# CHANGE OF BODY COMPOSITION IN PROCESS OF POWER CONDITIONAL TRAINING

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**Abstract.** *Purpose:* to work out recommendations on choosing of exercises for power conditional trainees, considering decrease of fat mass percentage as the purpose. *Methods:* analysis of changes of body composition of trainees, practicing different kinds of conditional power training. *Results:* the data about influence of different physical loads on thickness of subcutaneous fat in different parts of body have been generalized. Recommendations on choosing of exercises for power conditional trainees for body composition improving have been presented. It was found that fat loss occurs quicker in upper part of body (subcutaneous and visceral). This is observed with increasing of motor functioning and reducing calories of eating. When training any separate muscular group changes of subcutaneous fat take place not compulsory in body parts, in which the trained group is located. *Conclusions:* it is purposeful to mainly use basic (multi-joint) exercises in power conditional training.
**Key words:** strength, training, composition, conditional, body, eating, weight.

## Introduction

Popularity of conditional training with application of power exercises is constantly growing; its arsenal of means and methods increases. In structure of different age contingents' motivation the factor of figure improvement (change of body composition, reduction of fat mass, increase of muscular mass) constantly takes the second place after factor "health" [1, 4, 6].

For significant part of trainees the purpose of training is "removal of fat from problem zones". Until recent time the principle of fitness theory that it is impossible to remove subcutaneous fat selectively, fulfilling exercises for separate parts of body had been considered generally accepted [5, 7]. In some researches, devoted to influence of local specific exercises on composition of all body and separate its parts tissues scientists received contradictory results. Some researchers think that exercise can result in local mobilization of subcutaneous fat [2, 13, 17]. In other experiments no changes were found [9, 10, 15]. Contradictions in results can be conditioned by methodology, used in the mentioned researches.

Thus, absence of single opinion on one of key question of fitness theory conditioned our choice of the subject of the research.

## Purpose, tasks of the work, material and methods

*The purpose of the research* is to work out recommendations on choosing exercise and main load parameters for power conditional trainees for them to reduce percentage of body fat mass.

## Results of the research

Fulfillment of physical exercises (aerobic of power orientation) can result in differentiated loss of fat tissue in different body parts. Some researches showed that with physical load fat loss is higher in abdomen [15] or on arms [16] in comparison with tight zone. It witnesses about possibility of fat reserves' usage in different body ports under physical load. Alongside with it, the question about possibility of local physical exercises' influence on fat tissue in corresponding body parts is still open for discussion.

Some researches indirectly refute fat spot reduction. It is illustrated by examples with tennis players. Tennis players have different loads on right and left arms owing to specificity of this kind of sports. Researchers measured circumferential sizes and subcutaneous fat thickness in zone of shoulder and forearm. They did not find statistically significant differences between left and right arms [9].

In the research by Krotkiewski et al. [11] it was described that ten women without any health problems fulfilled exercises for one leg. It resulted in significant increment of muscular mass in the trained leg. In other leg increment of muscular mass was much less. Thickness of subcutaneous fat (SF) reduced. In trained leg thickness of muscles increased. In not trained leg thickness of subcutaneous fat (SF) did not change. For checking up of the received data two biopsies of muscles at each thigh was made. The researchers registered insignificant reduction of fat cells' mass (–7% from 0.6 ± 0,07 mkg to 0.56 ± 0.05 mkg) and (–26% from 0.42 6 ± 0,07 mkg to 0.31 6 ± 0.08 mkg) in trained


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leg. They also registered increase (+ 11% from 0.54 ± 0.03 mkg to 0.60 ± 0.03 mkg) and (+ 7% from 0.46 ± 0.08 mkg to 0.49 ± 0.08 mkg) in not trained leg. Reduction of subcutaneous fat thickness was conditioned by geometric factors (pressure of increased muscles, which are under it). The conclusion of the researchers: correlation of muscular and fat components of human thigh to large extent depends on thigh muscles' functioning. Local power exercises can hardly be used for spot reduction of fat reserves above trained muscle [11]. Bente Stallknecht et al. [20] notes possibility of speculations with conclusions and statistic error in processing of biopsy data. Besides, we can not understand reasons of insignificant increase of fat cells' mass with unchanged thickness of SF in not trained leg. It is quite probable that all measures were conducted just after load and reflect to large extent urgent training effect. Such changes are manifestations of long adaptation. It would be logical to assume that lipolysis increase in SF under load can result in super compensation of fat content in recreation period.

It should also be noted that from practical point of view the final result (reduction of SF thickness) is of great significance, but not the reasons of its reductions. Alongside with it, we can assume that geometric factors resulted in reduction of SF on thighs.

The research by Stallknecht B. et al. is also interesting. Ten healthy men fulfilled leg unbending at 25% of maximal load (Wmax) during 30 minutes. Between exercises the men had 30 minutes' restв течение. Then they fulfilled 55% Wmax during 120 minutes by other leg. After it they fulfilled 85% Wmax during 30 minutes again by first leg and again had 30 minutes' rest. Blood circulation in thigh SF was assessed by Xe133 blurring (radio-active marker). Lipolysis was calculated by interstitial and arterial concentration of glycerin and blood circulation velocity. In all cases blood circulation and lipolysis were higher in SF adhering working muscle. Thus, specific exercises can cause spot lipolysis in fat tissue [20].

Lipolysis is a process of fat splitting into fat acids under impact of lipase. This term is used for disruption of bio-chemical process at cell level. It should be noted that increase of lipolysis under load in certain parts of SF does not prevent from but stimulates its deposit in recreation period.

Fat burning is not defined as concept in literature and other sources. That is why we offer the following definition (coming from context, in which it is used the most often): fat burning is a process of relatively stable in time reduction of fat tissue's mass and volume. In such meaning fat burning can be registered only in the course of durable experiment and only by final result of it. Term "spot reduction" relates to local loss of fat, resulted from impact of physical exercises on certain body parts [10].

In the researches by Ramírez-Campillo et al.[18]they studied influence of exercises for local muscular endurance training on general and regional body composition (correlation of fat, muscular and bone tissues). Seven men and four women (of 23 ± 1years' age) trained stronger leg during 12 weeks with 3 trainings every week. Every training consisted of one attempt (960-1200 repetitions – legs' pressing) with load 10–30% from maximal weight (single maximum). Before and after experiment body mass, bone mass, mineral density of bone tissue, muscular mass, and fat were registered in percents. Energy value of diet was registered with the help of questionnaire of eating. Al level of the whole body, body and bone masses, mineral density of bones, muscular mass and body fat percentage did not change. Nevertheless, body fat mass reduced by 5.1% (before experiment: 13.5 ± 6.3 kg, after experiment 12.8 ± 5.4 kg, $p<0.05$), percentage of body fat reduced by 0.9 (from 21.74 ± 10.7 to 20.88 ± 9.1). Substantial changes of body, muscular and fat masses were not observed. Confident ($p<0.05$) reduction of fat mass was registered in upper limbs and torso (10.2 and 6.9%, accordingly, $p<0.05$). Reduction of fat mass in upper limbs and torso was much higher ($p<0.05$), than in both legs. No substantial changes were registered in energy taking from food before and after experiment (2646 ± 444 kcal per day and 2677 ± 617 kcal per day accordingly). So the program was effective for reduction of fat mass. But this reduction was not localized in the trained part of body [18].

In the research by Singh Prachi et al. [19] 23tested (15 men and 8 women of age 30 ± 6 years) with normal body mass (BMI 23.6 ± 3.9) gained 3.1 ± 2.1 kg of fat during 8 weeks. In the next 8 weeks they lost 2.4 ± 1.7 kg of fat due to correction of calorie value of eating. SF and visceral fat increment in upper part of body were completely removed after 8 weeks of hypo calorific eating. SF in lower body parts did not return to initial values. It was found that in lower body parts increase of adipocytes' quantity in first 8 weeks of hyper calorific eating was not removed. SF adipocytes in upper body parts and visceral fat turned to initial sizes and quantity.

**Discussion**

In most of researches isolated exercises were used, effectiveness of which were lower than of basic or structural ones [8, 14]. Choice of exercises was conditioned by the tasks of the research and corresponded to the chosen tactic. Impossibility to get rid of subcutaneous fat locally can be explained by two reasons:

1. Contribution of fat oxidation to muscles functioning energy supply is extremely little [3, 12]. Actually only main metabolism can be supplied by fat oxidation [12].
2. Lipolysis increase [20] is only initial link of fat utilization as source of energy. More durable and energetically effective fat oxidation in Krebs's cycle has not been researched.

Our research confirms recommendations of NSCA, ACSM about purposefulness of prevailing usage of basic (multi-joint) exercises in power conditional training.

**Conclusions**

When training any muscular group SF changes do not take place compulsory in body parts, which are located near trained muscles. Experimental researches of recent years refute possibility of SF thickness spot reduction in trained parts of body. Higher fat mass reduction in upper limbs and torso in comparison with lower limbs [16] are explained by researches of Singh Prachi et al. [19]. This phenomenon shall be considered when programming trainings. Especially it is important for those, who train the so-called A-like figure.

Strengthening of blood circulation and lipolysis in SF (adherent to working muscle) [17] may be make purposeful exercises of local character before durable aerobic loads. But this hypothesis requires experimental approval.

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**Conflict of interests**

The author declares that there is no conflict of interests.

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