtain anemonin extract liquor. Hot-maceration refers to soaking and extracting the raw material in heated extracting liquid to get the extract liquor.

The method of the present invention for preparing anemonin extract liquor is characterized in that it converts protoanemonin contained in raw material turn into anemonin by polymerization, resulting in anemonin extract liquor having anti-bacterial and anti-

inflammation effects, especially anti-aseptic inflammations.

From the practical point of view, a preferred embodiment of the method comprises soaking the raw material at room temperature with 30%-50% ethanol for over 8 months or adding the raw material to the same solvent kept boiling, sealing the container and soaking for over 6 months.

According to the method of the present invention, effective parts of the raw herb can be chosen for extraction, such as the whole grass or a mixture of the whole grass and root of fresh *Ranunculus japonicus Thunb.* After being pulverized, the chosen effective part may be placed into an extraction jar, and an extractant is added in suitable proportion, then the jar is sealed to carry out the extraction. After extraction, protoanemonin has been polymerized sufficiently and turned into anemonin, and the resultant anemonin has been dissolved in the solvent. After squeezing the contents discharged from the jar and removing the dregs, a juice is obtained. Then the juice may be filtered, and the filtrate is settled. An anemonin extract liquor, a clear yellow transparent liquid, is obtained and the content of animonin in the extract can be determined with a conventional detection method.

As mentioned above, according to a preferred embodiment of the present invention, a method for converting protoanemonin contained in raw herbs into anemonin is provided, which comprises the step of storing the raw herb and a suitable extractant in suitable amounts under sealed conditions for a prolonged period. The suitable extractants useful in the present invention are the same as described above. Methanol may be hot or cold about 30% concentration. Vegetable oil may be castor oil, tea oil or peanut oil. Ethanol, methanol or water is preferably used as the extractant. One herb or any mixture of at least two herbs can be used as the raw herb. For example, the method according to the present invention can be carried out in the so-called hot-extraction manner as follows. The fresh *Ranunculus japonicus Thunb.* whole grass and its root or only the whole grass, after being pulverized, is placed into a container. Hot ethanol in suitable concentration, such as about 40%, used in an amount such that the weight ratio of the fresh *Ranunculus japonicus Thunb.* to ethanol is about 1:1, is then added into the container containing the fresh *Ranunculus japonicus Thunb.* The contents in the container are heated, and then the container is sealed and stored, to polymerize protoanemonin contained in the fresh *Ranunculus japonicus Thunb.* into anemonin and dissolve the resultant anemonin in the solvent. After squeezing the contents discharged from the container and removing the dregs, a juice is obtained. The juice is filtered, and the filtrate is settled. An anemonin extract liquor, a yellow transparent liquid, can be obtained.

Alternatively, the method of the present invention can be carried out in the so-called cold-extraction manner as follows. The fresh *Ranunculus japonicus Thunb.* whole grass and its root or only the whole grass, after being pulverized, is placed into a container. A solution of ethanol at approximately 40% concentration or methanol at about 30% concentration is added to the container in an amount such that the weight ratio of the fresh

Ranunculus japonicus Thunb. to the ethanol is about 1:1. Then the container is sealed and stored for a long period, to polymerize protoanemonin contained in the fresh *Ranunculus japonicus Thunb.* into anemonin and dissolve the resultant anemonin in the solvent. After squeezing the contents discharged from the container and removing the dregs, a juice is obtained. Then the juice is filtered, and the filtrate is settled. An anemonin extract liquor, a yellow transparent liquid, is obtained.

Alternatively, the anemonin extract liquor can be obtained by the hot-extraction or cold-extraction method using herbal pieces for decoction as raw material, such as *Clematis chinensis osbeck* herbal pieces or *Pulsatilla chinensis (Bge.) Regel* herbal pieces. More particularly, the raw material is extracted with ethanol in suitable concentration, such as 40 %, in such amount that the weight ratio of ethanol to the raw material is about 3:1, according to the hot-extraction or cold-extraction method. The container is sealed and stored for 3 to 6 months while the contents are stirred once a day, to dissolve the anemonin contained in *Clematis chinensis osbeck* or *Pulsatilla chinensis (Bge.) Regel* herbal pieces into ethanol completely. After filtration and settling, a brown anemonin extract liquor is obtained.

If water is used as the solvent, the present method can be carried out in the so-called hot-extraction or cold extraction manner as follows. Water, used in amount such that the weight ratio of the fresh *Ranunculus japonicus Thunb.* to water is about 1:1, and suitable amount of preservative (foodstuff grade) are added directly into a container containing the pulverized fresh *Ranunculus japonicus Thunb.*, and the container is sealed and stored, to polymerize protoanemonin contained in the fresh *Ranunculus japonicus Thunb.* into anemonin and dissolve the resultant anemonin in water. After squeezing the contents discharged from the container and removing the dregs, a juice is obtained. The juice is filtered, and the filtrate is settled. An anemonin extract liquor, a yellow transparent liquid, is obtained.

It should be noted, in the present method, a suitable extractant is used to carry out the extraction under specific conditions.The aim is to extract the protoanemonin and anemonin contained in the raw material and to polymerize the extracted protoanemonin into anemonin, so as to obtain an anemonin extract liquid. The anemonin extract can then be adjusted to desired concentration for therapeutical use or be further processed into suitable preparations. Therefore, the ratio of the extractant to the raw material herb in the present method is not essential.

According to preferred embodiments of the present invention, the stability of the extracted anemonin or anemonin extract liquor is not affected by combination with one or more Chinese herbs, chemical pharmaceuticals or chemical components contained therein, and the amenonin can still effectively treat various aseptic inflammations. A stability test for prolonged storage shows, anemonin in the present medication is stable over at least 5 years.

According to preferred embodiments of the present invention, a suitable method can be selected with respect to the practical conditions in industry. The anemonin compound synthesized in advance, bought in the market, or the anemonin extract obtained by extracting the raw material as described above can be used to further prepare various preparations.

In addition to the extraction methods as described above, percolation, forced-circulation process in extraction jar, supercritical extraction technique, dynamic extraction technique, and other separation and extraction techniques useful for herbal effective components, or distillation can also be used.

The present invention also provides a pharmaceutical composition useful for treating aseptic inflammations comprising a therapeutically effective amount of anemonin and a pharmaceutically acceptable vehicle/excipient (if necessary). According to conventional pharmaceutical methods, the composition according to the present invention can be manufactured into preparations suitable for oral administration, injection and topical application. The preparations for topical use include liquid extract, plaster, suppository, liniment, paint and other preparations suitable for the trans-dermal absorption of active components. For example, said liquid extract can be the anemonin extract liquor obtained by extracting with 30-40% ethanol according to the method of the present invention. This liquid extract can be used to paint the affected sites or be applied to the affected sites with gauze soaked therewith. An anemonin ointment containing ethanol as preservative can be made as follows: 90% ethanol is added to fine powder of fresh *Ranunculus japonicus* at proportion of 1:3 (the fine powder/ethanol) in a container, the mixture is stirred thoroughly and sealed or heated and stored for a prolonged period. During the process, protoanemonin contained in the fresh *Ranunculus japonicus* will be polymerized into anemonin. Herbal pieces of *Clematis chinensis osbeck* or/and of *Pulsatilla chinensis* (Bge.) *Regel* can be extracted in the same way. The extract liquor may be decocted and concentrated into herbal granules (suitable additives can be added if necessary). The main active ingredient of such granules is anemonin which can be used for treating aseptic inflammations administered either orally or by topical use.

Clinical use: Anemonin liquid or anemonin extract prepared contains 12.5 mg anemonin per 25ml of the liquid or solution. In one cycle of treatment for three weeks, 25ml of the anemonin extract liquor is applied to the affected area or painful sites of various aseptic inflammatory diseases with soaked gauze, once per week. The transdermal application may be carried out on an area of about 100 cm^2 for about four hours. The curative ratio in one cycle of treatment is as high as 90%. This medicament relieves pain in short time. Notable therapeutic effect can be obtained after the first application. Some patients may be cured with only one application. There's no side effect such as redness, swelling, blistering, running liquid, allergic reaction or pain. This treatment has minimal toxicity. Anemonin liquid or anemonin extract liquor can be prepared into liquid extract, plaster, suppository, liniment, paint and other preparations for topical use. Anemonin can

also be formulated into oral tablet, injection, drop pills, oral liquid and medicated wines.

The medicament or pharmaceutical composition according to the present invention can also conatin any herbal abstract compatible with anemonin including that from *Mucuna birdwoodiana Tutcher, Sargentodoxa cuneata* (Olic.) *Rehd.et Wils, Pittosporum glabratum Lindl, Tetrastigma obtectum Planch, Lespedeza cuneata* (Dum.Cours.) *G.Don, Helledorus thidetanus Franch, Serissa Serissoides Druce* and the like.

It would be appreciated that the present invention is based on finding and providing the use of anemonin or medicament containing anemonin in treating aseptic inflammations. Additionally, protoanemonin contained in raw herbs is effectively polymerized into anemonin according to the method of the present invention. Because of the conversion of protoanemonin to anemonin, the irritant effect of protoanemonin to the body, especially to skin is eliminated. The medicament can effectively treat various aseptic inflammatory diseases by topical application. It has notable effects on cervical spondylosis, lumbar diseases, periarthritis humeroscapularis, rheumatic arthritis, ischias, pain due to old injury, aseptic prostatitis, bronchial astham, stubborn stomach-ache and cholecystitis. With the application of medicament containing anemonin, aseptic inflammations can be effectively treated. The clinical tests indicated that the medicament of this invention has a notable therapeutic effect on aseptic inflammations and is effective in over 85% cases. It does have the effect of clearing away toxic agents from the body, relieving rigidity of muscles and activating collaterals, relieving swelling and pain from the point of view of traditional Chinese medicine.

Acute toxicity test and toxicity test in prolonged term have been done with the active anemonin extract liquor. The results are as follows.

By intraperitoneal administration, the maximal tolerating dose for guinea pig was 266g/kg without any intoxication or death. By topical administration, no intoxication or death was observed when the area of administration reached 10% of animal's body surface area. By successive topical administrations for 4 weeks, no abnormal or pathologic change was observed on the weight, visceral coefficient, hemogram, liver function, kidney function, internal organs and skin of the tested guinea pigs.

The results of animal tests also show that the medicament of the present invention is non-irritant and non-allergenic, especially for skin. It won't cause pathologic change to injured skin by repeated use. So it will not hamper the skin wound from healing.

Specific embodiments and efficacy of the present invention will be further illustrated with reference to the following Examples. The scope of protection for the present invention is defined in the claims. Any variation based on the spirit of the present invention such as polymerizing protoanemonin into anemonin with any other feasible method and employing other forms of medicament containing anemonin or similar ingredient as the treatment of aseptic inflammations shall fall into the scope of this invention.

Examples

Example 1

The fresh *Ranunculus japonicus Thunb.* whole grass and its root or only the whole grass picked from April to September, after being pulverized, was used as raw material. 50 kg of the raw material was placed into a ceramic or plastic container. 50 kg of ethanol at 40% concentration was heated to its boiling point, then added into the container containing the fresh *Ranunculus japonicus Thunb.* The contents of the container were heated to boiling. The container was sealed and stored for a half year or more in order to polymerize protoanemonin contained in the fresh *Ranunculus japonicus Thunb.* into anemonin and to dissolve the resultant anemonin in the solvent. After squeezing the contents discharged from the container and removing the dregs, a juice was obtained. Then juice was filtered, and the filtrate was settled. An anemonin extract liquor, a yellow transparent liquid, was obtained. Using conventional detection method, the content of anemonin in the effective ingredients of the extract was determined to be about 90%. The extract was then mixed with ethanol to from a preparation containing 12.5 mg anemonin per 25 ml liquor. The preparation was for topical use.

Alternatively, the anemonin extract can be obtained by cold-extraction for one year or more with ethanol.

Example 2

Using the whole grass or the root or a mixture thereof of *Ranunculus* plants selected from the group consisted of: fresh *Ranunculus japonicus Thunb.*, *Caltha palustris L.*, *Ranunculus sceleratus L.*, *Anemone hupehensis Lem.*, *Pulsatilla chinensis (Bge.) Regel,* nine kinds of *Clematis* and root of Imperata cylindrical, *Anemone raddeana Regel, Ranunculus Chinensis Regel,Anemone altaica Fiseh,* and *Anemone hupehensis Lem. var. japonic (Thunb.)* , an anemonin extract was obtained by hot-extraction or cold-extraction with ethanol, and a preparation suitable for topical application or a liniment was obtained according to the method of Example 1 (dried plants of the herbs can alternatively be used as the raw material).

Example 3

Clematis chinensis osbeck herbal pieces, or a mixture of *Clematis chinensis osbeck* herbal pieces and *Pulsatilla chinensis (Bge.) Regel* herbal pieces was used as raw material. The raw material was placed in a container. An ethanol solution of 40% concentration in an amount such that the weight ratio of ethanol solution to the herbal pieces is 3:1, was heated to its boiling point and added to the container. The contents in the container were heated to boiling, and then the container was sealed and stored for 3

months, contents were stirred once a day to dissolve the anemonin contained in *Clematis chinensis osbeck* and/or *Pulsatilla chinensis (Bge.) Regel* herbal pieces into ethanol completely. After filtration and settling, a brown anemonin extract liquor was obtained which can be concentrated, refined and granulated to from a granule preparation.

Example 4

Using the cold-extraction method, 100 kg of raw material consisting *Clematis chinensis osbeck* herbal pieces was extracted using 300 kg of 40% concentration ethanol at room temperature for six months. The contents in the container were stirred once a day during this period to dissolve the anemonin contained in *Clematis chinensis osbeck* herbal pieces into ethanol completely. After filtration and settling, a brown anemonin extract was obtained which can be concentrated, refined and granulated to form a granule preparation.

Alternatively, a mixture of *Clematis chinensis osbeck* and *Pulsatilla chinensis (Bge.) Regel* herbal pieces can be used as the raw material to replace *Clematis chinensis osbeck* herbal pieces.

Example 5

Using the hot-extraction or cold-extraction method, 100 kg of water and 50 g of sodium benzoate as preservative were added into a container containing100 kg of pulverized fresh *Ranunculus japonicus Thunb.*. The container was sealed and stored 8 to 12 months or more, to polymerize protoanemonin contained in the fresh *Ranunculus japonicus Thunb.* into anemonin and dissolve the resultant anemonin in water. After squeezing the contents discharged from the container and removing the dregs, a juice was obtained. The juice was filtered, and the filtrate was settled. An anemonin extract liquor, a yellow transparent liquid, was obtained which can be used in the next steps for preparing preparations.

Example 6

33 kg of 95% concentration ethanol as a preservative and solvent was added into a container containing 100 kg of pulverized fresh *Ranunculus japonicus Thunb.*, and contents were stirred thoroughly to from a homogeneous mixture. The container was sealed and stored at room temperature or an elevated temperature for 8 to 12 months or more to polymerize protoanemonin contained in the fresh *Ranunculus japonicus Thunb.* into anemonin and dissolve the resultant anemonin in ethanol. Depending upon the consistency of the resultant extract, a proper amount of vaseline was added and stirred uniformly to obtain an anemonin ointment.

Example 7

Following the method described in **Chemistry of Chinese Herbs Components**, page

226 (published by Science Publisher, 1977), *Pulsatilla chinensis (Bge.) Regel* whole grass as raw material was steam distillated. The resultant distillate was extracted with diethyl ether. After further treatment with ethanol, the anemonin crystal was obtained (which is also market available). The crystal was dissolved into ethanol soultion of about 4%, then the liquor which contains about 50mg anemonin per 100ml liquor was obtained, which can be used further to prepare preparations for liniment or paint.

Example 8

A liquor which contains about 12.5 mg anemonin per 25 ml liquor was prepared with the anemonin extract obtained in Example 1, and 100 cm^2 wet towels were prepared by soaking non-woven fabrics with the liquor.

Example 9

Anemonin powder was added into lanoline and mixed thoroughly to form an ointment which contains 12.5 mg anemonin per 25 ml. The oinment is for topical application which is applied on skin for 5-6 hours per dosage.

Pharmacodynamics tests

The following tests were carried out using the topical preparation of Example 1 (commercial name, Guanyin Dew):

1. Analgesic test with formalin

The experiment included 5 groups of mice totaling 80 and each weighed 18-22 g: high concentration group, moderate concentration group, low concentration group (Guanyin Dew was administered at 12.5 mg/25ml, 8.75 mg/25ml, and 6.25 mg/25ml respectively), dolantin group (25 mg/kg) and control group (same volume of 25% ethanol). One group received Dolantin by intraperitoneal injected and other groups received test medication on left and right hind feet. 15 minutes after administration, 0.03 ml of 2.5% formalin was given to each mouse by subcutaneous injection on right hind foot and then the test medication was applied again. Then, the number of times of each mouse's licking its right hind foot in 15 minutes was counted.

Results: high concentration of Guanyin Dew has significant analgesic effect on pain induced by formalin. The number of times of mice's licking their right hind feet decreased notably compared with the control group with $p<0.05$ (see Table 1).

Table 1 Inhibiting effect of Guanyin Dew on mice's licking foot

Groups	Animal number	Times of licking hind feet	Value of P	Rate of inhibition(%)
Control	16	15.68±4.13		
High	16	9.13±6.20	<0.05	42

Moderate	16	12.44±7.20	>0.05	21
Low	16	13.79±5.33	>0.05	12
Dolantin	16	0.00±0.00	<0.001	100

2. Analgesic test with hot plate

This experiment included 4 groups of female mice, totaling 64 and each weighed 18-22g, selected for normal pain reaction with 55℃ hot plate: high concentration group, low concentration group, dolantin group and control group. The route of administration and dosage are the same as described in the test with formalin. One group received Dolantin by intraperitoneal injected and other groups received test medication on left and right hind feet and abdomen. 30, 60 and 90 minutes after the administration, the mice were put on a 55℃ hot plate and the latent time of each mouse for pain reaction was determined.

Results: high concentration of Guanyin Dew has significant analgesic effect on pain induced by hot plate. The latent time of mice for pain reaction prolongs notably and the pain threshold increases remarkably compared with the control group with $p<0.05$ (see Tables 2 and 3).

Table 2 Effect of Guanyin Dew on the latent time for pain reaction $(\overline{X} \pm SD)$

Groups	No.	Latent time for pain reaction (second)			
		Before administration	30 min after administration	60 min after administration	90 min after administration
Control	16	29.33±4.12	30.13±5.19	29.69±7.33	29.21±8.18
High	16	28.46±3.49	31.33±7.21	45.49±9.47	47.34±10.29
P			>0.05	<0.05	<0.05
Low	16	30.12±5.03	31.78±6.32	35.26±7.79	36.30±9.74
P			>0.05	>0.05	>0.05
Dolantin	16	30.08±4.92	49.86±5.23	54.29±9.27	58.31±11.23
P			<0.01	<0.001	<0.001

Table 3 Effect of Guanyin Dew on pain threshold

Groups	Number of animals	Increase of pain threshold (%)		
		30 min after administration	60 min after administration	90 min after administration

Control	16	3	1	0
High	16	10	60	66
Low	16	6	17	21
Dolantin	16	66	80	94

3. Anti-swelling test on rat's hind foot

This experiment included 4 groups of rats totaling 40 and each weighed 200-250g: high concentration group, low concentration group (12.5 mg/25ml, 6.25 mg/25 ml respectively), fluocinolone acetonide group, control group (the same volume of 25% ethanol). Fluocinolone acetonide was given using a 0.025% ointment, and other groups received corresponding medicament on the left and right hind feet prior to subcutaneous injection of 0.1 ml of 1% carrageenan on the metatarsus of each rat's right hind foot. Immediately after the administration of carrageenan, corresponding medicament was applied on the right hind foot. The metatarsal perimeters of right and left hind foot of each rat were measured 2, 3, 4, and 5 hours after the final administration. The difference between the metatarsal perimeters of the two feet of each rat is taken as a measure of swelling. Corresponding medicament was applied again on rat's right hind foot after each measurement.

Results: high concentration of Guanyin Dew has significant inhibiting effect on the swelling of rat's hind foot in the test compared with the control group with $p<0.05$. See table 4.

Table 4 Inhibiting effect of Guanyin Dew on swelling of rat's hind foot ($\overline{X} \pm SD$)

Groups	No.	Degree of tumefaction (cm)			
		2 hours	3 hours	4 hours	5 hours
Control	10	1.44±0.21	1.48±0.13	1.47±0.19	1.45±0.13
High	10	1.24±0.23	1.01±0.17	0.97±0.21	0.92±0.18
P		>0.05	<0.05	<0.05	<0.05
Low	10	1.37±0.19	1.36±0.21	1.39±0.24	1.40±0.14
P		>0.05	>0.05	>0.05	>0.05
Fluocinolone acetonide	10	0.91±0.20	0.92±0.13	0.90±0.18	0.92±0.24
P		<0.01	<0.01	<0.01	<0.01

4. Test on isolated ileum of guinea pig

Four guinea pigs, weighed each 300-350 g, 2 male and 2 female, were used in this experiment. Ileum was taken out and put into cold Tyode's solution bubbled with oxygen

immediately after the animal was sacrificed. The isolated ileum was cleaned and cut into segments of 2-2.5 cm. Both ends of two intestinal segments were ligated. One end of the segment was tied on an aeration hook and put into a thermo-constant Magnus's bath. The other end of the segment was connected to a tension transducer connected with a recorder. The contraction and relaxation of the ileum were recorded after the addition of Guanyin Dew, acetylcholine (10^{-9}) and atropine (0.05%).

Results: high concentration of Guanyin Dew significantly relaxes myenteron stimulated by acetylcholine.

Claims

1. A medicament useful for treating aseptic inflammations, which contains therapeutically effective amount of anemonin.

2. The medicament as claimed in claim 1, wherein the anemonin originates from extract of a natural plant or Chinese herb which contains anemonin or its precursor.

3. The medicament as claimed in claim 2, wherein the natural plant or Chinese herb is selected from the group consisting of *Ranunculaceous* plants including *Ranunculus japonicus Thunb., Caltha palustris L., Ranunculus sceleratus L., Anemone hupehensis Lem., Pulsatilla chinensis (Bge.) Regel, Anemone raddeana Regel, Ranunculus Chinensis Regel, Anemone altaica Fisch, Clematis chinensis osbeck, Clematis flnetiana Ievi et Vant, Clematis hexapetala Pall, Clematis Manshurica Rupr., Clematis paniculata, Clematis florida, Clematis clasiandra Maxim, Clematis uncinata champ.ex Benth, Clematis meyeniana Walp,* and *Anemone hupehensis Lem. var. japonic (Thunb.) Bowles et Stearn; Graminaceous* plants including root of *Imperata cylindrical*, ranunculin-containing plants of *Ranunculaceae Helleborus, Anemone, Hepatica, Ranunculus, Bratrachium,* and *Aconitum scaposum var. vaginatum.*

4. The medicament as claimed in claim 1, wherein the anemonin is a chemical synthetic product.

5. The medicament as claimed in claims 2 and 3, wherein the anemonin originates from the anemonin extract obtained by extracting a Chinese herb with an organic solvent, water, an animal oil, a vegetable oil, a brewage vinegar or an inorganic acid.

6. The medicament as claimed in claims 1-5, which further contains any extract of a Chinese herb, which is compatible with the anemonin compound and favorable for the treatment.

7. The medicament as claimed in claims 1-6, which is a preparation for oral administration, injection, and topical application.

8. The medicament as claimed in claim 7, wherein the preparation for topical application is a liquid extract, plaster, suppository, liniment or paint, which can be transdermally absorbed.

9. The medicament as claimed in any one of the proceeding claims, wherein the aseptic inflammations comprise cervical spondylosis, lumbar diseases , periarthritis humeroscapularis, tennis elbow, muscular fascia syndrome, rheumatic arthritis, osteoarthritis, aseptic prostatitis, multiple neuritis, neurodermatitis, tenosynovitis, lumbar muscle strain; ischias, painful heel, migraine, stubborn stomach-ache, cancerous pain, bronchial asthma, and early necrosis of femoral head caused by aseptic

inflammations, and other diseases belong to aseptic inflammations as defined in the medical field.

10. A naturally originated medicament useful for treating aseptic inflammations, which contains, as an effective ingredient, extract obtained by extracting any natural plant or Chinese herb containing anemonin or its precursor with an organic solvent, water, an animal oil, a vegetable oil, a brewage vinegar or an inorganic acid.

11. The naturally originated medicament as claimed in claim 10, wherein the natural plant or Chinese herb is selected from the group consisting of *Ranunculaceous* plants including *Ranunculus japonicus Thunb., Caltha palustris L., Ranunculus sceleratus L., Anemone hupehensis Lem., Pulsatilla chinensis* (Bge.) *Regel, Anemone raddeana Regel, Ranunculus Chinensis Regel, Anemone altaica Fisch,Clematis chinensis osbeck, Clematis flnetiana Ievi et Vant, Clematis hexapetala Pall, Clematis Manshurica Rupr., Clematis paniculata, Clematis florida, Clematis clasiandra Maxim, Clematis uncinata champ.ex Benth, Clematis meyeniana Walp,* and *Anemone hupehensis Lem. var. japonic (Thunb.) Bowles et Stearn; Graminaceous* plants including root of *Imperata cylindrical*, ranunculin-containing plants of *Ranunculaceae Helleborus, Anemone, Hepatica, Ranunculus, Bratrachium,* and *Aconitum scaposum var. vaginatum.*

12. The naturally originated medicament as claimed in claims 10 and 11, wherein the effective ingredient is the extract obtained by extracting the natural plant or Chinese herb with ethanol.

13. The naturally originated medicament as claimed in claims 10 and 11, which further contains an extract of a Chinese herb, which is compatible with the anemonin compound and is favorable for the treatment.

14. The naturally originated medicament as claimed in claim 10, which is a preparation for oral administration, injection, and topical application.

15. The naturally originated medicament as claimed in claim 14, wherein the preparation for topical application is a liquid extract, plaster, suppository, liniment or paint, which can be transdermally absorbed.

16. Use of the medicament as claimed in claims 1-5 for treating aseptic inflammations and various stubborn pains caused by aseptic inflammations.

17. Use as claimed in claim 16, wherein the aseptic inflammations comprise cervical spondylosis, lumbar diseases, periarthritis humeroscapularis, tennis elbow, muscular fascia syndrome, rheumatic arthritis, osteoarthritis, aseptic prostatitis, multiple neuritis, neurodermatitis, tenosynovitis, lumbar muscle strain; ischias, painful heel, migraine, stubborn stomach-ache, cancerous pain, bronchial asthma, and early necrosis of femoral head caused by aseptic inflammations, and other diseases belong to aseptic

inflammations as defined in the medical field.

18. A method for the preparation of a medicament useful for treating aseptic inflammations, which comprises cold-extracting or hot-extracting a natural plant or a Chinese herb containing ranunculin with, as an extractant, an organic solvent, water, an animal oil, a vegetable oil, a brewage vinegar or an inorganic acid under sealed condition, and recovering the resultant extract.

19. The method as claimed in claim 18, wherein the organic solvent is methanol, ethanol, propandiol, glycerine, chloroform or any mixture thereof.

20. The method as claimed in claim 18 or 19, wherein the cold-extraction is carried out with 30 to 50% strength ethanol for 8 months or more.

21. The method as claimed in claim 18 or 19, which comprises heating the extractant 30%-50% strength ethanol to its boiling point, adding the ethanol into a container containing the natural plant or Chinese herb, heating the contents to boiling, and then sealing and storing the container for 6 months or more.

22. The method as claimed in claim 19, which comprises adding 95% strength ethanol as preservative into the pulverized natural plant or Chinese herb to prepare ointment.

23. The method as claimed in claim 18, wherein a preservative is added in conventional amount during the extraction when water is used as the extractant.

24. A method for treating aseptic inflammations which comprises applying gauze or non-woven fabric absorbed with the medicament as claimed in claims 1-9 on the affected or painful sites one dosage per week for 3 weeks, lasting 4 to 6 hours per dosage.

25. A method for treating aseptic inflammations which comprises applying gauze or non-woven fabric absorbed with the naturally originated medicament as claimed in claim 10 on the affected or painful sites one dosage per week for 3 weeks, lasting 4 to 6 hours per dosage.

26. A wet towel useful for treating aseptic inflammations by transdermal absorption, which is prepared by soaking non-woven fabrics with the medicament as claimed in claims 1-9.

27. A wet towel useful for treating aseptic inflammations by transdermal absorption, which is prepared by soaking non-woven fabrics with the naturally originated medicament as claimed in claim 10.

28. A medicament useful for treating aseptic inflammations, which contains, as an effective ingredient, anemonin crystal obtainable by extracting a natural plant containing anemonin or its precursor, and separating the anemonin crystal in a conventional manner.

Abstract

Medicament for treating aseptic inflammations containing anemonin as effective component

The present invention discloses a medicament useful for treating aseptic inflammations, containing anemonin as an effective ingredient, and use of the anemonin compound in treating aseptic inflammations. The effective ingredient in the present medicament, anemonin, can be extracted and separated from natural plants containing anemonin or its precursor. The present invention also discloses a method for preparing anemonin extract. The present medicament can be formulated into preparations for oral administration, injection and topical application, especially liquid extract, plaster, suppository, liniment, and paint etc., which can be transdermally absorbed.