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Cellulite

The Slim Truth



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10 Reasons Smooth Skin Means Inner Wellness

Table of Contents

- | | | |
|---|----------------------------------|---------|
| 1 | Overweight | Page 7 |
| 2 | Inadequate Nutritional Practices | Page 9 |
| 3 | Slow Metabolism | Page 11 |
| 4 | Lack of Physical Activity | Page 13 |
| 5 | Stress | Page 15 |
| 6 | Circulatory System Issues | Page 16 |
| 7 | Hormonal Changes | Page 18 |
| 8 | Inflammation | Page 19 |

9	Improper Fluid Balance	Page 20
10	Genetics	Page 23
	References	Page 25

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What is Cellulite – and Why?

Cellulite is what most people call skin with excessive dimpling and puckering – described as resembling ‘cottage cheese’^{1,2}. It is much more common in women than in men³, due to gender differences in body fat distribution, and is estimated to be present in over 80% of women to some degree. In addition, cellulite is more common with aging⁴, when the skin loses some of its elasticity, muscle loses some of its tone, and circulation is slowed, as well as in individuals with a sedentary lifestyle, for similar reasons^{5,6}.

Known formally as ‘liposclerosis,’ cellulite is most common in areas of the body with natural fat deposits – usually around the thigh area, front and back, as well as the lower belly and under the arms – and results from unevenness of fatty tissue when it pushes through muscle “cords,” bumping up against the skin⁵. The less muscle and more fat there is in these areas, the greater the appearance of cellulite.

Though mild cellulite is considered normal, and even severe cellulite is by itself not considered a serious medical condition, many people are concerned about the appearance, and go about trying to eliminate it through various means⁷.

The most popular include electronic procedures (lasers, radiofrequency, laser-assisted liposuction, vacuum), plastic surgery, spot exercises, special creams (both prescription and over-the-counter), massage, and internal treatments (injection and oral). Most of these yield results that are at best temporary, and at worst, dangerous⁸⁻¹⁰.



It is generally agreed that these methods are largely inadequate because they do not address the fundamental causes of cellulite, which are more internal than external, physiological rather than cosmetic, related to muscle as much as or more than fat³, and most importantly, multifactorial and requiring ongoing effort for long-term maintenance^{1,6,7}.

Factors that may increase the risk of development or appearance of cellulite include the following:

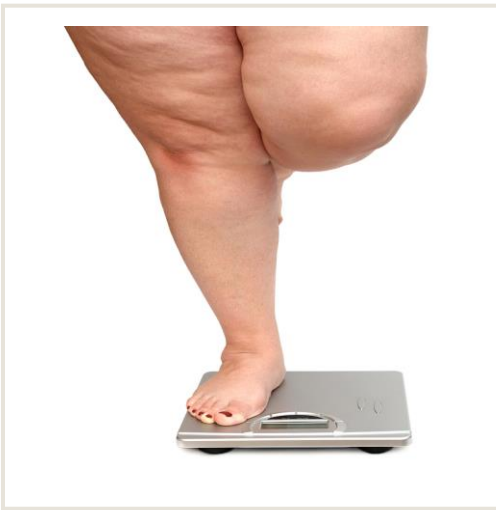
- 1. Overweight**
- 2. Inadequate Nutritional Practices**
- 3. Slow Metabolism**
- 4. Lack of Physical Activity**
- 5. Stress**
- 6. Circulatory System Issues**
- 7. Hormonal Changes**
- 8. Inflammation**
- 9. Improper Fluid Balance**
- 10. Genetics**

Fortunately, these can be addressed with both sound nutrition and exercise – in ways consistent with meeting weight loss and health goals.

Cellulite is more than skin-deep – and so are the solutions

1 Overweight

Though cellulite is technically not caused by overweight or obesity¹¹ – and can occur in individuals of normal weight¹ – being overweight and especially overfat without adequate lean muscle mass means there is more fatty tissue to push through the existing muscle, which can worsen the appearance⁶.



Loss of muscle mass is often a problem in overweight and obesity¹². First, one of the most common contributors to overweight is lack of physical activity, which is necessary to maintain muscle tissue. Second, extreme/starvation dieting methods, common among overweight and obese individuals, lead to muscle loss and ultimately fat gain in its place.

A key issue in weight control for cellulite management is losing fat mass while preserving lean muscle – which is also key to health. Certain hormones are closely involved in this¹³,

and are discussed later in *Hormonal Changes*. Recommended lifestyle upgrades favor right-sizing energy intake and exercise to maintain balance – meaning that input matches output – as well as muscle tone¹².

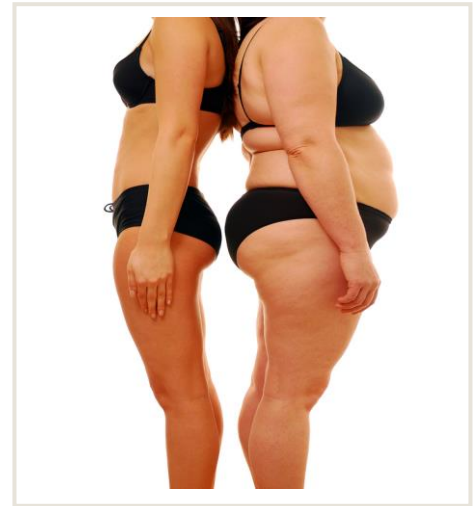
Gotu kola (*Centella asiatica*), a plant that has been widely used in traditional medicine, has been studied in clinical research for its use in the cellulite fight. Among other observed benefits, gotu kola has been associated with reduction in the size of fat cells (called adipocytes) in the thighs and seat area – top cellulite trouble spots¹⁴.

Fermented foods, such as well-cultured yogurt and kefir, soy products such as tempeh, and pickled vegetable are rich in probiotics, also known as ‘good’ bacteria or ‘microflora’. Certain probiotics have been shown in studies not only to support digestive health, but also to decrease belly fat and fight inflammation linked to overweight and related health conditions¹⁵.

Garcinia (*Garcinia cambogia*) has long been popular for an apparent benefit in weight management due an active component called hydroxycitric acid (HCA), which particularly interferes with fat-building. Furthermore, it is suggested that its extract is able to change the levels of hormones involved in fat storage and burning¹⁶.

Other plants studied for such benefits include fucoxanthin from *brown seaweed*¹⁷, *yerba maté*¹⁸, and chlorogenic acid from *green coffee bean extract*^{19,20}, as well as **chitosan**, which has been found to decrease excess body fat while preserving lean body mass²¹.

2 Inadequate Nutritional Practices



Weight loss diets have long been used to control the degree and appearance of cellulite, given the key role of excess fat tissue. **However, while a healthy weight is helpful to limit the appearance of cellulite, extreme diets for rapid results can cause ‘yo-yoing’ of body weight, which results in reduction of muscle mass – itself considered an even more important factor in development of cellulite**³. When the weight comes back (‘rebound’ gain), it is not muscle tissue, but rather fat and water. This is the perfect storm for cellulite development.

Further, extreme diets can be nutritionally inferior relative to the body’s needs, much as a junk food diet can be. Various nutrients in foods are required for proper fat and muscle metabolism, and missing out on these can not only leave you feeling drained, it can deflate your slimming efforts.

Nutrients particularly involved in fat burning and muscle maintenance include **vitamins C, B2, B3, B5, B6** and the B-vitamin relatives **choline** and **inositol**; the minerals **chromium, iodine**, and electrolytes **potassium, magnesium, calcium**, and even **sodium**; and key unsaturated fatty acids from the **omega-3, omega-6, and omega-9 families**^{22,23}.

- Vitamins B2, B3, B5, and B6 are essential for energy burning keep your metabolism running, a key factor in weight loss and maintenance, and ensure a healthy thyroid. Good sources include wheat bran, eggs and oats.
- B-vitamin relative choline is crucial for metabolism of fat, and is supported in this function by fellow B-cousin inositol. An unfortunate effect of inadequate choline in the body is that fats can stagnate in the liver; this creates inflammation, which in turn leads to excess fat storage in tissues. Good sources of choline include egg yolks, wheat germ, and peanuts, and good sources of inositol include soy, eggs, and nuts.
- Chromium is critical to processing of carbohydrates and balancing of blood sugar and insulin levels. Studies have shown it to enhance weight loss efforts, possibly by preventing excess insulin, linked to weight gain. Good sources include onions, tomatoes, brewer’s yeast, potatoes, and whole grains, especially the bran; brane is also rich in vitamin B3, which is critical to chromium’s glucose-balancing function.

- Iodine is essential to thyroid function, and inadequacy – often found in landlocked areas – has been linked to a slow metabolic weight and resultant hard-to-lose excess weight. The best sources of iodine are sea foods, especially seaweeds, which are sold in many regular supermarkets and nearly all health-oriented food shops.
- Electrolytes are essential for proper muscle function and tone, and inadequate levels and/or levels that are out of balance with one another can contribute to muscle weakness and slackness, which are key factors in development of cellulite.
- Certain fatty acids important to healthy weight maintenance tend to be inadequate in most modern western diets, including omega-3s docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), highest in wild fatty fish; an important omega-6 known as conjugated linoleic acid (CLA), high in pasture-raised meat and poultry, as well as mushrooms; and the key omega-9 oleic acid (OA), highest in olive oil. Today, most westerners get too much of CLA's common form linoleic acid through cheap cooking and salad oils and processed foods, and more and more fish available in stores has been farmed with inexpensive feed that reduces the natural DHA and EPA content in favor of linoleic acid (LA) and its cousin arachidonic acid (ARA). While LA is essential to the body, too much – especially relative to omega-3s – has been shown to contribute to inflammation, which in turn can contribute to obesity risk.

In addition to sound nutrition, healthy weight management has been considered to be dependent upon two additional basic components, which are also considered key in cellulite: metabolic rate and physical activity.

3 Slow Metabolism

Everybody loses weight at a different pace, for a variety of reasons – genetics, stress, medications, dieting and medical history, to name a few of the big ones. Sometimes it can feel too slow and be frustrating, especially if you know you’re doing all the right things. Sometimes it can be too tempting to resort to ‘crash diet’ starvation methods just to see a change fast. It is very, very important to resist this urge, as we all know how that can backfire with even greater slowing of metabolic rate.



Green tea A systematic review of high-quality human studies found that green tea may drive key components of a healthy metabolic rate ²⁴. Because of this benefit, green tea is considered a top “fat-burner – both during exercise and at rest – supported by several scientific studies ^{25,26}. While it had been thought that the modest caffeine content was responsible, currently proposed mechanisms are much more exciting – these include curbing of fat-building genes and ramping up of fat metabolism genes in the liver ²⁵, as well as increased energy burning and impaired fat absorption ²⁶.

Black chokeberry (*Aronia melanocarpa*) has been found in human research to increase thermogenesis (energy burning), possibly by increasing levels of noradrenalin (or norepinephrine) ²⁷, a hormone that increases blood flow to muscle.

Carbohydrates are necessary for efficient fat-burning. Without adequate amounts, fats are incompletely metabolized, forming ketones – which can break down muscle and lead to ‘atrophy’ (loss) ²⁸, considered a contributor to cellulite. Where low-carbohydrate diets have been favored for fat reduction because of their insulin-lowering features, a similar benefit may be obtained in muscle by eating complex, high-fiber carbohydrates ^{29,30}.

Protein. Many studies have found that, in addition to curbing hunger, protein boosts energy-burning more than any other major food components to be ideal with whey ³¹ (dairy ³²) or plant-based ³³ proteins, rather than meat. Additionally, a diet that favors a moderate level of protein (one or more grams per kilogram) has been shown to be protective of muscle tissue during weight loss, especially long-term ³⁴. If protein intake is too high, however, it can be hard on the kidneys in predisposed individuals – which includes many individuals with diabetes and high

blood pressure ³⁵, potentially leading to fluid retention and inflammation that can contribute to muscle loss ³⁶.

Studies have shown that eating a protein source with a carbohydrate source can slow the impact on blood sugar and provide the sort of balance that enables hormone levels to support efficient fat-burning ³³, a benefit optimized by making the best complex, high-fiber carbohydrate choices ³⁷⁻³⁹.

Vitamin D has been shown to preserve muscle mass during weight loss ⁴⁰, as well as favor limiting adverse metabolism of body fat that contributes to obesity ⁴¹. Sources include mushrooms, fortified milks (vegetal and dairy), whole dairy milk, and fish such as cod, salmon, and tuna. The combination with resveratrol (high in grapes and red wine) has been linked to enhanced fat-burning ⁴².

Omega-3 fatty acids have been found to boost the benefits of exercise on fat loss ^{43,44} and lean muscle gain ^{43,45}, including by exerting anti-inflammatory effects ⁴⁶. Food sources of omega-3s include chia and flax seeds, almonds, walnuts, certain green leafy vegetables (kale, purslane, and moringa), fortified and pasture-raised eggs and meats/poultry, and wild-grown fatty fish such as salmon (including trout) and sardines.

Capsaicin-rich spices such as chili are rich sources were found in research to be ‘thermogenic’ – meaning they can accelerate the body’s metabolic rate, including fat-burning ⁴⁷.

Calcium may increase fat-burning and can enhance weight loss efforts according to scientific studies in humans, especially when intake improved over previously low dietary levels ⁴⁸ and came from food (not pill) sources ⁴⁹. Calcium is high in dairy products and fortified vegetal alternatives, sardines, salmon, firm tofu, and deep green leafy vegetables such as collard greens.

Water, especially cold water has been found in several studies to enhance the metabolic rate ⁵⁰⁻⁵⁴, possibly through correction of dehydration suggested to slow metabolism ⁵⁰, as well as putting the body in an energy-burning thermogenic (self-heating) mode to compensate for the cold temperature of the water ⁵², correction of dehydration that slows metabolism ⁵⁰, and a possible chemical effect, proposed upon observation that metabolic enhancement was observed only with plain water ⁵¹.

4 Lack of Physical Activity

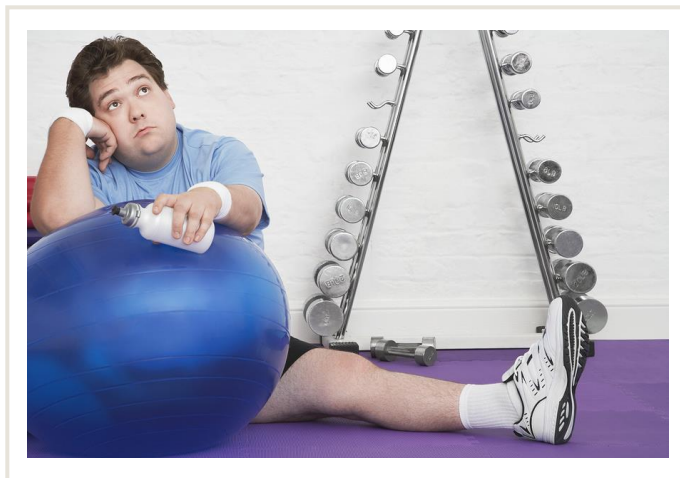
Connective tissue integrity is key to preventing cellulite ^{2,3,6-8}, and lack of physical activity is considered the number one way it can be weakened in otherwise basically healthy people (i.e., without a ‘wasting’ disease such as advanced cancer or systemic blood infection). Without optimal strength and structure, this tissue can’t hold back the fat from pushing upward and becoming visible.

Exercise targeting cellulite is best when working several key muscles, rather than a single set in the style of ‘spot reducing’. Spot reducing is controversial, with many saying it may not be effective – yet it continues to be promoted because it is what people often seek. However, the more advantageous version of this is spot *toning* – particularly of cellulite-prone areas that are vulnerable to shrinking of muscles – which is what cellulite management is really all about.

Further, muscle plays a major role in setting your metabolic rate, the speed at which you burn energy and fat ⁵⁵. The more muscle is built up and challenged, the more it is on your side in the weight war. Exercise has therefore been linked to increases in the metabolic rate, not only during the activity itself, but also when not exercising ⁵⁶.

Exhausting exercise is not necessary here, especially if it is so intimidating and discouraging that it is not done on a regular basis. Moreover, building muscle doesn’t necessarily mean building bulk – most of the time, it means swapping out fat.

Cardiovascular (‘cardio’) exercise is based on taking oxygen into the muscles, making it ‘aerobic’. This is the energy-burning type, and if carried out for at least 20 minutes, it favors fat-burning – with the added benefit of muscle preservation ⁵⁷. When muscles start to appear burn less energy than they did in the past – most noticeable as a weight ‘plateau’ – it is often recommended to introduce new muscles into the workout regimen ⁵⁸. For example, adding floor exercises to your walks or vice versa, or finding a way to make them even just a little more challenging ⁵⁹. Nothing too intense for too long, though: remember that breathing is the only way oxygen gets into the body to burn fat ^{60,61}. Breaking up your regular pace with short bursts of somewhat more intense activity has been shown to enhance the effects of physical activity on fat loss ^{62,57,63,64}.

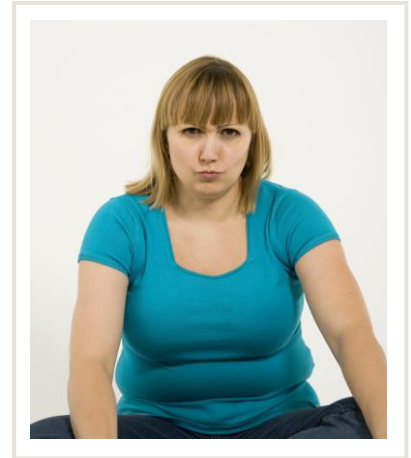


Where aerobic exercise is best at burning energy during the activity, strength training is more muscle-building, which can increase the metabolic rate for sustained energy- and fat-burning⁵⁵, in addition to toning trouble spots. It can provide an excellent complement to aerobic exercise^{12,57,63,64}.

For more tips, please see our illustrated guide on anti-cellulite toning moves.

5 Stress

Stress, particularly emotional stress, has been linked to overweight. One of the most visible reasons studied is the tendency to overeat in response to stress – particularly energy-dense ‘comfort’ foods – which unfortunately does not necessarily dull stress reactions in the brain. In fact, foods high in simple carbohydrates have been found to actually increase levels of the stress hormone cortisol. In turn, increased cortisol levels have been linked to increased fat storage in the body⁶⁵. This combined with the cortisol’s effect of reducing muscle mass creates ideal conditions for cellulite – and this hormone has indeed been identified as a key factor in its development⁶⁶, especially in obese individuals⁶⁷. Stress and cortisol levels can be addressed through various methods, including relaxation, and sufficient and good-quality sleep, as well as sound nutrition.



Nutritional measures may include adequate protein intake to enhance satiety and counteract the urge to eat energy-dense ‘fattening’ foods^{68,69}. Further, favoring complex, high-fiber foods over simple sugar-rich foods may limit cortisol secretion⁷⁰.

Bitter melon, or bitter melon, is often used as an anti-cortisol ingredient in fat-burning products. It has indeed demonstrated a fat-burning effect in research⁷¹, appearing to improve insulin balance⁷². Bitter melon is used in Asian cuisine as a savory vegetable, and in diabetes care by traditional medicine practitioners.

Vitamin C was found in research to reduce blood levels of cortisol in response to stress⁷³. Good sources include citrus fruits, strawberries, sweet red bell pepper, broccoli, and potato.

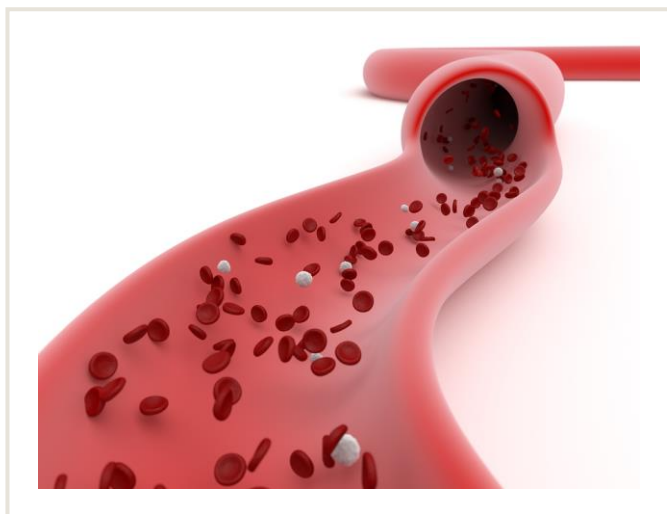
Rosenroot (*Rhodiola rosea*) has been found in several studies to have a natural cortisol-reducing effect, with implications for effects of stress on the body⁷⁴.

6 Circulatory System Issues

Cellulite is thought to develop in part from abnormal circulation, either of the blood or lymph system. Such abnormalities have been linked to structural changes in fat tissue under the skin, as well as the collagen in the connective tissue that crosses it and the protein-sugar compounds ('proteoglycans') nearby ⁷⁵. These proteoglycans have been shown to be increased in cellulite, and to have water-attracting properties that can worsen the edema or fluid retention characteristic of the affected tissue ⁷⁶.

Normalizing the connective tissue (muscle, collagen, etc.) in cellulite trouble spots is considered advantageous in cellulite management.

A particularly popular option is through anti-inflammatory measures. Gotu kola has been observed to have a strengthening effect on the tissues surrounding fat-storage cells by enhancing collagen formation in the blood vessels under the skin as well as healthy fluid drainage and relief of fluid retention. Its key action has been suggested to be improvement of the nutrition of key tissues and stimulation of circulation ⁷⁷.



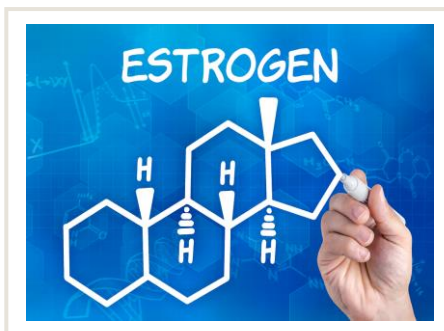
Caffeine is a popular ingredient in topical anti-cellulite creams, and using caffeine and similar compounds found in coffee and chocolate internally is also suggested to be of benefit.

Daily consumption of **dark chocolate high in natural cocoa**, rich in cocoa flavonols, has been shown in human research to improve blood vessel health and circulation, as well as inflammation, in as little as four weeks ⁷⁸.

Gotu kola has been studied successfully both as a key ingredient in a topical anti-cellulite cream and in a nutritional cellulite-reducing supplement. In these experiences, it was observed to be safe in individuals who are not allergic, and side effects were rare ⁵.

Chokeberry, a rich source of antioxidant phytonutrients, has been associated with improved circulation and reduced thickness in subcutaneous (under-the-skin) tissue characteristic of cellulite⁷⁹. Chokeberry has also been found in human research to increase thermogenesis, possibly by increasing blood flow to muscle through the hormone noradrenalin/norepinephrine²⁷.

7 Hormonal Changes



Hormones have been suggested to play a major role in factors affecting cellulite development and management ¹⁴. Features of a healthy lifestyle may support proper balance of these hormones, or compensate for their actions.

Estrogen imbalance in women, either excess or the loss characteristic of but not limited to the aging process, has been linked to slowing of metabolic rate and greater storage of fat relative to muscle preservation ⁸⁰⁻⁸³, suggested to be related to cellulite development ^{14,84}. Ironically, hormonal replacement therapy to compensate for losses has been linked to development of cellulite. Fortunately, the plant-based alternatives, known as phytoestrogens, may have the opposite effect. Those found in soy, called isoflavones, have been shown to combat the fat accumulation characteristic of middle age ⁸⁵. Fermented organic soy is considered the healthiest option.

More recently, attention has also turned to balancing certain gender-neutral hormones that are involved in energy burning, which affects fat storage ¹³.

The ‘obesity hormone’ leptin has been observed to be balanced by garcinia (*Garcinia cambogia*), a fruit used in Asian cuisine, widely popular for its apparent benefit in weight management. Garcinia is rich in hydroxycitric acid (HCA), shown in studies to interfere with generation of fat in the body, possibly through leptin-balancing properties ^{86,87}. **The African mango (*Irvingia gabonensis*)** has also been shown to enhance body fat loss and prevent fat storage ⁸⁸⁻⁹⁰ through its apparent effect on leptin ⁹⁰.

The hormone adiponectin, also well-known to be key here, was found to be lower in women with cellulite than without, independent of weight ¹. **Mangosteen (*Garcinia mangostana*)**, a tropical fruit, has been found to be beneficial in raising adiponectin levels in obese individuals ⁹¹, as has **resveratrol from red grapes** and Japanese knotweed ⁹², **African mango** ⁹⁰, **Dolichos biflorus seed extract**, and **Piper betle leaf extract**. The latter two were tested in combination and found to not only increase adiponectin, but also to result in significant weight loss in obese individuals ⁹³.

8 Inflammation

Inflammation has been suggested to play a role in development of cellulite through specific biochemical pathways ⁷, as well as through increasing the risk and degree of increased fatty tissue in the body ^{46,94,95}. Inflammation can also increase fluid retention under the skin, observed to be a factor in cellulite ^{76,96,97}.

Foods, edible plants, and individual nutrients shown to have anti-inflammatory properties targeting development of fat tissue include **curcumin (from turmeric)**, the key spice in curry), **chokeberry**,

resveratrol from red grapes, **gotu kola**, **oleuropein from olive leaf**, **omega-3 fatty acids**, and **vitamin D** ^{5,42,46,79,98-100}. In particular, curcumin – particularly when absorption is optimized by pepper – was found to decrease inflammation in the fat tissue under the skin ⁹⁸, and **gotu kola** has been credited specifically with anti-edema ⁷⁹ and anti-cellulite ⁵ benefits.



9 Improper Fluid Balance

Dehydration



Dehydration is considered more common in obesity, especially in women¹⁰¹, and has been shown to worsen muscle breakdown in the body, especially after exercise. While some breakdown is actually necessary to build muscle, the amount associated with a fluid deficit is considered disadvantageous. In young men, dehydration was observed to significantly increase levels of cortisol, a stress hormone, as well as insulin and glucose, all of which are associated with fat accumulation, and to limit testosterone secretion, an effect that can limit muscle-building¹⁰².

Not surprisingly, drinking cold water has been found in several studies to enhance the metabolic rate⁵⁰⁻⁵⁴, possibly through correction of dehydration suggested to slow metabolism⁵⁰, as well as other mechanisms described in ***Slowed Metabolic Rate.***

It should be kept in mind as well that dehydration, especially due to heat or exercise, often comes with loss of electrolytes (potassium, sodium, calcium, and magnesium), which are critical to muscle function and tone. Without proper levels, muscles can become slack, which lays the groundwork for cellulite to creep up.

Though fluid intake needs can be as individual as energy and protein needs, general guidelines for adequate fluid intake have been published by health authorities¹⁰³ and presented below.

Water requirements expressed in relation to energy recommendations				
Sex	Age	Kcals/d Estimated Energy Requirement	AI for fluid intake (ml/d)	Ratio AI ml/d: EER Kcal/d
Child	2-3	1000-1400	1300	0.93
Female	4-8	1400-1600	1700	1.06
	9-13	1600-2000	2100	1.05
	14-18	2000	2300	1.15
	19-30	2000-2200	2700	1.23
	31-50	2000	2700	1.35
	50+	1800	2700	1.5
	Male	4-8	1400-1600	1700
9-13		1800-2000	2400	1.20
14-18		2400-2800	3300	1.18
19-30		2600-2800	3700	1.32
31-50		2400-2600	3700	1.42
50+		2200-2400	3700	1.54

AI for total fluids derived from dietary reference intakes for water, potassium, sodium, chloride, and sulfate

Ratios for water intake based on the AI for water in liters/day calculated using EER for each range of physical activity. EER adapted from the Institute of Medicine Dietary Reference Intakes Macronutrients Report, 2002.

AI = Adequate Intake

EER = Estimated Energy Requirements

Note that a typical glass of liquid contains 8 fluid ounces or 240 ml, meaning the above recommendations translate to about 8-12 glasses per day for a typical adult, somewhat less if foods eaten throughout the day are high in water, i.e. fresh fruit and yogurt. The daily fluid requirement can go down in cases of certain ailments, such as congestive heart failure, or up in cases of major losses i.e. with fever, hot ambient temperatures without air conditioning, or exercise that is especially intense, long, or performed in high temperatures. In such cases, water losses can double or even triple if several factors occur in combination, as in “high extremes of heat and activity”¹⁰³.

Since fitness is a key component of cellulite management, the following exercise-specific fluid intake recommendations made by the American College of Sports Medicine¹⁰⁴ are particularly relevant:

- Drink about 17 fluid ounces or 500 ml (just over 2 glasses) of fluid about 2 hours before exercise to promote adequate hydration and allow time for excretion of excess ingested water.
- During intense exercise or in hot weather, or if the exercise session will be longer than an hour, start drinking early and at regular intervals to be sure to replace all the water lost through sweating.
- Ingested fluids should be cooler than ambient temperature, about 15-22°C or 59-72°F.

- Flavoring is acceptable and even encouraged to enhance palatability and promote fluid replacement, but the concentration of sugars should fall within a recommended range of 4-8%.
- During intense exercise lasting longer than 1 hour or performed in hot weather, it is recommended to drink 20-40 fluid ounces (2½-5 cups) or 600-1200 ml per hour of beverages containing electrolytes and 4-8% carbohydrates (4-8 grams per 3½ fluid ounces or 100 ml). The carbohydrates can be sugars (glucose or sucrose) or starch (e.g., maltodextrin)*.

Fluid retention

Edema, or fluid retention in the body commonly known as bloating, has been identified as an aggravating factor for cellulite, limiting it is considered key to cellulite management ^{76,106}, as well as general health, including for blood pressure and prevention of heart failure. For edema without a known cause, called ‘idiopathic,’ it is considered crucial to balance electrolyte intake in the body. The primary component of this balance generally involves limiting sodium (salt) intake – especially from processed foods – and taking care to get adequate amounts of potassium. Food sources of potassium include primarily bright yellow and orange fruits and vegetables and dark green leafy vegetables, as well as bananas, potatoes, and coconut water.

Fluid retention in cellulite has also been observed to be favored by increased proteoglycans characteristic of affective tissue ⁷⁶, which are involved in inflammation ^{96,97}.

In a clinical study, a juice made from black chokeberry – known to have anti-inflammatory properties that can counteract excess fat storage ¹⁰⁷ – was associated with reduction of edema in 55.2% of affected subjects ⁷⁹.

* It is recommended that the sweetener not be fructose-based, as this may work against fitness goals ¹⁰⁵. (Hu FB, Malik VS. Sugar-sweetened beverages and risk of obesity and type 2 diabetes: epidemiologic evidence. *Physiology & behavior*. Apr 26 2010;100(1):47-54.)

The role of genes in the cellulite process itself is controversial – which means: keep it in mind, but don't let it discourage you. While some information sources



suggest that the chance of cellulite is not technically genetic, a research study identified two gene forms that may make the body more predisposed¹⁰⁸ – one of these has been estimated to occur in approximately 55% of individuals, and has been linked to increased risk of ‘fat-related’ conditions such as hypertension, stroke, and diabetic kidney disease¹⁰⁹, though it and the other gene form may be protective in diabetes itself^{109,110}.

Cocoa in chocolate was found in a study to reduce the influence of the hypertension-related gene on cardiovascular risk –

however, its influence on cellulite has not yet been evaluated¹¹¹. Given that chocolate may have other benefits in issues related to cellulite control, there may be reason for optimism here.

Beyond the basic discussion, genetics undoubtedly influences the thickness and pigmentation of skin – thicker and darker skin types tending to be more concealing – as well as how the body stores fat¹¹² and maintains muscle. Genes that affect the latter two factors can indeed be impacted by nutrition¹¹³.

For example, certain foods such as ***apples***¹¹⁴, ***citrus fruits***^{115,116}, and ***chili peppers***¹¹⁷, have been found in studies to regulate gene activity related to excess fat in the body and fat burning, and resveratrol, found in high concentrations in grapes – particularly wine – to that supporting healthy muscle tissue⁹⁹.

Though cellulite is considered nearly impossible to prevent, maintaining a healthy weight and body composition – favoring lean over fat mass – and strengthening muscles through exercise can support skin tone and texture, as well as boost circulation.

Nutritional approaches to managing cellulite include principles that address the 10 key contributors discussed here – which are relevant to the bigger picture of sound health. The balanced diet featured in ***“The Trim Down Club”*** is based on these principles.

Exercise is considered one of the most reliable methods of body smoothing, and can enhance your efforts toward a healthy weight. See our “**Your Slim Body**” guide for targeted recommendations.

Get a leg up on cellulite: hand-picked products that can give you an edge

Specialty products that address key aspects of cellulite management can complement the benefits of a slimming lifestyle.

- **BioTRUST LeptiBurn** contains high-quality natural ingredients – including African mango, olive leaf extract, brown seaweed extract, green tea, and yerba mate, which have been shown in scientific studies to increase fat-burning hormones and prevent carbohydrates from being stored as fat.
[For more information Click Here](#)
- **RealDose Weight Loss Formula No. 1** provides Dolichos biflorus seed, Piper betle leaf, rosenroot, and green coffee bean extracts delivered at the doses found to be successful in clinical studies to increase fat burning and weight loss, as well as curb appetite and relieve stress.
[For more information Click Here](#)
- **NewLife’s Pure Garcinia Cambogia** Premium provides 60% of the active component HCA at the clinically recommended dose based on scientific research. This product is 100% natural with no additives, produced in an FDA-approved lab.
[For more information Click Here](#)
- **Okuma Nutritionals** offers their Wu-Long Premium Chinese Slimming Tea in both traditional bags for enjoyment and concentrated capsules for convenience. Both provide pure natural green tea, high in the active component epigallocatechin gallate (EGCG), shown in clinical studies to support fat-burning, sound weight loss, and general health.
[For more information Click Here](#)

While supplements don’t take the place of good nutrition, these carefully selected, high quality products may give your body an extra advantage over key problem areas, and help you feel as good as you look!

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