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ORIGINAL ARTICLE

Loss of subcutaneous fat in 20 patients, both sexes, using a second-generation TECAR device of 1.240 Watts and results analyzed with magnetic resonance

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Abstract

Background: Body contouring and abdominal fat loss without surgery are increasingly used technique. In a study in pigs, it is noted that both capacitive and resistive radiofrequency stimulation reduced subcutaneous fat. One human study demonstrated a loss of 2.90 cm in waist diameter. Second-generation TECAR (Acronym for Transfer Electric Capacitive and Resistive) device with 4 channels, 200 cm^2 work area per channel, and high power (1240 W), regulates body energy input by measuring absorption in the body and adjusting the power for 80 min at 50°C.

Aims: To evaluate the loss of subcutaneous fat, this magnitude was measured in grams and centimeters throughout the abdomen by MRI before and after each treatment.

Subject and Methods: We have studied 25 patients, 13 women and 12 men with a mean age of 49 years. All patients had their waist diameter measured and an MRI performed before and after 10 continuous sessions except Saturday and Sunday, over 2 weeks. Additionally, a lipid profile was performed on the same day of the study and at the end of it. The study was approved by the Ethics Committee.

Results: Waist diameter decreased by 5.5 cm, these differences being statistically significant ($p = 0.000$). Subcutaneous fat measured by MRI in cm decreased by 784 cm ($p = 0.000$). In grams, it decreased 808.7 g ($p = 0.000$). In the lipid profile, all the values decreased, but they were not statistically significant.

Conclusions: The use of this second generation of TECAR equipment at 1 MHz decreases the waist diameter by more than 5 cm and leads to the loss of more than 800 grams of subcutaneous fat in 12 days. It is a method without risks or side effects, well tolerated, and an alternative for those patients who do not want to go to the operating room.

KEYWORDS
Capenergy, high power TECAR, MRI, subcutaneous fat loss

1 | INTRODUCTION

Central abdominal subcutaneous adipose tissue (SAT) deposits are a particularly common area of cosmetic concern for male and female patients of all demographic groups. Abdominal bulge can lead to significant body image dissatisfaction, prompting people to develop abnormal eating habits, anxiety, or even social inhibition.[1,2] Aesthetic treatments for the abdominal SAT seek to restore an ideal flat abdominal contour.[3,4] But the importance of SAT is not only aesthetic; it is also a health problem for the population.

Nonsurgical techniques for reducing abdominal fat have been based on the application of different energy sources. There are fairly comprehensive reviews of these procedures and their results.[5] Much of the reported results are based on the decrease in abdominal perimeter obtained after treatment.[6-9]

Nonsurgical and noninvasive fat reduction methods include cryolipolysis, low-level lasers, high-intensity focused ultrasound, and radio frequency (RF) devices. These destroy adipose tissue through various mechanisms, including apoptosis or necrosis.[10,11] An investigation of cell membrane physiology demonstrated that increasing temperature 6°C above normal (i.e., 43°C) resulted in loss of structural integrity of the lipid bilayer (Moussa et al., 1979). A study on cell membrane permeability[12] indicated that cell membranes showed evidence of damage when heated to 45°C for more than 5 min. A third study of in vitro cell culture and in vivo human adipose tissue demonstrated that 15 min of thermal exposure at 43–45°C resulted in delayed adipocyte death.[13] Radiofrequency is used to tighten the skin and reduce fat or cellulite. In recent years, some radiofrequency devices have been reported to be safe and effective in reducing fat.[14]

TECAR is an acronym for Transfer Electric Capacitive and Resistive. It is the application of electromagnetic energy to bodily tissue. The frequency of the wave – which when passing from positive to negative generates polarity changes that make the dipole of the water molecules vibrate and produce heat, to the extent that when the area and power of the wave are greater, the penetration is greater – allows the liquefaction of the fat and the opening of pores in the membrane of the adipocytes allowing the exit of fatty acids to the outside. The secondary inflammatory process helps the adipocytolytic process, either through the direct action of local proinflammatory cytokines or indirectly through the release of catecholamines.[15]

The possibility of increasing the amount of energy, external nonablative, with four delivery channels of 1240 Watts with a surface area of 200 cm^2 of each of the emitting antennas, which cover practically the entire anterior face of the abdomen, and adjusting the energy delivered to its absorption by the patient and increasing the treatment time will increase the SAT temperature significantly, producing the denaturation of the adipocytes, as has been indicated.

We have already indicated that abdominal fat reduction studies are mainly based on the measurement of the abdominal perimeter. However, modern MRI devices allow for short breath holding, which reduces motion artifacts and gives us excellent data, and therefore MRI has become an important tool for fat quantification.[16]

The results of a review of published articles on fat loss from using external energy are presented in Table 1. The smallest average decrease was 1.05 cm in the least (Duncan et al., 2016) and 5.88 cm in the one that reported the most loss.[17] Note that fat loss is measured by centimeters of waist diameter loss. Only one patient underwent MRI to confirm visceral fat loss, that decrease was 192 cm^3.[18] A study with DEXA analysis showed a significant reduction in fat mass and percentage of fat mass after treatment in the trunk 3.97% after and 0.72% before.[19] The initial and final amount of fat present in the body are not reported.

High-intensity focused electromagnetic technology (HIFEM) has also been used. This is a way to deliver electromagnetic energy to the muscle to contract and increase fat consumption. Studies refer to a decrease in abdominal circumference of −3.8 cm and the decrease by MRI image is −4.3 cm. Total subcutaneous fat is not being measured.[25]

For all the above, we propose to apply Diathermy or radiofrequency tecartherapy conducted at high power of 1240 with 4 channels and automatic plates of 200 cm^2, in the entire abdominal area and to evaluate the SAT loss by MRI in a group of patients of both sexes to assess the actual loss of SAT after treatment.

2 | SUBJECTS AND METHODS

The sample was calculated using the EPINFO program with the data published by Duarte and Col in 2015.[26] Twenty pairs were calculated, and five were added in case there was any dropout. The study was approved by the Ethics Committee. Finally, the sample

TABLE 1 Presents a summary of the loss of abdominal fat in papers where physical means are applied for these purposes.

Author	Time	Waist (cm)	Device	Fat reduction
Duncan et al., 2016[20]	3 Month	2,6	BodyFX	1,07 cm US
Brightman et al., 2009[21]	3 Month	1,43	Velashape	
Pumprla et al., 2015[22]	1 Month	3,6	BTL Vanquish®	Omron BF 511. No statistically significant change
Fritz, K., & Salavastru, C., 2017[17]	1 Month	5,58	BTL Vanquish®	428.46-cc Vectra 3D Imagen de foto
Choi et al., 2018[23]	4 Week	3.40	enCurve®	Non Change CT
Suh et al., 2017[18]	6 Week	3.6	BTL Vanquish®	192 cm^3 CT
Hombrado et al., 2022[24]	6 Week	3,3	Capenergy	

Abbreviations: CT, computed tomography; US, ultrasound.

consisted of 25 subjects, 13 women and 12 men with an average age of 49. The following inclusion criteria were used: Index waist hip greater than 0.84 for women and 0.94 for men. Body mass index is defined as overweight between 25 and 29.9 or obese at 30 or higher. Visceral Fat Measurement by Inbody is greater than 9, which is the upper limit of normality in the team. All signed their informed consent. The exclusion criteria were: contraindication to the use of radiofrequency (pacemakers, metallic prostheses, active infection, history of cancer, chemotherapy treatments, radiotherapy, not having diabetes or metabolic disease).

Each patient underwent a lipid profile on the day of starting treatment at a Barcelona Accredited Clinical Laboratory consisting of triglycerides, cholesterol, HDL, LDL, and protein C reactive (CRP) and an MRI where they were asked to evaluate the superficial fat component of the entire abdomen, expressing the values in cm^3 and grams. With an anthropometric tape, the waist and hip measurements were made, and the body mass index was calculated. All these values were repeated on the day the treatment ended.

We worked with a Capenergy C 400 device, which has 4 outputs, in which 4 active capacitive plates of 200 cm^2 each, automatic, were placed on the abdomen of the patients, two located on the right side of the midline and two were placed on the left side (Figure 1). Power was applied for 60 min, controlling the temperature through a sensor built into the equipment itself. Subsequently, 20 min of manual capacitive and resistive electrodes were applied to the abdomen, and simultaneously with the manual application, 20 min of lymphatic drainage, placing an active plate on the foot and the other on the lumbo-dorsal area, so that the molecules loaded with lymph, water, and protein move towards the thoracic duct dragging the contents towards the circulation. They reported feeling only a comfortable warmth. Five sessions were applied daily from Monday to Friday for 2 weeks, for a total of 10 sessions.

The results were analyzed with the IBM SPSS V. 24 program. First, a Kosmogorov–Smirnov test was applied. As all the values were with a $p > 0.05$, the results were considered normal, and parametric statistical tests were applied.

FIGURE 1 The Drakarian equipment used to carry out the study, with the four channels and the four plates placed in the patient's abdomen.

3 | RESULTS

The characteristics of the 25 subjects are shown in Table 1. There were no statistically significant differences in weight ($p = 0.637$) or BMI ($p = 0.700$) between the initial and 12-week visits. There were statistically significant differences in subcutaneous fat in cm^3 and grams ($p = 0.01$) and waist circumference ($p = 0.01$) between baseline and 10 days of treatment. The lipid profile did not show a statistically significant difference ($p > 0.05$) (Table 1). The results of the *t* test are presented in Table 2. It is observed that the difference in weight, body mass index, and waist diameter is statistically significant ($p = 0.01$) for the three measurements, and the decrease in subcutaneous fat in grams and in cm^3 after treatment, measured by RMI, is statistically significant ($p = 0.001$) in both measurements. The CRP values before and after treatment were not statistically significant ($p = 0.857$). This allows us to affirm that it is a well-tolerated treatment. Figure 2 shows the transverse section of the abdomen and the loss of subcutaneous fat.

The decrease in the abdominal contour in the patients it can be seen in Figures 3–5.

4 | SIDE EFFECTS

There were no unwanted effects in any of the treated patients. The treatment was well tolerated with a high degree of satisfaction by all patients, with the exception that in one of the sessions the skin was slightly reddened when removing the plates, but without discomfort or pain. This redness disappeared within 30 min. However, there could be a risk of burns, especially if the patient has decreased sensitivity to heat or poor blood circulation that does not dissipate heat. Cosmetic lotions should not be applied before treatment. Irritation could occur. Further, it should not be applied during pregnancy.

5 | LIMITATIONS

The first limitation of the study was the frequency of treatment: every day for 10 days except Saturday and Sunday, which implied difficulty in finding patients. Another limitation was that the treated patients did not undergo MRI before selection but were selected by indirect measurements. Finally, although the sample was properly calculated, the number of subjects to be studied had to be increased.

6 | DISCUSSION

It has been known for many years that body fat, which is distributed between subcutaneous and visceral depots, influences metabolic

health regardless of body size.[27] On the other hand, limited expansion of the SAT during weight gain has been suggested to provide an attractive explanation for the redirection of excess lipids to ectopic sites, contributing to increased visceral adipose depots and the metabolic syndrome.

While VAT is associated with pathological conditions such as insulin resistance and cardiovascular diseases, SAT protects against these diseases in humans.[28] The inverse association between ST skinfold thickness and mortality risk implies potential benefits of SSAT in terms of mortality risk reduction. This effect was especially notable for ST measured in the suprailiac region.[29]

However, recent studies have shown that abdominal SAT (aSAT), but not gluteal-femoral fat, is also related to insulin resistance, noting that abdominal fat, regardless of whether it has a visceral or subcutaneous location, is negatively correlated with adiponectin levels.[30] In 2017, Vegiopoulos et al. showed that unlike obese patients who have insulin sensitivity, those with insulin resistance exceeded storage capacity, had a decreased number of adipocytes, increased adipocyte size, increased inflammation and immune cell infiltration, profile adverse effect of adipokines, and increased fibrosis.[31] However, the relative contribution of aSAT to insulin resistance and metabolic disorders remains controversial,[32] although the health criteria of decreased subcutaneous fat are debatable.

It is true that more and more women and men seek to improve their body contour by reducing abdominal and waist fat. With age, there is a decrease in functional capacity and resting energy expenditure, loss of muscle mass, and an increase in body fat (BF), both subcutaneous and visceral.[33] In the postmenopausal period, 1 year after the last menstruation, the redistribution of fat in the abdominal region and the increased risk of chronic diseases begins.[34]

In addition to the aesthetic studies outlined in this article, all available studies on different strategies for reducing SAT and VAT are related to weight loss, diet and/or physical activity, slimming drugs, testosterone, and bariatric surgery. It has been suggested that changes in BMI and waist circumference are the driving forces behind changes in both VAT and SAT, and that changes in VAT and SAT are correlated. On the other hand, changes in weight, and VAT more than SAT, are associated with metabolic changes, in particular decreased insulin levels.[35]

In a recent study of a 6-week CrossFit program, while consuming a low-carbohydrate ketogenic diet (LCKD), a loss of 2.83 kg of body fat as measured by DEXA was reported.[36] Another study conducted in women, also measured by DEXA, after 3 weeks of acclimatization and 8 weeks of resistance training and a ketogenic diet, reports that 1.1 kg of FM were needed throughout the body.[37] Another study in men, evaluated by DEXA, in a hypertrophic training protocol and ketogenic diet for 8 weeks, BF results decreased by 1.1 kg.[38] These results contrast with those of the present investigation, where an average loss of 0.830 kg in 12 days is reported, a loss 30% higher in

TABLE 2 Change of anthropometric, waist, lipid profile and RMI Subcutaneous adipose tissue.

Parameters	Means (± SD)	Min	Max
Age (Years)	49 (11,5)	32	77
Weight A (Kg)	93,9	70,5	144,9
Weight B (Kg)	91,8	70,1	142,9
Height (cm)	166 (8,4)	148	181
BMI A	33,8 (4,1)	26,8	45,2
BMI B	33,1 (4,06)	26,7	44,6
Waist A (cm)	108,8 (11,3)	92	134
Waist B (cm)	103,3 (12,0)	76	123
Subcutaneous fat A (cm^3)	9356,8 (2933,5)	6008	19 101
Subcutaneous fat B (cm^3)	8840,5 (2496,3)	5910	16 537
Subcutaneous fat A (gm)	8756,1 (2376,3)	5407	17 191
Subcutaneous fat B (gm)	7925,4 (2257,7)	5310	14 883
Cholesterol A (mg/dL)	201,0 (51,9)	103	329
Cholesterol B (mg/dL)	186,3 (52,2)	84	332
Triglicerids A (mg/dL)	121,7 (35,2)	60	205
Triglicerids B (mg/dL)	106,1 (48,8)	47	215
HDL A (mg/dL)	46,2 (11,4)	30	78
HDL B (mg/dL)	45,2 (12,3)	20	70
LDL A (mg/dL)	130,6 (12,3)	52	279
LDL B (mg/dL)	124,4 (41,5)	50	271
Energy (Jules)	61,3 (44,1)	44	36
Temperature (°C)	50,9 (1,31)	48,4	52,7
Power (Watts)	1200 per channel		

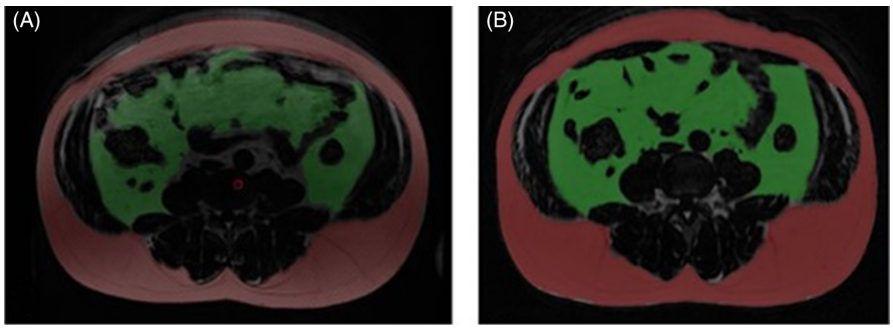

FIGURE 2 (A) The MRI image before treatment showing the visceral fat. (B) Image showing fat has decreased after treatment by 830 g.

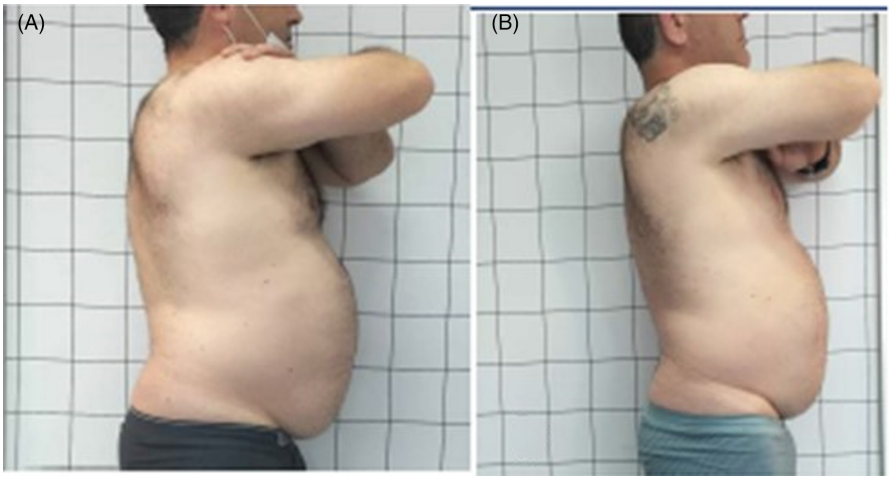

FIGURE 3 The photo shows the photographic image of a patients lateral before (A) and after (B) the treatment.

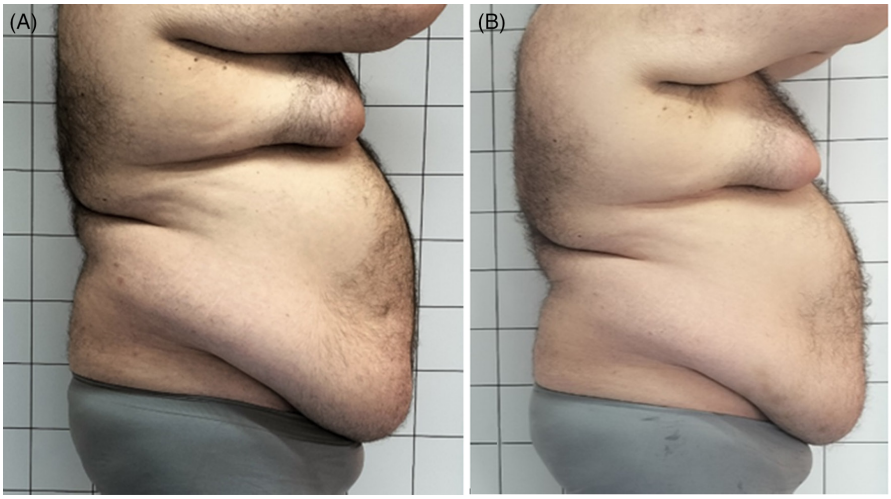

FIGURE 4 The photo shows the photographic image of another patients lateral before (A) and after (B) the treatment.

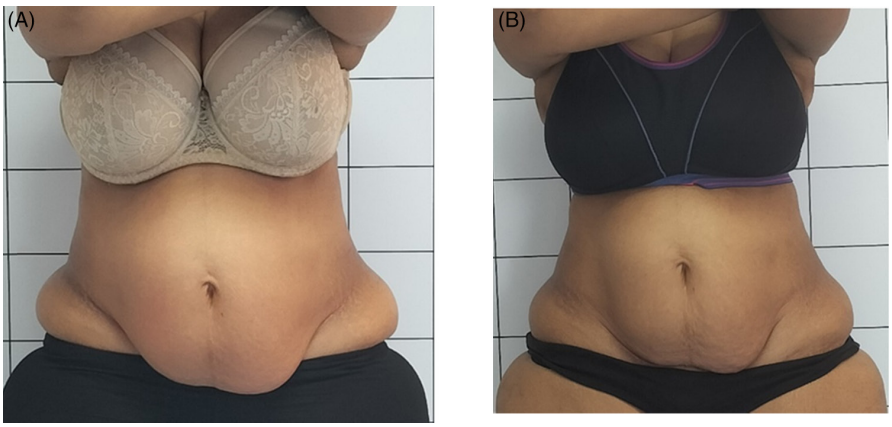

FIGURE 5 This frontal photo of a woman, before (A) and after (B) clearly shows the loss of subcutaneous fat and the better appearance of the abdomen after the treatment.

relation to the one who reports the most and 70% higher than the one who reports the least. This decrease, moreover, is limited exclusively to the abdominal area, which is the place where most people seek to improve their body contour. In relation to the diameter of the waist, most of the studies analyzed that use a single treatment method present a reduction of between 1.43 and 2.6 cm (Table 1). The results presented show a decrease of 5.45 cm, which means 47% more. This reduction takes place in 10 days. No acute inflammatory processes were detected during the procedure monitored by CPR. Table 3 presents the statistical significance of the parameters studied before and after treatment. Weight, body mass index, subcutaneous fat present a statistically significant decrease $p = 0.001$ for all values.

Body contouring procedures have a tremendous impact on the lives of our patients through strategic reshaping of the trunk as well as the extremities. The surgical method has significant risks

TABLE 3 Paired Sample *t* test results before and after treatment.

Variable pair		Related differences			
		Means	Standard dev.	*t*	*p* value
Par 1	Weight (Kg) A – Weight (Kg) B	2.115	1.50971	6.265	0.001**
Par 2	BIM A –BIM B	0.77255	0.57733	5.984	0.001**
Par 3	Waist A (cm) – Waist B (cm)	5.45	5.54147	4.98	0.001**
Par 4	Subcut fat A (cm^3) – Subcut fat B (cm^3)	813.36	814.79209	4.991	0.001**
Par 5	Subcut fat A (gm) Subcut fat B (gm)	830.7	679.61610	6.112	0.001**
Par 6	Cholest (mg/dL) A – Cholest (mg/dL) B	14.7	60.07898	1.094	0.288 NS
Par 7	TRIGL (mg/dL) A – TRIGL (mg/dL) B	15.6	48.45226	1.440	0.166 NS
Par 8	HDL (mg/dL) A – HDL (mg/dL) B	1.0	6.15587	0.726	0.476 NS
Par 9	LDL (mg/dL) A – LDL (mg/dL)	6.15	54.05579	0.509	0.617 NS

Note: **Significant; NS, Not significant.

such as financial costs and prolonged recovery time associated with surgery, discomfort, and possible complications. For this reason, advances in noninvasive cosmetic techniques are sought. Noninvasive devices for body contouring are therefore a rapidly developing area of aesthetic medicine[39] reducing fat where, despite exercise and diet, it persists. On the other hand, this energy delivery technique and anatomical locations were standardized for all patients equally to provide greater circumferential reduction and more favorable clinical outcomes with fewer treatment sessions (Table 3).

7 | CONCLUSIONS

Transfer Electric Capacitive and Resistive second-generation nonablative therapy with high power 1240 Watts per channel, four channels, and an automatic electrode with a 200 cm^2 contact area placed on the abdominal surface, provides a greater reduction in abdominal circumference, loss of 0.830 kg of subcutaneous fat with more favorable clinical results with fewer treatment sessions. The diameter of the waist decreased by 5 cm, a greater amount than reported in published studies. The technique was applied with standardized technique and anatomical locations, obtaining a high degree of satisfaction for the treated patients without secondary effects and immediate incorporation to daily tasks. This new form of noninvasive body contouring treatment is an attractive therapeutic modality for enhancing the ideal male and female physique that could change the future of aesthetic treatments using body contouring equipment.

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CONFLICT OF INTEREST STATEMENT

The authors have not received funding for this article and have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

This project received approval from the Commission for Ethics in Animal and Human Experimentation (CEEAH) of the Autonomous University of Barcelona, on 02/25/2022 and reference number 5324. All patients signed the informed consent.

REFERENCES

1. Brodie DA, Slade PD. The relationship between body-image and body-fat in adult women. *Psychol Med*. 1988;18(3):623-631. doi:10.1017/S0033291700008308
2. Cash TF, Thériault J, Annis NM. Body image in an interpersonal context: adult attachment, fear of intimacy and social anxiety. *J Soc Clin Psychol*. 2004;23(1):89-103. doi:10.1521/jscp.23.1.89.26987
3. GroganS.*Bodyimage*.Routledge;2016.doi:10.4324/9781315681528
4. Mintz LB, Kashubeck S. Body image and disordered eating among Asian American and Caucasian college students. *Psychol Women Quart*. 1999;23(4):781-796. doi:10.1111/j.1471-6402.1999.tb00397.x
5. Friedmann DP. A review of the aesthetic treatment of abdominal subcutaneous adipose tissue. *Dermatol Surg*. 2015;41(1):18-34. doi:10.1097/DSS.0000000000000209
6. Fajkošová K, Machovcová A, Onder M, Fritz K. Selective radiofrequency therapy as a non-invasive approach for contactless body contouring and circumferential reduction. *J Drugs Dermatol*. 2014;13(3):291-296.
7. Hwang IC, Kim KK, Lee KR. Cryolipolysis-induced abdominal fat change: split-body trials. *PloS One*. 2020;15(12):e0242782. doi:10.1371/journal.pone.0242782
8. Levenberg A. Clinical experience with a TriPollar radiofrequency system for facial and body aesthetic treatments. *Eur J Dermatol*. 2010;20(5):615-619. doi:10.1684/ejd.2010.1042
9. Manuskiatti W, Wachirakaphan C, Lektrakul N, Varothai S. Circumference reduction and cellulite treatment with a TriPollar radiofrequency device: a pilot study. *J Eur Acad Dermatol Venereol*. 2009;23(7):820-827. doi:10.1111/j.1468-3083.2009.03254.x

10. Decorato JW, Chen B, Sierra R. Subcutaneous adipose tissue response to a non-invasive hyperthermic treatment using a 1,060 nm laser. *Lasers Surg Med*. 2017;49(5):480-489. doi:10.1002/lsm.22625
11. Lee HJ, Lee M-H, Lee SG, Yeo U-C, Chang SE. Evaluation of a novel device, high-intensity focused ultrasound with a contact cooling for subcutaneous fat reduction. *Lasers Surg Med*. 2016;48(9):878-886. doi:10.1002/lsm.22576
12. Gaylor DC. *Physical Mechanisms of Cellular Injury in Electrical Trauma*. Massachusetts Institute of Technology, Dept. of Electrical Engineering; 1989 https://core.ac.uk/download/pdf/4402788.pdf
13. Franco W, Kothare A, Ronan SJ, Grekin RC, McCalmont TH. Hyperthermic injury to adipocyte cells by selective heating of subcutaneous fat with a novel radiofrequency device: feasibility studies. *Lasers Surg Med*. 2010;42(5):361-370. doi:10.1002/lsm.20925
14. Key DJ. A preliminary study of a transdermal radiofrequency device for body slimming. *J Drugs Dermatol*. 2015;14(11):1272-1278.
15. Pereira J, Cavalcante Y, Wanzeler R. The role of inflammation in adipocytolytic nonsurgical esthetic procedures for body contouring. *Clin Cosmet Investigat Dermatol*. 2017;10:57-66. doi:10.2147/CCID.S125580
16. Pooler BD, Wiens CN, McMillan A, et al. Monitoring fatty liver disease with MRI following bariatric surgery: a prospective, dual-center study. *Radiology*. 2019;290(3):682-690. doi:10.1148/radiol.2018181134
17. Fritz K, Salavastru C. Long-term follow-up on patients treated for abdominal fat using a selective contactless radiofrequency device. *J Cosmet Dermatol*. 2017;16(4):471-475. doi:10.1111/jocd.12429
18. Suh DH, Kim CM, Lee SJ, Kim H, Yeom SK, Ryu HJ. Safety and efficacy of a non-contact radiofrequency device for body contouring in Asians. *J Cosmet Laser Ther*. 2017;19(2):89-92. doi:10.1080/14764172.2016.1256486
19. Milanese C, Cavedon V, Piscitelli F, Zancanaro C. Effect of low-intensity, low-frequency ultrasound treatment on anthropometry, subcutaneous adipose tissue, and body composition of young normal weight females. *J Cosmet Dermatol*. 2014;13(3):202-207. doi:10.1111/jocd.12101
20. Duncan DI, Kim THM, Temaat R. A prospective study analyzing the application of radiofrequency energy and high-voltage, ultrashort pulse duration electrical fields on the quantitative reduction of adipose tissue. *J Cosmet Laser Ther*. 2016;18(5):257-267. doi:10.3109/14764172.2016.1157368
21. Brightman L, Weiss E, Chapas AM, et al. Improvement in arm and post-partum abdominal and flank subcutaneous fat deposits and skin laxity using a bipolar radiofrequency, infrared, vacuum and mechanical massage device. *Lasers Surg Med*. 2009;41(10):791-798. doi:10.1002/lsm.20872
22. Pumprla J, Howorka K, Kolackova Z, Sovova E. Non-contact radiofrequency-induced reduction of subcutaneous abdominal fat correlates with initial cardiovascular autonomic balance and fat tissue hormones: safety analysis. *F1000Research*. 2015;4:49. doi:10.12688/f1000research.5708.1
23. Choi SY, Kim YJ, Kim SY, et al. Improvement in abdominal and flank contouring by a novel adipocyte-selective non-contact radiofrequency device. *Lasers Surg Med*. 2018. doi:10.1002/lsm.22808
24. Hombrados Balza MJ, Rodríguez Lastra J, Arroyo Fernández RL. Improvement of body contour in young women using a high-power radiofrequency device. *J Cosmet Laser Ther*. 2021;23(7–8):195-201. doi:10.1080/14764172.2022.2055076
25. Kinney BM, Lozanova P. High intensity focused electromagnetic therapy evaluated by magnetic resonance imaging: safety and efficacy study of a dual tissue effect based non-invasive abdominal body shaping. *Lasers Surg Med*. 2019;51(1):40-46. doi:10.1002/lsm.23024
26. Duarte FO, Sene-Fiorese M, de Aquino Junior AE, et al. Can low-level laser therapy (LLLT) associated with an aerobic plus resistance training change the cardiometabolic risk in obese women? A placebo-controlled clinical trial. *J Photochem Photobiol B Biol*. 2015;153:103-110. doi:10.1016/j.jphotobiol.2015.08.026
27. Vague J. The degree of masculine differentiation of obesities. *Am J Clin Nutr*. 1956;4(1):20-34. doi:10.1093/ajcn/4.1.20
28. Mancuso P, Bouchard B. The impact of aging on adipose function and adipokine synthesis. *Front Endocrinol*. 2019;10:137. doi:10.3389/fendo.2019.00137
29. Wu SE, Chen WL. Not the enemy: potential protective benefits of superficial subcutaneous adipose tissue. *Pol Arch Intern Med*. 2022;132(7–8):16237. doi:10.20452/pamw.16237
30. Borges MC, Oliveira IO, Freitas DF, et al. Obesity-induced hypoadiponectinaemia: the opposite influences of central and peripheral fat compartments. *Int J Epidemiol*. 2017;46(6):2044-2055. doi:10.1093/ije/dyx022
31. Vegiopoulos A, Rohm M, Herzig S. Adipose tissue: between the extremes. *EMBO J*. 2017;36(14):1999-2017. doi:10.15252/embj.201696206
32. Varela-Rodríguez BM, Juiz-Valiña P, Varela L, et al. Beneficial effects of bariatric surgery-induced by weight loss on the proteome of abdominal subcutaneous adipose tissue. *J Clin Med*. 2020;9(1):213. doi:10.3390/jcm9010213
33. St-Onge M-P, Gallagher D. Body composition changes with aging: the cause or the result of alterations in metabolic rate and macronutrient oxidation? *Nutrition*. 2010;26(2):152-155. doi:10.1016/j.nut.2009.07.004
34. Gambacciani M, Ciaponi M, Cappagli B, De Simone L, Orlandi R, Genazzani AR. Prospective evaluation of body weight and body fat distribution in early postmenopausal women with and without hormonal replacement therapy. *Maturitas*. 2001;39(2):125-132. doi:10.1016/S0378-5122(01)00194-3
35. Pontiroli AE, Frigè F, Paganelli M, Folli F. In morbid obesity, metabolic abnormalities and adhesion molecules correlate with visceral fat, not with subcutaneous fat: effect of weight loss through surgery. *Obes Surg*. 2009;19(6):745-750. doi:10.1007/s11695-008-9626-4
36. Ashtary-Larky D, Bagheri R, Asbaghi O, et al. Effects of resistance training combined with a ketogenic diet on body composition: a systematic review and meta-analysis. *Crit Rev Food Sci Nutr*. 2022;62(21):5717-5732. doi:10.1080/10408398.2021.1890689
37. Vargas-Molina S, Petro JL, Romance R, et al. Effects of a ketogenic diet on body composition and strength in trained women. *J Int Soc Sports Nutr*. 2020;17(1):19. doi:10.1186/s12970-020-00348-7
38. Vargas S, Romance R, Petro JL, et al. Efficacy of ketogenic diet on body composition during resistance training in trained men: a randomized controlled trial. *J Int Soc Sports Nutr*. 2018;15(1):31. doi:10.1186/s12970-018-0236-9
39. Mazzoni D, Lin MJ, Dubin DP, Khorasani H. Review of non-invasive body contouring devices for fat reduction, skin tightening and muscle definition. *Australas J Dermatol*. 2019;60(4):278-283. doi:10.1111/ajd.13090

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