

## What Is Cellulite?

by Dr. Diana Howard

Few subjects have elicited more debate and controversy amongst the scientific community and professional skin and body therapists than that of cellulite. For years, many in the medical community have argued that cellulite is merely fat and can only be treated with diet and exercise. Yet, non-overweight, physically active women have also been known to show up at the spa or skin treatment center with pleas for treatments or products to address dimpled thigh skin. The unfortunate truth is that 80-90% of women will get cellulite sometime after they reach puberty, and not all of these women are considered overweight. So what is this thing we call cellulite that coexists with the fat cells in our bodies?



Since the word cellulite was first coined in Europe over 150 years ago, studies have focused on the structure of cellulite tissue. As a result of more recent studies, it is safe to conclude that cellulite is indeed more than just ordinary fat, and in order to treat it, one must truly understand its unique aspect. To better understand this condition we need to look at the structure of fat as well as the causes of cellulite.

### What is Cellulite?

Like it or not, man is a fatty animal. Our skin's surface is covered in a coating of oil, and with a few exceptions, a layer of fat occurs over most of the body. The primary functions of this fat layer are to provide thermoregulation, cushioning against mechanical trauma, body contour and filling of body space; most importantly, this fat layer is a source of energy.

For the purpose of energy, lipids accumulate in the fat cells (or adipocytes) as fatty acids that are combined with glycerol and stored as larger triglyceride molecules; when energy reserves are needed, the triglyceride molecules are broken down into glycerol and fatty acids that are metabolized as an energy source. Hence, the fat cell functions as an energy reservoir for our body.

The adipocytes store body fat, which collectively form adipose tissue. Fat is a form of loose connective tissue that is found beneath the skin (dermis) around muscles, organs and joints in our body.

In the late 1970s, Drs. Nurnberger and Muller, in their effort to better understand cellulite and fat, examined the structure of skin and the component of fat cells.<sup>1</sup> They found that in the female body, the uppermost layer of the subcutaneous tissue (or hypodermis) consisted of freestanding fat cell chambers (filled with fat cells), which were separated by vertical walls of connective tissue called septa. The apex of these upright fat chambers was in the form of an arc-like dome, which was weak and prone to collapse when undue pressure was applied. This pressure could be the result of excess weight, fluid retention or lack of strength due to little or no exercise. These larger chambers generated smaller compartments of fat

cells (known as papillae adipose) that clustered tightly under the skin. This combination of freestanding fat cell chambers and compartmentalized clusters of fat cells are the elements that create the change in appearance in the skin's surface that we know was cellulite.

Interestingly, when they compared the structure of the hypodermis in female vs. male patients, they found that the men had smaller fat cell chambers with oblique septa; this latter structural difference affords more strength to the septa and enables them to withstand collapsing under pressure. They also noted that the smaller compartments of fat cells (papillae adipose) had the same structure in men and women.<sup>2</sup> It is hypothesized that this difference in structure of fat cell chambers may predispose women to cellulite more so than men. Interestingly, men with more feminine characteristics tend to have fat cell chambers similar to women, thus inferring that hormones may control this aspect of our structural diversity.

### **How Does Cellulite Form?**

Now that we understand some of the structural differences associated with the cellulite condition, let's look at the four progressive stages that occur during cellulite formation.

#### **Stage One**

In stage one, several phenomena occur that are invisible to the naked eye. These changes involve a deterioration of the skin's dermis, whereby the integrity of the blood vessels and capillaries that create a complex transport network throughout the skin slowly begins to break down. Similarly, the upper region of the dermis begins to lose some of its capillary network. Fat cells, housed within the freestanding fat cell chambers, begin to engorge with lipids, often swelling 2-3 times their original size. Fat cell clumping may commence at this stage as well. Fluid begins to accumulate in the tissue, most likely due to a breakdown in the capillary system. Projections of fat begin to occur in the dermis and there is an increase in Glycosaminoglycans (GAGs), which may account for the enhanced ability for tissues to retain excess water.<sup>4</sup>

#### **Stage Two**

In stage two, dermal deterioration continues and the microcirculatory system continues to decline. Fat cells engorge further and clumping is more pronounced, pushing the much-needed blood vessels further away. It is not uncommon for gaps to appear in the dermis, which may be the result of the normal inflammatory process, which activates specific enzymes such as collagenase and elastase, creating an available path for immune cells to migrate to the site of inflammation.<sup>3</sup> Fluids continue to accumulate. At this stage, "orange peel" skin is now evident.

#### **Stages Three and Four**

In stages three and four, the microcirculatory system continues to deteriorate, slowing metabolism in the cells of the dermis. Both protein synthesis and the repair process are reduced drastically, which may contribute to a thinning of the dermal layer. Protein deposits begin to form around fat cell clusters.

Pinching the skin between finger and thumb at this stage demonstrates a definite “orange peel” effect. By stage four, hard nodules are evident in the dermal region. These are comprised of fat cell clumps encased in a hardened protein shell. This is the final stage in cellulite formation.

### **What Causes Cellulite?**

The precise cause of cellulite is most likely a combination of factors. We have already looked at the structure of the hypodermis layer and explored differences that are inherent in women. We now know from numerous studies that each of the four stages in cellulite formation is distinguished by changes in the molecular and structural level. Now we must examine what is the trigger mechanism and what is orchestrating this condition known as cellulite.

According to Drs. Sherwitz and Braun Falco, one of the causes of the rippling effect of cellulite is fluid retention in adipose tissue.<sup>3</sup> They noted that, along with an engorgement of fat cells, cellulite tissue showed clear evidence of fluid invasion in the connective tissue fibers of the upper layers of skin. They concluded that not only do the retained fluids cause visible swelling of thighs, hips and abdomen, but that the toxic wastes the fluids contain break down collagen and elastin fibers that help to keep the skin smooth and firm.

Further studies by Drs. Nurnberger and Muller confirm this finding and indicate that there is a definite decrease in the number of elastin and collagen fibers in cellulite tissue. It is believed that, as we age, these structural proteins generally begin to stiffen and lose their flexibility. Engorging fat cells, accumulated fluids and toxins and poor circulation can exacerbate the loss of firmness. All of these factors are believed to contribute to the formation of cellulite.

While the actual cause of cellulite is the result of a breakdown in the connective fibers, one must remember that the reason for this breakdown is most likely a decline in the circulatory system. Although toxic accumulation and fluid retention certainly are major contributing factors to cellulite formation, it is poor circulation (blood and lymphatic flow) that ultimately creates the right environment for cellulite formation. Loss of circulation to an area – whether caused by lack of exercise, too much sitting, clogged arteries or nutrient deficiency – can have a serious impact and accelerate cellulite formation. That is why cellulite generally appears in areas that have poor circulation; unfortunately, once it forms it slows circulation in an area even more.

### **What can be done to Treat Cellulite?**

Aside from weight loss, exercise and liposuction, the number of treatments that are effective in treating cellulite are limited. Even massage, once touted as being effective in treating cellulite, probably does more harm than good. If a professional performs a firm, kneading type of massage on cellulite areas, she may actually stimulate additional fluids into the tissues. Unless accompanied with a means of improving blood and lymph flow out of the tissues, massage may only exacerbate the problem.

On the other hand, a lighter form of massage, known as Manual Lymphatic Drainage (MLD), stimulates lymph flow and may in fact be one of the most effective means of treating the causes of cellulite. MLD is a light, rhythmic pumping massage pioneered by Dr. Emil Vodder. This technique has the unique result of aiding in the elimination of lymphatic fluids without increasing blood flow. It is recommended that it be done at least twice a week, or even daily, for best results. However, this is a therapeutic technique that requires proper training and certification before it can be effectively performed.

### **Aromatherapy Oils for Treatment**

The use of essential oils in conjunction with MLD is an especially effective technique. These oils help stimulate elimination and improve circulation and lymphatic movement. Some of the essential oils that we recommend at The International Dermal Institute include:

- Lavender
- Eucalyptus
- Lemon
- Black Pepper
- Rosemary
- Sage
- Cypress
- Atlas Cedar
- Juniper
- Geranium
- Lemon Grass

### **The Future of Cellulite Research**

While our knowledge of cellulite has progressed considerably in the past two decades, there is still more investigative work to complete. As new ingredients are introduced, the scientific community must undertake responsibility to determine that these ingredients are not only efficacious, but safe and effective as well.

### **References**

1. F. Nurnberger, G. Muller, So-called Cellulite: An Invented Disease, J. Dermatology, Surg., Oncol. March 1978, vol. 4, No. 3, p. 221
2. M. Rosenbaum, V. Prieto, J. Helimer, M. Boschman, J. Krueger, R. Leibel, A. Bishop, An Exploration and Investigation of the Morphology and Biochemistry of Cellulite, Plastic and Reconstructive Surgery, June 1998, vol. 101, no. 7, p. 1934
3. K. Marenus, Cellulite Etiology, Dermatol. Surg. 1997, vol. 23, p. 1 177
4. W. Smith, Cellulite Treatments: Snake Oils or Skin Science, C&T Ingredient Resource Series, AHAs and Cellulite Products, 1995 p. 29 I