



## Nutrition for the Fighting Arts

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Nutrition and food intake is a vital aspect to achieve goals and this should always be matched up to the individual's requirements. Looking across the plain of the gym floor, you will find some members seeking weight loss, some building up in the free weights room and others working hard to improve fitness levels. However, the issue can become quite complex when you have an individual who needs it all; this is the case for martial artists.

From boxers, kickboxers and cagefighters to students of judo, karate and wing chun... whilst their techniques may vary, the issues they experience in training are very similar and their added nutritional requirements added by their sport will be comparable. On top of the pure athleticism required for sustained high-intensity activity, there is the concern of efficiently training for technique. Perhaps most importantly from a nutritional perspective, there is the constant issue of staying within the designated weight category and staying as strong as possible.

So how different are the requirements different for this breed of fighting athlete? Naturally, this will depend somewhat on the individual (and how hard they are pushed by their trainer) but, in any case, the demands for energy are massive. On a day of training, most martial artists could expect to train for a breathless two hours, more just before a competition. This excellent for fitness but uses up more than 1500 calories across the course of the session, which would typically include a warm-up of skipping for five rounds, stretching, some lighter technique work then padwork/sparring for a further 10-15 rounds. See figure 1 for relative energy use across different sports.

Fig 1, Relative energy expenditure rates by Sport

Powerwalking/walking round a golf course	≈ 300 KCals per hour
Cycling at 11mph	≈ 450 KCals per hour
Competative football	≈ 600 KCals per hour
Marathon running	≈ 650 KCals per hour
Cross-country skiing	≈ 900 KCals per hour
Kickboxing	≈ 900 KCals per hour

At this point, a number of factors must be considered. Where is this energy coming from? How are you going to replace the energy? What are the consequences of these choices?

It is easy to understand that athletes have several stores of energy. Understanding what is utilized, when and why is much more complicated. As well as a minute amount of glucose within the blood stream (about 8g/33kcal), energy can be sourced from carbohydrates, fat or protein. Carbohydrates are stored as glycogen in the liver (about 100g/420kcal) and in

the skeletal muscles (potential storage depends on size of muscles, total stored between 300g-500g/1260-2100 kcal when *entirely* fuelled). Of course, the body tends to have abundant stores of 'spare' energy, fat, stored subcutaneously. It is of great use to have a reserve energy supply to dip into when running low on our primary source, carbs, but fat is limited as an energy source by the fact it can only be converted to energy in the presence of oxygen. Because of its 'reserve' status, hardly any fat is used at the beginning of a fighter's session, but this changes in line with the duration of the session (you can only burn fats efficiently when your stores of carbs are depleted).

However, fats can not be converted to energy quickly enough to provide fuel at medium and high intensities, even when you start to flag. Within these zones, carbohydrates are the dominant fuel source, but even these 'superior' substrates have their own limitations so, as the heart rate increases above 180bpm (energy expenditure is now 13kcal/m), the body needs to utilize other fuels – not out of choice but necessity. Fats are once again oxidized as required, up to their maximal rate, approximately 5kcal/m.

Fig 2, Typical amounts of energy used per min, in athletes 30 minutes into training

<i>Activity</i>	<i>Heart Rate</i>	<i>Total Energy</i>	<i>Energy from Fat</i>
Powerwalking	120 bpm	7 kcal/m	5.5 kcal/m
Running	145 bpm	9 kcal/m	3 kcal/m
Sparring	180 bpm	13 kcal/m	5 kcal/m

Your body will also utilize muscle, breaking it down into amino acids then, through the process of gluconeogenesis, into glucose – however, this is another reaction that will not happen out of choice, only necessity. Whereas fat is a reserve energy source, muscle is more of an emergency source, but the fact is that this muscle breakdown occurs much more regularly than athletes would think. Although not such a big deal for marathon runners, whose running becomes more efficient with a wiry upper body, this is a big concern to martial artists; they must understand that, whilst working in a state of carb depletion allows the individual to burn fat, it also runs the risk of squandering muscle with it. The key is the intensity of training – when carb-depleted, your body is happy to use fat as its fuel for low-intensity exercise, but when train harder you are asking your body for carbs; it will provide these through gluconeogenesis, eg. muscle breakdown.

Therefore, in a typically intense training session, you can guarantee there will be plenty of use of all three fuels. In almost all situations, the burning of fat is beneficial and helps to improve the strength-to-weight ratio, extremely important for fighters. Carbs must be replaced to aid recovery. Most importantly, protein must be included in the diet in sufficient quantity; this will promote muscle repair and muscle fibre growth, which can then counteract the muscle loss sustained through exercise. Over the course of a demanding workout regime, an adequate protein supply can make the difference between a wiry, fit fighter who is lighter than necessary, and a lean, muscular fighter with a maximal power-to-weight ratio.

Naturally, having an impressive power-to-weight ratio is only useful if that weight is within the limits of your weight category – herein lies the issue of weight management. It may be surprising to discover that more fighters that I train have had more problems keeping their

weight up, rather than bringing it down. It is less surprisingly when you look at the fighters' daily energy requirements. One is a light heavyweight (79kgs/12 and a half stone), with good body composition and a bodyfat percentage of 12%. His Basal Metabolic Rate is more than 2150 kcals per day and, when you factor in lifestyle and general movement, this fighter has a Daily Calorific Need of approximately 3036 calories *before* adding any dynamic training to the equation. On a training day, over 4,500 calories are required to maintain weight. The FSA recommend 2,500 for the adult male.

This is one situation where calorie-counting is normally required, but in the opposite sense from dieters. Of course, this is not a license to chuck all sorts of junk down the throat, because the quality of the food consumed is vital for any athlete and fighters are no different. Athletes will need to make use of all types of macronutrients (carbs, fats and protein) but one thing they have no need for is sugar. Sugar is released into the blood stream too quickly, and consumption of this vice causes the blood sugar level to soar – the ensuing insulin release causes the blood sugar level to drop, resulting in fats storage and hunger and poor concentration. Without enough energy in the blood stream, muscle repair is compromised so performance and body composition will naturally suffer. It is important that fighters take in the right quantity and quality.

There is also a massive demand for micronutrients (eg vitamins and minerals). Sedentary people have a bigger need for increased vitamins and minerals than they think, and athletes who are training hard will see their requirements skyrocket. This is why so many fighters are deficient. Sweat loss and cellular reactions caused by intense training can use up 40mcg of iodine per litre of sweat, 12mg of zinc per day and 800mg of calcium per day to name but just a few and, as an example, can increase usage of important chromium six-fold after just 10 minutes. This added requirement is on top of basic daily requirements - combine with a normal diet and you are making deficiency certain. Deficiency does not always come with obvious signs but will always harm muscular development, resistance to injury and general vitality.

A good diet will help to overcome these deficiencies, but vitamin supplementation is the only solution to get near to an optimal balance. As much as I would like to be able to get all the necessary nutrients from 'the fat of the land', this is simply not possible due to the degradation of soil that has been over-farmed and saturated with pesticides. The scope of this article cannot will not extend to the inside track, suffice to say that every fighter has an individual need for vitamins and some are more relevant to the sport than others. Glucosamine is an excellent example, as it is required by the structures that make up connective tissue (cartilage etc) to renew and repair themselves; a deficiency in this area will make any fighter very susceptible to joint problems. A deficiency in essential oils (Essential Fatty Acids) will also compromise soft tissue further, as well as unbalancing the balance of a substance called prostaglandins within the bloodstream which, amongst other problems, compromises the body's anti-inflammatory action. Fighters would do well to ensure that they do not add to pain they receive in the ring through dietary neglect.

In biological terms, fighters have similar responses to training, use similar resources within the body and develop similar nutritional deficiencies.. However, the nature of the sport dictates that their requirements for maximal technique, flexibility, power and endurance whilst remaining within a distinct weight category means that more attention must be given to matching up macro and micro nutritional requirements to demand. By definition, the

intense demands placed upon the entire body of such an athlete must never be underestimated when a nutritional plan is put into play but, when implemented correctly, measurable improvements in CV fitness, strength, body definition and energy levels to provide the best possible platform for taking part in this most challenging and rewarding form of competition.

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