



## Periodisation Designs for maximal Power:Weight Ratio

Research on the physiological demands of Muay Thai competition athletes during fight conditions is limited, with data restricted to simulated matches. One such study found that aerobic metabolism and anaerobic glycolysis were primarily responsible for providing energy during a fight and concluded that training protocols should include exercises that train aerobic and anaerobic energy pathways ([Crisafulli et al, 2009](#)).

Training protocols for professional fighters are complicated by the necessity to perform optimally at their chosen weight category. Recommendations for maximal power-to-weight ratio suggest an athlete's body fat percentage be <10% during competition (Heatrick, 2015).

Subsequently, the overall strategy of Thai Boxing training programmes should be to optimise fat reduction, whilst preparing the athlete for the aerobic and anaerobic demands of competition (Delp, 2013).

The sport is not seasonable and professional athletes may fight numerous times per year, therefore a 12-month macrocycle is appropriate when designing periodisation programs designed to progressively prepare the fighter to reach their peak performance level at the appropriate time (Wright, 2013). The macrocycle usually consists of a preparatory phase following a linear periodisation model which is dictated by the period of time between fights, an 8-week competition phase following an undulating model and a 1-week recovery period (Delp, 2013).

Aerobic Endurance training methods are valuable throughout the athlete's general fitness program and whilst long, slow distance (LSD) training is widely used to promote physiological adaptations such as improved energy production, improved fat utilisation as fuel and glycogen sparing, high-intensity aerobic training is more appropriate to the Muay Thai athlete as it does not compromise power performance. Intensity should be as close to the lactate threshold as possible in order to progressively build up the intensity at which the athlete is able to work without loss of



function. This increases the fighter's  $VO_2\text{Max}$ , thus improving their efficiency in releasing energy from aerobic metabolism and preparing them for higher intensity during the pre-fight mesocycle. Aerobic endurance training at an intensity below the lactate threshold is preferable to anaerobic interval training as it allows the athlete to avoid post training discomfort resulting from lactate acid build up, which may interfere with other aspects of their development such as specific skill training (Wright, 2013).

Strength training is also an invaluable component of the athlete's preparation phase, being used to develop and explosive power (Delp, 2013), whilst being fundamental to injury prevention (Wright, 2013). However, there is a playoff between developing power and increasing weight. Subsequently, resistance training methods should be carefully selected in order to optimise weight-to-power ratio (Delp, 2013).

'Core' resistance exercises are more appropriate to this period of Thai Boxing training as they employ multi-joint movements across the large muscle groups, allowing training programmes to be designed around functional compound exercises which mimic competition movements. During the preparatory phase the athlete should perform 2-3 sets of 12-20 repetitions with a load of <67% of their 1rep max in order to develop muscular endurance. High tempo resistance training and supersets can also be used to develop power and free up more time for sports-specific skills training. Progressive overloading of the muscles during this training cycle will lead to an increase in muscular endurance and prepare the athlete for the intensive workload associated with fight preparation, although subsequent hypotrophy (and related weight gain) should also be expected (Wright, 2013).

Core stability training is also vitally important during the preparatory phase, particularly training aimed at developing 'reactive power' along the diagonal lines from shoulder to hip. Developing power through the 'serape' muscles is also critical during the competition phase of training, incorporating medicine ball and upper body plyometric movements to utilise the stretch-shortening cycle in order to develop stored elastic energy (Wright and Steele, 2013) and equating to an increase in power through the rotational punching/kicking actions central to Thai boxing (Heatrick,

2015). Isolation exercises for local core endurance and muscle density are also valued more highly amongst competitors/coaches involved in contact sports than in other activities and are included in most microcycles (or daily training regimes) due to the level of protection they afford the athlete from impact during fights (Delp, 2103).

The pre-fight mesocycle (competition phase) is planned once the date of competition and details of opponent are known. The focus shifts to fight-specific training and to high intensity/low volume training methods. The intensity involved in this phase means that microcycles should consider the risk of exhaustion and promote supercompensation, or maximal biological, structural and mechanical adaptations (Wright, 2013). The emphasis during this period is on developing punching and kicking power, whilst continuing to develop the athlete's aerobic and anaerobic capacities (Delp, 2013).

### **Example competition phase mesocycle for professional Muay Thai:**

Week	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
1	MT	EN	PW	MT	EN	MT3	REST
2	MT	EN2	PW	MT	PW+EN4	MT3	REST
3	MT	EN2	PW	MT	PW+EN4	MT3	REST
4	MT	EN3	MT	PW	MT3	SW	REST
5	MT2	PW	MT3	EN2	EN2	EN2	REST
6	MT2	EN3	PW	MT3	EN4	MT2	REST
7	MT3	EN3	PW	MT2	EN2	MT3	REST
8	MT2	MT4	EN4	MT4	REST	COMPETITION	REST

*(Adapted from Sample eight-week training program for competition (Delp, 2013))*

### **Microcycle:**

MT = Muay Thai Training, MT2 = Muay Thai Tactics, MT3 = Muay Thai Sparring,

MT4 = Shadow Boxing

EN = Aerobic/Anaerobic Endurance Training (Run 40-60mins medium intensity), EN2 = Interval Runs (40-60mins), EN3 = Fartlek Training (40-60mins), EN4 = Low intensity run (30mins)

PW = Power Training (whole-body program, 140 contacts per session)

SW = Swimming (60mins)



The most efficient way to develop maximal power during the competition phase is through plyometric training methods, which develop stored elastic energy in the muscles and tendons. Variables such as the stretch rate of movements, forcefulness of the eccentric phase and speed of the switch from eccentric to concentric actions can be manipulated to improve explosive performance during specific sport-related movements, thus increasing elastic energy and enhancing functional power (Wright, 2013).

High-intensity aerobic endurance training is replaced with shorter duration interval or Fartlek training. The value of this type of training is that it echoes the demands of competition and serves to further increase the athlete's VO<sub>2</sub>Max, enhance anaerobic metabolism, increase lactate threshold and improve fuel utilisation. This ensures that the athlete is able to perform at his/her optimum level for longer with no loss of function during competition (Wright, 2013).

The shorter volume of aerobic/anaerobic and resistance training during the competition phase also leaves adequate time for the athlete to focus on sport-specific training such as technique drills, pad work and sparring as well as recovery (48-72 hours is required for the athlete to fully recover from a power training (plyometric) session) (Wright, 2013).

Speed and agility training is not considered as a separate entity in Muay Thai programmes. Instead, it is incorporated into the extensive pad work/sparring sessions which mimic competition conditions and are a feature of pre-fight mesocycles. During these sessions a MDSA approach is used, whereby the athlete will respond quickly to commands from the pad holder or actions of their sparring partner, thus improving reaction, decision making and rapid information processing (Wright, 2013).

Mesocycles should include a 3-day tapering phase, where work rate is reduced in order to stimulate supercompensation. Tapering should coincide with increased carbohydrate intake which increases the glycogen storage capacity of the muscles



and liver. The carb-loading method has proven to enhance endurance, skill execution and power output during competition ensuring that athletes perform at their peak (The Health Sciences Academy, 2014).

## References

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