



Experience Summary of Acupoint Catgut Embedding with the “Shouji Four-Point Formula” in Intervening Muscle Loss After Fat Reduction

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Abstract: Obesity has become a global public health challenge. The concomitant muscle loss during fat reduction directly affects long-term weight loss outcomes and physical recovery. Based on the classic TCM theory of “spleen governing muscles”, this paper proposes a self-designed acupoint catgut embedding protocol—the “Shouji Four-Point Formula”—to address the common issues of muscle flaccidity and mass reduction after fat reduction. Six core acupoints (Daimai, Jingmen, Chengshan, Zusanli, Binao, Siqiang) are selected to target four major muscle-loss-prone areas: lateral waist, calf, upper arm, and thigh. Through clinical case reviews, this paper summarizes practical experiences in enhancing limb muscle strength, tightening muscle contours, and preserving muscle mass, offering a new TCM external therapy approach and practical reference for clinically managing post-fat-reduction muscle loss.

Keywords: Acupoint catgut embedding; Fat reduction and body shaping; Muscle loss; Spleen governing muscles theory; Obesity intervention

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1. Introduction

Obesity is a chronic metabolic disorder caused by an imbalance in energy metabolism, influenced by genetic predisposition, daily routines, dietary structures, and environmental factors. Its core feature is abnormal fat accumulation, and it has become a global public health priority. According to the Report on Chinese Residents' Nutrition and Chronic Disease Status (2020), the overweight rate among Chinese adults is 34.3%, and the obesity prevalence is 16.4%; among children and adolescents aged 6–17, the overweight rate is 11.1%, and the obesity rate is 7.9 %, with both showing a continuous upward trend year by year ^[1]. Epidemiological studies show that obesity is more common in males than females, with significantly higher prevalence in northern regions compared to southern regions, and there is a certain correlation with regional

economic development levels. Obesity not only affects body shape but also predisposes individuals to insulin resistance, cardiovascular and cerebrovascular diseases, endocrine disorders, and joint injuries, severely compromising physical and mental health, lowering quality of life, and placing a heavy burden on the healthcare system ^[2].

Current mainstream weight loss approaches include lifestyle intervention, pharmacotherapy, and metabolic surgery. In recent years, GLP-1 receptor agonists such as semaglutide and liraglutide have been widely used due to their rapid and significant weight loss effects. However, with their widespread application, the drawback of concurrent muscle loss has become increasingly prominent. A recent review reports that 25–40% of weight lost with incretin-based therapies derives from lean mass, with skeletal muscle being a key component ^[3]. Muscle, as the body's core metabolic organ, directly lowers basal metabolism when lost, increases the likelihood of weight regain, and causes limb function weakening and decreased immunity ^[4].

Acupoint catgut embedding is an extension and innovation of traditional acupuncture. By embedding absorbable medical catgut into specific acupoints, the slow degradation and continuous stimulation of the catgut regulate visceral function, harmonize yin and yang and Qi and blood, and unblock meridians. Compared with conventional acupuncture, it has the advantages of longer duration of action, no need for frequent follow-up visits, and higher patient acceptance and compliance ^[5]. Based on clinical practice and the pathogenesis and constitutional characteristics of post-fat-reduction muscle loss, this paper summarizes the application experience of the “Shouji Four-Point Formula” acupoint catgut embedding therapy, providing a practical reference for clinical syndrome differentiation and treatment.

2. TCM understanding of muscle loss and mechanism of catgut embedding

2.1. TCM understanding of muscle physiology

As early as the Huangdi Neijing, the ancients systematically discussed the physiological attribution and visceral connections of muscles. Suwen • Treatise on Flaccidity clearly states that “the spleen governs the muscles of the body”, establishing the inseparable relationship between the spleen and muscles ^[6]. The spleen is the acquired foundation and the source of Qi and blood production and transformation. It is responsible for transporting and transforming ingested water and grain into Qi, blood, and body fluids, distributing them to nourish the muscles and limbs. When the spleen and stomach transport and transform function robustly, muscles are full, firm, and strong. If the spleen is deficient, transformation and transportation are impaired, Qi and blood production is insufficient, and muscles lack nourishment, leading to emaciation and limb weakness.

Suwen • Treatise on Taiyin and Yangming further adds that the Qi mechanism of the four limbs originates from the stomach, but stomach Qi cannot directly reach the meridians; it must rely on the spleen's transformation and distribution to nourish all muscles. Lingshu • Benshen also records that spleen Qi deficiency is the core internal cause of limb flaccidity and muscle weakness.

The kidneys store essence, govern bones, and produce marrow, serving as the congenital foundation. When kidney essence is abundant, marrow production is sufficient, bones are strong, and they provide stable support for muscle attachment. If kidney essence is deficient, marrow fails to nourish bones, bones become weak, muscles lose support, often manifesting as soreness and weakness in the lower back and knees, and easy fatigability. The spleen and kidneys mutually nourish and complement each other: kidney

essence depends on the continuous replenishment of water and grain essences transformed by the spleen and stomach, while spleen yang relies on the warmth of kidney yang to normally transport and transform water and grain. Therefore, the fullness and strength of muscles cannot be separated from the synergistic harmony of the spleen and kidneys ^[7].

2.2. TCM pathogenesis of post-fat-reduction muscle loss

Although the term “muscle loss” does not appear in TCM classics, based on clinical manifestations such as muscle flaccidity, reduced mass, and limb weakness, it can be categorized under the “flaccidity syndrome” or “deficiency-consumption” categories. The core pathogenesis is closely related to spleen-stomach deficiency, Qi and blood insufficiency, liver-kidney yin deficiency, and meridian stasis ^[8].

The spleen governs transportation and transformation, and controls the muscles of the whole body and the functions of the four limbs. It is the core viscus for maintaining full muscle morphology and normal limb activity. When the transportation and transformation function of the spleen and stomach is weak, the essences of water and grain cannot be normally transformed, transported, and distributed. Muscles lack adequate nourishment, and over time, muscle flaccidity, physical atrophy, and sagging of the skin and flesh appear. Qi and blood are the most fundamental material basis for muscle growth and fullness. During the process of fat reduction intervention, excessive dieting or drug-induced weight loss can easily damage the transportation and transformation function of the spleen and stomach, leading to depletion of Qi and blood production. Muscles, lacking long-term nourishment, gradually experience reduced mass and decreased strength.

The liver governs the sinews and fasciae, and the kidneys govern the bones. Once the essence and Qi of the liver and kidneys become deficient, the sinews and bones lack nourishment and support. Muscles lose the support and tension provided by the sinews, fasciae, and bones, making them prone to flaccidity, sagging, and reduced mass. Simultaneously, liver-kidney insufficiency can also obstruct the circulation of systemic Qi and blood, further exacerbating the state of local muscle nutritional deficiency. If daily routines are disrupted and diet is inappropriate during the fat reduction phase, it can easily cause disturbances in the ascending and descending of Qi movement in the body, leading to stasis of meridian Qi and blood circulation. This obstructs the pathways for transporting nutrients to the muscles, accelerates muscle consumption and loss, and ultimately forms a vicious cycle where deficiency hinders muscle nourishment, and stasis exacerbates consumption and damage ^[9–11].

Among people who adopt rapid weight loss methods, the majority experience a sharp reduction in dietary intake and a dramatic increase in energy expenditure. From the perspective of TCM pathogenesis, these individuals often suffer from excessive consumption of Qi and blood. Blind dieting and excessive food restriction lead to insufficient intake of the essences of water and grain, depriving Qi and blood of their source of generation, and muscles remain in a state of nutritional deficiency, gradually becoming flaccid and weak. Inappropriate weight loss behaviors can also directly damage the stomach’s receiving and the spleen’s transporting and transforming capacities, leading to the internal generation of dampness, turbidity, and phlegm pathogens, which obstruct meridian Qi and blood circulation and further aggravate muscle malnourishment.

Under conditions of rapid fat reduction, the body needs to mobilize its stored energy to maintain basic physiological functions. Over the long term, this leads to gradual depletion of kidney essence, deficiency of marrow, and instability of the bone foundation to which muscles attach. Clinically, symptoms such as

soreness and weakness of the lower back and knees, weak lower limbs, and joint soreness and distension are common. High-intensity exercise accompanied by profuse sweating also consumes the body's primordial Qi and Yin fluids. Qi deficiency fails to propel blood circulation, resulting in insufficient Qi and blood perfusion to muscles; yin fluid deficiency fails to moisten the muscular interstices and striae, directly causing decreased muscle elasticity, sagging, and other visible changes.

Considering the overall pathogenesis, the core essence of post-fat-reduction muscle loss lies in deficiency of both the spleen and kidneys, insufficiency of Qi and blood, and failure of systemic muscles to receive nourishment from the essences. The disease location primarily involves the muscles throughout the body. The root cause of the pathological changes lies in the spleen and kidneys, and it is also closely related to the Qi and blood circulation in the Yangming and Taiyang meridians.

2.3. The TCM mechanism of acupoint catgut embedding in regulating muscle loss

Acupoint catgut embedding is rooted in traditional acupuncture theory and is one of the characteristic external therapies of TCM. It converts short-term needling stimulation into a long-lasting, stable, holistic meridian-regulating effect^[12,13]. This therapy primarily involves implanting absorbable medical catgut into the deep layers of acupoints. Relying on the entire process of gradual degradation, metabolism, and absorption of the catgut in the body, it provides gentle, sustained physical and physicochemical stimulation to the acupoints. This helps unblock meridian stasis, harmonize systemic Qi and blood, supplement the vitality of the spleen and kidneys, tighten muscle lines and body contours, address the root pathogenesis of post-fat-reduction muscle loss, and simultaneously consolidate the overall weight loss effect.

Catgut embedding provides long-acting stimulation to the corresponding acupoints, unblocks stagnant Qi and blood flow in the meridians, improve the local microcirculation, allows muscles to continuously receive nourishment from the essences of water and grain, and alleviates the manifestations of muscle flaccidity and functional decline due to malnourishment. Through benign, targeted acupoint stimulation, it also regulates the transportation, transformation, and absorption functions of the spleen and stomach, enhances the utilization rate of dietary essences, builds a solid material foundation for muscle growth and tissue repair, and fundamentally slows the process of muscle loss.

Embedding catgut at liver- and kidney-related acupoints can nourish the yin essence of the liver and kidneys, consolidate the physiological foundation of sinews and bones, provide stable structural support for the superficial muscles, and delay the progression of muscle atrophy and skin/flesh flaccidity. Simultaneously, catgut embedding can beneficially regulate autonomic nervous function, harmonize systemic metabolic rhythms, and promote the catabolism of excess fat while protecting skeletal muscle tissue, achieving the therapeutic goal of preserving muscle mass during fat reduction. This is consistent with modern research findings that catgut embedding can optimize serum metabolic parameters and increase the body's basal metabolic rate^[14-16].

Furthermore, the medical catgut implanted into the body, as a foreign substance, can induce a mild, benign immune response, gradually enhance systemic immune function, and laying a good physiological foundation for muscle injury repair and body shape restoration^[17].

3. Acupoint combination analysis of the Shouji four-point formula

Based on the predilection sites and body shape changes associated with post-fat-reduction muscle loss, the

Shouji Four-Point Formula acupoint catgut embedding protocol was developed targeting four high-risk areas: lateral waist, calf, upper arm, and thigh. The treatment adheres to the principles of invigorating the spleen and kidney, supplementing Qi and nourishing blood, firming muscle strength, and unblocking meridians, addressing both symptoms and root causes to target muscle flaccidity and mass reduction. This forms a standardized, reproducible TCM external therapy protocol ^[18]. All acupoint locations follow the national standard positioning of the 10th edition of Acupuncture and Moxibustion ^[19].

3.1. Acupoint group for tightening waist and abdomen, relaxing sinews and strengthening the spine

This group primarily warms and nourishes the Belt Vessel and protects the lumbar core, specifically addressing issues such as lumbar muscle flaccidity, weak core strength, lower back pain, and waist-abdominal fat accumulation after fat reduction. The paired acupoints Daimai and Jingmen are selected to stabilize lumbar muscle morphology ^[20].

Daimai acupoint is an acupoint on the Belt Vessel (one of the eight extra meridians), located on the lateral abdomen at the intersection of the level of the umbilicus and the mid-axillary line. Known as the body's "natural belt", the Belt Vessel binds all meridians. Stimulating this acupoint unblocks waist-abdominal Qi and blood circulation, improves lumbar muscle sagging, simultaneously strengthens the spleen and stomach, regulates metabolism, reduces waist-abdominal fat accumulation, and plays a dual role in tightening lumbar muscles and shaping/fat reduction.

Jingmen (GB25) belongs to the Gallbladder Meridian of Foot-Shaoyang. It is located at the lower border of the free end of the 12th rib. This acupoint is an important pathway for kidney Qi to directly reach the lumbar spine. It can supplement the kidney, strengthen the lower back, warm and unblock the meridian Qi and blood of the lumbar region, and nourish the local sinews, bones, and lumbar muscles. It can effectively improve common post-fat-reduction issues such as lumbar soreness and weak core strength, and enhance the support and stability of the lumbar muscle groups ^[21].

3.2. Acupoint group for strengthening the calf, benefiting primary Qi, and invigorating the spleen and stomach

This acupoint combination focuses on dredging the lower limb meridian Qi, tightening the muscle contours of the calf, and relying on meridian conduction to form a physiological muscle pump effect. It is specifically designed to address post-fat-reduction issues such as calf muscle flaccidity, soreness, distension, and weakness. The paired acupoints Chengshan (BL57) and Zusanli (ST36) are selected for their synergistic effects: they invigorate the spleen to consolidate the foundation, supplement the acquired constitution, unblock the meridians, strengthen lower limb muscle strength, and achieve a therapeutic effect that addresses both the root cause and the symptoms ^[22].

Chengshan belongs to the Bladder Meridian of Foot-Taiyang, located in the middle of the posterior calf, at the apex of the V-shaped depression formed when standing on tiptoe. It stimulates Taiyang meridian Qi, unblocks lower limb meridians, tightens calf muscle contours, relieves calf flaccidity and soreness, and enhances calf muscle tightness and strength.

Zusanli is the He-Sea acupoint of the Stomach Meridian of Foot-Yangming, located on the lateral calf, 3 cun below Dubi (ST35), one fingerbreadth lateral to the anterior tibial crest. It is a classic acupoint for clinical invigoration of the spleen, supplementation of Qi, and reinforcement of the acquired foundation.

It harmonizes the spleen and stomach, generates Qi and blood, strengthens sinews and bones, provides Qi and blood essences for systemic muscles, and directly nourishes the calf muscles, fundamentally improving muscle malnourishment, flaccidity, and weakness ^[23–25].

3.3. Acupoint group for tightening the thigh and enhancing muscle strength

This acupoint combination primarily acts on the quadriceps femoris region, focusing on refining the overall contours of the thigh. It is often used to improve common post-fat-reduction manifestations such as thigh muscle atrophy, sagging skin and flesh, and weakness in limb exertion. The extra-meridian acupoint Siquang is frequently selected clinically as a specific effective point for regulating the state of the thigh muscle groups ^[25,26].

Siquang is located on the anterior thigh region. Its position is 4.5 cun vertically above the midpoint of the superior border of the patella, precisely at the center of the belly of the rectus femoris muscle. This acupoint has a significant regulatory effect on thigh muscle flaccidity and strength decline. Stimulation directly mobilizes the overall activity of the quadriceps, unblocks the local meridian Qi and blood in the thigh, nourishes the muscle fiber tissue, significantly improves thigh sagging, weakness, and soreness during walking, while optimizing the tightness of the leg contours and enhancing overall lower limb muscle strength ^[27].

3.4. Acupoint group for shaping the upper arm and nourishing muscle collaterals

This acupoint combination focuses on activating the Qi movement of the Hand-Yangming Meridian, nourishing the upper arm muscle tissues. It is mainly used to improve the “bat wing” problem caused by muscle consumption and soft tissue flaccidity on the medial and posterior aspects of the upper arm after fat reduction. Clinically, Binao is selected as a dedicated essential point for specifically improving upper arm muscle flaccidity and preserving the contours of the upper arm ^[28].

Binao belongs to the Large Intestine Meridian of Hand-Yangming. When the elbow is flexed and the fist is clenched, it is located on the lateral upper arm at the lower border of the deltoid muscle. The Hand-Yangming meridian is abundant in Qi and blood. Stimulating this acupoint frees upper arm meridian Qi, unblocks local meridians, nourishes flaccid muscular interstices, acts on the anterior edge of the deltoid and the triceps brachii, tightens the loose contours of the upper arm, fundamentally improves upper arm muscle flaccidity, and eliminates the “bat wing” body shape issue.

4. Operation standards

4.1. Preoperative preparation

Instrument preparation: Use absorbable medical catgut (0.3–0.4 mm × 2–3 cm), 12–16-gauge disposable specialized embedding needles, along with sterile gauze, iodophor, medical alcohol, hemostatic forceps, sterile gloves, and other consumables. All instruments are strictly sterilized to avoid intraoperative infection.

Preoperative patient assessment: Carefully inquire about medical history and allergies, strictly screen for contraindications to catgut embedding, including skin breakage/infection, coagulation disorders, severe hypertension, organic heart disease, severely weakened immunity, catgut allergy, etc.; women should avoid the two heaviest days of menstruation. Following acupuncture operation standards, explain the procedure and expected postoperative reactions (normal soreness, numbness, slight bruising) to alleviate psychological concerns and obtain cooperation. Assist the patient into a comfortable supine, prone, or lateral position, fully expose the treatment area, and clean the local skin ^[29].

Precise acupoint location: Strictly follow the national standard positioning in Acupuncture and Moxibustion, adjust acupoints based on the patient's body proportions, mark the acupoint centers to ensure precise embedding and therapeutic effect.

4.2. Operating procedure

Local disinfection: Starting from the marked acupoint center, apply iodophor in a spiral motion outward. The disinfection area diameter should be no less than 5 cm. Repeat disinfection 2–3 times; allow natural drying after each application to avoid iodophor residue irritating the skin.

Embedding procedure: The operator wears sterile gloves, uses hemostatic forceps to hold the prepared catgut, and loads it into the embedding needle. Puncture quickly through the skin at the acupoint center, adjust the needling angle according to the depth of the acupoint, generally insert 1–2 cun to reach the muscle layer, avoiding superficial blood vessels and nerves. After reaching the appropriate depth, slowly push the needle core to implant the catgut, then quickly withdraw the needle. Use sterile gauze to gently press the needle hole to stop bleeding, preventing oozing and catgut slippage.

Postoperative inspection: After completing embedding for one group of acupoints, check each needle hole for oozing or discharge. If no abnormalities, cover the needle holes with sterile gauze for protection.

4.3. Postoperative care and contraindications

Needle hole care: Keep the needle holes completely dry for 24 hours after the procedure; no water contact, bathing, or soaking. Maintain local cleanliness and dryness. Do not scratch or rub the skin around the acupoints.

Dietary and lifestyle regulation: Maintain a light diet for one week after the procedure. Avoid spicy, greasy, raw, cold, seafood, and allergenic foods to prevent interference with catgut absorption and needle hole healing. Avoid high-intensity strenuous exercise in the short term; gentle walking is acceptable. Prevent muscle strain that could cause catgut displacement. Maintain regular daily routines; avoid staying up late to support Qi and blood repair and muscle nourishment recovery.

Adverse reaction management: Mild redness, swelling, soreness, numbness, or a heavy sensation at the needle holes are normal post-procedure responses and typically resolve spontaneously within 1–3 days without special treatment. If any abnormal manifestations occur after the procedure, such as obvious redness and swelling at the acupoint site, increased pain, fever, or systemic allergic reactions, the patient must seek medical attention promptly for examination and management. If catgut detachment or displacement occurs, immediate routine disinfection of the affected area should be performed, followed by re-embedding of the catgut at the acupoint.

The frequency of clinical treatment can be flexibly arranged according to individual constitutional differences and the severity of muscle loss. Generally, treatment is administered once every 2–3 weeks, with four consecutive sessions constituting a standard course of treatment. After completing 1–2 courses of treatment, the subsequent diagnosis and treatment plan should be adjusted accordingly based on the improvement of the patient's muscle condition and clinical symptoms.

5. Case report

Patient Zhang, female, 32 years old, height 165 cm, weight 78 kg, BMI 28.7 kg/m², estimated body fat

percentage 33.07%, history of obesity for 2 years. She had used GLP-1 receptor agonist weight loss drugs continuously for 3 months, reducing weight to 72 kg, BMI 26.45 kg/m² but subsequently developed obvious muscle loss: lumbar flaccidity, accumulation of waist-abdominal fat, soreness and weakness in calves and thighs, prominent bat wings on upper arms, accompanied by dull lower back pain, and a heavy feeling in the legs when climbing stairs; basal metabolic rate decreased to 1270 kcal/day, waist circumference 86 cm, body fat percentage 31.7%. She also experienced poor appetite, mental fatigue, and soreness and weakness in the lower back and knees. Tongue: pale with thin white coating; pulse: thready and weak.

TCM differentiation: spleen-stomach deficiency, liver-kidney insufficiency, Qi and blood deficiency. The Shouji Four-Point Formula acupoint catgut embedding protocol was applied, using Daimai, Jingmen, Chengshan, Zusanli, Siquang, and Binao. Treatment was performed every 2 weeks, with 4 sessions as one course.

After one course of treatment, the patient's mental state significantly improved, appetite increased, low back and knee soreness alleviated and low back pain and weakness during stair climbing substantially relieved. Lumbar flaccidity notably tightened, bat wings on upper arms markedly improved, calf and thigh soreness and weakness largely resolved. Basal metabolic rate rose to 1360 kcal/day, weight stabilized at 70.2 kg without rebound, BMI 25.79 kg/m², waist circumference 82 cm, body fat percentage 28.5%. Muscle mass was maintained without notable additional decline.

After two courses, lumbar and abdominal muscle tension significantly increased, excess waist-abdominal fat reduced, calf and thigh muscle strength recovered well, upper arm lines became tight and smooth, and bat wings largely disappeared. Basal metabolic rate increased to 1430 kcal/day, weight stabilized around 68.3 kg, BMI 25.09 kg/m², waist circumference 77 cm, body fat percentage 24.2%. Tongue appearance turned light red with a thin white coating, pulse became harmonious, and various clinical discomfort symptoms basically resolved.

At 3-month follow-up, the patient's weight remained stable, with no obvious flaccidity or loss of muscle mass in the waist, abdomen, or limbs. Basal metabolic rate remained within the normal range. No adverse reactions occurred, confirming that the Shouji Four-Point Formula acupoint catgut embedding has a definite clinical effect on post-fat-reduction muscle loss.

6. Conclusion

Obesity is a highly prevalent chronic metabolic disease and has long been a major clinical challenge. Although Western weight loss drugs can rapidly reduce body weight, the consequent muscle loss is increasingly problematic. Muscle loss not only causes atrophy and flaccidity of the waist, abdomen, and limb muscles, and decreased limb function, but also predisposes to weight regain, severely affecting physical and mental health and long-term weight loss outcomes^[30].

Based on the classic TCM theories of “spleen governing muscles”, “Qi and blood nourishing the body”, and “liver and kidneys governing sinews and bones”, combined with the pathogenesis characteristics of post-fat-reduction muscle loss and drawing on the clinical acupoint selection experience of the Wangjing Hospital Weight Loss Specialty, the Shouji Four-Point Formula acupoint catgut embedding therapy is used to intervene in post-fat-reduction muscle damage. Targeting four high-risk areas for muscle loss—waist, calf, thigh, and upper arm—six specialized muscle-regulating acupoints are selected. The four acupoint groups work synergistically, and the absorbable catgut provides long-acting acupoint stimulation, achieving the

effects of unblocking meridians, harmonizing Qi and blood, supplementing spleen and kidney, and nourishing and firming muscles.

This therapy effectively preserves muscle mass, slows the rate of muscle loss, consolidates weight loss outcomes, reduces the risk of rebound, simultaneously improves underlying constitutional issues such as spleen-stomach deficiency and liver-kidney insufficiency, and enhances overall body function. It is simple and safe to perform, yields sustained efficacy, presents minimal toxicity and few adverse effects, and has favorable patient acceptance.

Clinical practice and case follow-up have verified that the Shouji Four-Point Formula acupoint catgut embedding has a definite therapeutic effect on post-fat-reduction muscle loss. Its advantages lie in its alignment with the anatomical characteristics of post-fat-reduction muscle loss and the core TCM pathogenesis, precise targeted acupoint combination addressing both symptoms and root causes, standardized and safe operation procedure, and its ability to effectively improve reduced muscle mass and tissue flaccidity, elevate basal metabolic rate, thereby providing a practical and generalizable TCM external therapy for the clinical prevention and treatment of post-fat-reduction muscle loss.

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