

## Lipostabil: The Effect of Phosphatidylcholine on Subcutaneous Fat

Lipostabil, advertised as an injectable product for eliminating fat, has been available for 3 decades in Europe, South America, and South Africa for the treatment of numerous medical conditions. The author outlines what is known about the aesthetic applications of Lipostabil and explores the important questions that remain unanswered. (*Aesthetic Surg J* 2003;23:413-417.)

In October 2002, the American Society for Aesthetic Plastic Surgery (ASAPS) issued a news release, "Lipoplasty (Liposuction) Without Surgery?",<sup>1</sup> in response to magazine articles and news coverage in the fall of 2002 about Lipostabil (Aventis, Strasbourg, France). This injectable, heralded as a new way to melt or dissolve fat and described as a nonsurgical alternative to lipoplasty, is being administered by some United States physicians, although it has not received U. S. Food and Drug Administration (FDA) approval. As news of Lipostabil continues to spread, we can expect patients to begin asking questions. Any product that sounds too good to be true demands investigation, especially when this latest "miracle" for eliminating fat is sold through Internet sites for less than \$100 per injection.

### What Is Lipostabil?

Lipostabil is the trade name for intravenous (IV) phosphatidylcholine (PC). Although not approved by the FDA for any medical use in the United States, Lipostabil has been available for more than 3 decades in Europe, South America, and South Africa for the treatment of numerous conditions. However, the Brazilian Health Ministry has banned the injection of Lipostabil for cosmetic purposes because it lacks proof of safety and efficacy. An Aventis Pharma package insert dated December 19, 1974, classifies it pharmacologically as a serum-cholesterol reducer. Lipostabil is marketed in ampoules intended for slow IV injection to treat "all diseases associated with quantitative and qualitative changes of the blood fats." These include hyperlipidemia, atherosclerosis, diabetic angiopathies, angina pectoris, postmyocardial infarction, hypertension of sclerotic origin, and fat embolism. Each 5-mL ampoule contains the active ingredient of 250 mg of PC.

A June 2003 Internet search of the National Library of Medicine (PubMed) returned 66 references for Lipostabil, none of which referred to cosmetic uses. Of the 66 citations, 30 were in English and 46 were related to human studies. The earliest Lipostabil reference is a 1966 article on fat embolism. The first English-language publication is a 1975 investigation of Lipostabil as a treatment for chronic hepatitis. It appears that these Lipostabil references are for product use in its intended IV form.



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### What Is Phosphatidylcholine?

A PubMed search for "phosphatidylcholine" (also June 2003) yielded just 1 reference to aesthetic applications (discussed later), but with search parameters limited to English language and human uses, PubMed returned more than 9,000 references for "PC" in varied forms and for varied conditions. In addition to the IV form, PC can be administered orally. It is an important component of lecithin, which typically contains 10% to 20% PC. Because large doses of lecithin tend to produce gastrointestinal side effects, other more concentrated PC products have been developed. Most dietary supplements labeled as PC contain about 35% of this phospholipid, but concentrations as high as 95% to 100% are available and easily obtained.

PC is composed of a phosphate group, 2 fatty acids that vary, and choline, an essential nutrient. Its chemical formula is shown in Figure 1. Linoleic acid is the most prevalent fatty acid. PC is the most abundant phospholipid in animals and plants and the most important for normal cell membrane composition and repair. Between 40% and 50% of cell membranes are composed of PC, which provides the main structural membrane support. Furthermore, its chemical structure is highly consistent from species to species. Because of its role in maintaining cell membrane integrity, PC is critical to all basic biologic





**Figure 2. A,** A 71-year-old woman with prominent lower eyelid fat pads. **B,** Patient following 3 Lipostabil injections. (Photos courtesy of Dr. Patricia Guedes Rittes.)

tions. They contain polyunsaturated linoleic acid (50% to 66%) and linolenic acid (4% to 9%), monounsaturated oleic acid (18% to 26%), and saturated palmitic acid (about 10%) and stearic acid (3.5%). In comparison, Lipostabil contains no saturated fatty acids and consists of about 70% linoleic acid plus unknown percentages of linolenic acid and oleic acid.

#### Aesthetic Applications of PC

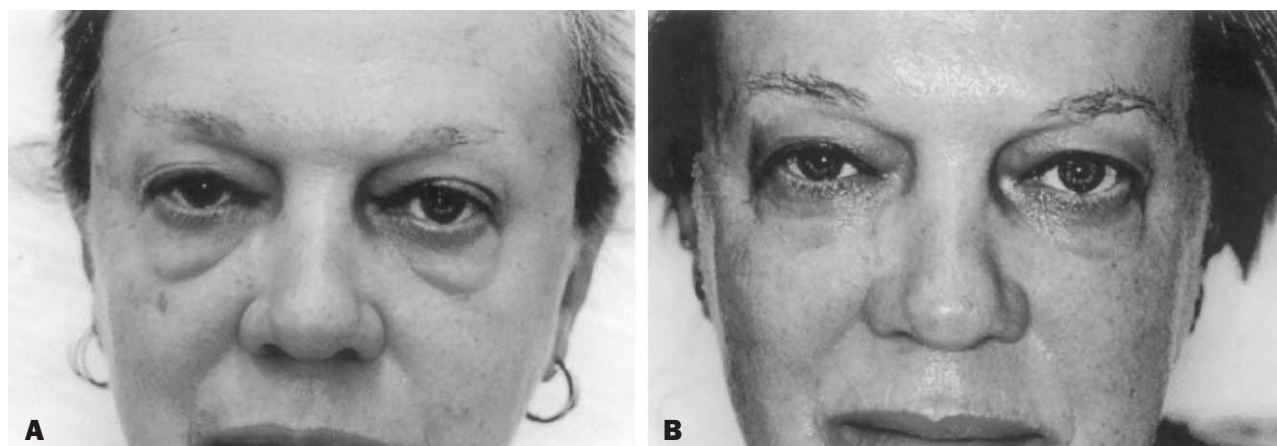
Cosmetic interest in Lipostabil originated in 2001 when Patricia Guedes Rittes, a dermatologist in São Paulo, Brazil, reported her results from injecting lower eyelids to eliminate unwanted fatty bulges. She says she has treated about 1300 patients with PC. Rittes' reports were soon followed by articles in popular American magazines about people who succeeded in having fat deposits eliminated with Lipostabil injections. In her only article to date in a peer-reviewed publication,<sup>2</sup> Dr. Rittes reports treating 30 patients with prominent fat pads in their lower eyelids, comprising 22 women and 8 men ranging from 30 to 71 years of age. After the lower eyelids were pulled downward and the infraorbital fat pads well visualized, the fat pads were injected with 0.4 mL of PC (250 mg/5 mL). (Although it is not specified, I assume that Rittes used the IV form of Lipostabil.) Two patients received 4 injections, 5 needed 3 injections, 12 had 2 injections, and 11 required just 1 injection. If more than 1 injection was needed, treatments were administered at 15-day intervals so that all infraorbital swelling could resolve. All patients complained of mild burning for about 15 minutes; local erythema and edema persisted for about 72 hours. Otherwise, there were no adverse reactions. This study included no controls, and

the endpoint was judged on the basis of resolution of the fat-pad bulge.

According to Rittes, cosmetic improvement occurred in all 30 patients, and the prominent fat-pad bulges disappeared. Moreover, there have been no recurrences of the protruding infraorbital fat pads during 2 years of follow-up. The photographs included in Rittes' article are impressive, especially because one might expect less uniform fat disappearance (Figures 2 and 3). For example, fat loss with steroids is often unpredictable and uneven. The pretreatment photos demonstrate excess skin that would normally require excision, but in these patients, excision was not performed. Rittes states that what appears to be excess skin is actually convexity caused by the appearance of herniated fat pads under the skin. This explanation may be plausible, but it is difficult to evaluate without more information. Rittes stresses the need for careful patient selection because she believes this treatment will work only for herniated infraorbital fat pads, which must be distinguished from prominent malar folds, lax lower eyelid skin, and periorbital edema associated with other problems.

On her Web site,<sup>3</sup> Rittes also states that serial injections of Lipostabil can eliminate unwanted fat in the flanks, abdomen, and thighs. Interviews in lay publications as well as statements by U.S. physicians who have used Lipostabil seem to corroborate her claims. However, as stated earlier, the Brazilian Health Ministry has banned the injection of Lipostabil for cosmetic purposes.

An extensive Internet search yielded only 1 other report about the use of PC in a cosmetic context. Drugs used to treat human immunodeficiency virus (HIV)/AIDS frequently cause the side effect of lipodystrophy in vari-



**Figure 3. A,** A 55-year-old woman with prominent lower eyelid fat pads and what appears to be excess skin in that area. **B,** Patient following 4 Lipostabil injections. (Photos courtesy of Dr. Patricia Guedes Rittes.)

ous body areas. Plastic surgeons treat facial wasting with various methods, and lipoplasty has been proposed to reduce or remove unsightly fat deposits in HIV/AIDS patients. A 2001 international workshop on HIV included a presentation on the treatment of “buffalo hump” with PC injections in 2 HIV patients.<sup>4</sup> The hump was divided into 2-cm squares, and each square was injected with 4 mL of PC and 1 mL of mesocaine at 2- to 3-week intervals. After their first injections, both patients demonstrated improved ability to move their necks. After 5 injections, the size of each patient’s hump was substantially reduced, though it did not disappear completely. The only local reactions were edema and erythema after the injections, but these resolved within 3 to 4 days.

#### Potential Mechanism(s) of Action

Does Lipostabil really eliminate unwanted fat, or is it just another scam similar to the early 1990s thigh creams that were hailed as the answer to cellulite? There are plausible mechanisms by which PC, injected into subcutaneous tissue, might theoretically affect triglycerides (the form in which fat is stored by lipocytes). PC is a natural emulsifier and could theoretically dissolve triglycerides and transport them as micelles to other areas where they could be metabolized for energy or, more likely, restored in another fat cell. This scenario may be difficult to accept because the fat is intracellular, and we don’t know whether PC could dissolve it through the cell membrane. However, PC transports fat into cells, and a similar mechanism may be employed in transporting it out. The lipophilic tails of PC, which attract and absorb fats, may play a role in a mechanism of action. The same is true of the cellular-messaging functions of PC.

Another possibility lies in the capacity of PC to stimu-

late lipase release, which might result in breakdown of triglycerides to fatty acids that are then transported as lipoproteins. Patients treated with Lipostabil typically report itching and erythema that could indicate histamine release, which is frequently associated with lipase activity. The enzyme lipase has a lipolytic function and may break down lipids or dissolve cell membranes and intracellular fats through emulsifying action.

It seems likely that systematic study could reveal other mechanisms of action. One possibility is to biopsy injected areas and use electron microscopy to look for effects on cell membranes and intracellular structures. It is notable that investigations may be facilitated because PC analysis is relatively straightforward; PC can be readily isolated with the use of thin-layer or high-pressure liquid chromatography.

Although the claims made about Lipostabil may be hard to take at face value, we must be cautious about rejecting new ideas. Just as absence of proof is not proof of absence, lack of scientific validation is not proof that it does not work. For example, we know that steroid injections frequently result in irreversible subcutaneous fat atrophy. This is well documented, but I can find no scientific explanation of why it occurs. In an ongoing clinical trial conducted with FDA approval, Zachary Gerut has determined that a single injection of collagenase can shrink lipomas by 50% to 80%. The exact mechanism of action is unclear, but the results are exciting and must be pursued.

#### Questions to Answer

The results obtained by Rittes and others with Lipostabil are impressive, but so far all reports have been anecdotal. Further investigation with properly designed



and conducted clinical and scientific studies are needed to duplicate Rittes' work and to determine whether PC can reduce or eliminate fat deposits safely and effectively. Even though the mechanism by which PC may eliminate fat remains unclear, it is difficult to see how it might be harmful. In addition to being the most common phospholipid in all cell membranes and plasma, PC has a long history of use as a dietary supplement and therapeutic drug. It appears safe, but evidence is needed to show what happens when PC is injected into subcutaneous tissue. It apparently poses no risks when taken orally, injected intravenously, or used as an intratracheal suspension. In its October 2002 news release,<sup>1</sup> ASAPS raised important questions that remain unanswered: (1) How can one control the amount of fat that is dissolved? (2) If PC dissolves fatty tissue, does it also dissolve other tissue? (3) What problems might evolve from injecting an uncontrolled amount of PC into subcutaneous tissue? (4) Could PC cause leakage of cell membranes or even cell death?

Controlling the action of PC may be difficult. A substance injected into subcutaneous tissue can migrate. It should be possible to measure the area through which PC disperses at various time points and determine how long it remains in its injected form. If PC is used but fat is altered unevenly, what do we do? The answer is probably more complicated than injecting additional PC. This question could become very important if people begin to inject themselves with PC purchased through the Internet.

It seems doubtful that PC injections will replace lipoplasty, at least not in the near future. Lipoplasty removes fat cells, but we don't yet know whether PC does the same thing or simply shrinks their size. Data on

long-term results are needed to find the answer. Because PC injections do not permit contouring, lipoplasty will retain its value for body sculpting. However, a product such as Lipostabil may prove beneficial in minimizing fat deposits of relatively small volume. PC injections certainly could have important benefits: They are nonsurgical, and the few known side effects, primarily initial swelling and erythema, resolve within a few days. The price of PC injections appears to be as high as \$1000, but it is unclear whether this includes serial injections and multiple areas. It is possible that the total costs of PC could be the same as those for lipoplasty.

Because PC is basically available to anyone with a credit card, we should be prepared for patients seeking help for complications, which may be more serious than a lumpy contour. At the same time, because anyone can buy PC, we should begin scientific studies and clinical trials as soon as possible. ■

#### References

1. Lipoplasty (liposuction) without surgery? New York, NY: American Society for Aesthetic Plastic Surgery; October 8, 2002.
2. Rittes PG. The use of phosphatidylcholine for correction of lower lid bulging due to prominent fat pads. *Dermatol Surg* 2001;27:391-392.
3. Prittes PG. [prittes.com.br](http://prittes.com.br) [in Portuguese]. Last accessed June 2003.
4. Serra M, Pereira FB. Subcutaneous infiltration with phosphatidylcholine solution for treatment of buffalo hump and fatty pads. 2002 Antiviral Therapy 6(suppl 4):75-76. Program and abstracts of the 3rd International Workshop on Adverse Drug Reactions and Lipodystrophy in HIV, October 23-26, 2001, Athens, Greece.

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