

Why Killing Fat Cells is Harmful for Your Body Facts and Scientific Evidence

How are fat cells produced and regulated?

We accumulate fat cells during our childhood and adolescence. However, studies show that after the age of 20, the number of fat cells in our body remains approximately the same.

The number of fat cells in adults is strictly regulated by hormones and neural innervation (signals sent to fat cells from the brain). Studies have suggested that the peripheral nervous system (PNS) and different hormones (e.g. Leptin, Glycerol, Insulin) play a pivotal role in keeping the fat cells balance in our adipose tissue.

Nevertheless, fat cells go through a natural life cycle; it is estimated that fat cells turnover rate is 8-10 % a year (meaning every year 8-10 % of our old fat cells are replaced by new fat cells). Fat cells do not divide like most other cells in the body – instead they are produced as a result of fat stem cells' maturation and differentiation. In adults, fat cells can proliferate as a response to two extreme conditions: extreme obesity and artificially-induced fat cell destruction/extraction.

How does lipolysis maintain the balance of fat cells in our bodies?

The main function of adipose cells is to store energy in the form of triglycerides and to help regulate metabolic functions. During a process called lipolysis, fat cells break apart stored triglycerides into glycerol and free fatty acids. These free fatty acids are released and become available for energy production by other organs.

Lipolysis is the natural way our body regulates its free fat levels throughout normal daily activity. High-fat and high-sugar diets will increase fatty acid intake by fat cells, causing fat cells to expand and gain volume. Contrarily, in times of energy shortage, fat cells will undergo enhanced lipolysis in order to secrete fatty acids for energy production. In this case, fat cells lose volume and shrink.

How do body contouring treatments affect the body's regulation of fat cells?

Radio frequency technology – enhancing metabolism

When we use Radio Frequency for body shaping treatments, we increase fat cell lipolysis and encourage fat cells to secrete fatty acids to their environment. In other words, **Radio Frequency amplifies a naturally occurring process.**

In other common modalities such as cavitation, cryolipolysis, and liposuction, fat cells are artificially destroyed (cavitation & cryolipolysis) or completely removed from the body (liposuction).

Artificial elimination of fat cells – what are the adverse effects?

There are three common modalities for artificial elimination of fat cells:

1. Cryolipolysis – non-invasive fat cells destruction by extreme cold.
2. Ultrasound Cavitation – non-invasive fat cells rupture by low frequency sound waves.
3. Liposuction – invasive fat cells removal by external suction.

When the number of fat cells in our body is artificially reduced, the body will react and trigger a compensation mechanism that will restore the fat balance in our body. There are two known mechanisms of compensation:

- a. Production of new fat cells in the treated area or in untreated areas of the adipose tissue
- b. Expansion of existing fat cells, usually not in the same location of manipulation

We don't know yet how to prevent or even delay these compensation processes. In other words, we can't trick our body. We can't reduce the number of fat cells and expect no reaction. **The fat will come back, either by producing more fat cells or expanding existing ones.** The bottom line is: in one way or another we will regain the fat that was artificially eliminated.

It has been shown in laboratory rodents, and more recently in humans, that liposuction indeed provides immediate fat reduction in the treatment local area, but **in the long term, the fat comes back in other areas of the body.** More specifically, a 2011 study showed that non-obese women who were treated with liposuction on the lower body (thighs and hips) reacted by accumulating fat in the abdominal area and eventually regained their weight 12 months after the procedure.

In the context of cryolipolysis, evidence shows "paradoxical hyperplasia" of fat cells following the fat freezing procedure. "Paradoxical hyperplasia" means **the body reacts with an unusual increased production of new fat cells in the treated area,** so instead of shrinking the adipose tissue, the treatment resulted in more fat cells and higher fat content in the specific location.

This case study was reported in 2014, and it states that by the time of its publication, 33 similar cases were reported after cryolipolysis treatment.

Conclusion

It should be noted that so far no one has conducted a thorough study about the long-term effects of cryolipolysis, maybe because this technology is still relatively new. It was liposuction that was investigated as a tool of understanding how our body maintains its fat balance and fat distribution throughout our adulthood. This is a challenging objective to study, and researchers do not fully understand yet all the mechanisms which are involved in fat regulation and re-accumulation following artificial manipulations on the adipose tissue. However, liposuction and cryolipolysis do share some fundamental aspects, first of which is artificial destruction of fat cells which means imposing an un-balanced fat state on the body.

Figure 1. Paradoxical Adipose Hyperplasia Approximately 5 Months Following Cryolipolysis



There is a sharply demarcated, rectangular enlargement around the umbilicus corresponding to the treatment zone. This soft-tissue protrusion was soft, mobile, and slightly tender to palpation. The overlying skin was unremarkable.

References

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