Plyometrics and Interval Training for Muay Thai

by Saki
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A few months ago, I saw the following question posted on a Muay Thai chat room website.

> I was browsing the book store yesterday and ran into a book called "Training
> for Speed And Endurance." It's basically all about the physiology of training,
> mainly geared at runners and sports players (soccer, etc.). I was wondering if
> you guys have taken physiology into account when creating your training
> schedule or if you just winged it.

This inspired me to write the following article.

Sports physiology is a major consideration for any serious martial artist. Many of us certainly have the discipline, dedication, and drive to push ourselves to the point of exhaustion, but less of us have the knowledge to ensure that our training is optimized for efficiency. In other words, we may train hard, but do we train "smart"?

I tend to prefer the term "kinesiology" over "sport physiology" when referring to the science of physical training. Kinesiology is the study of the anatomy and physiology of body movement, especially in relation to physical education or therapy [1]. If you want to know the best way to train, a martial artist with a background in kinesiology is your best friend.

Several books have been written to help maximize training benefits for runners, weight lifters, football players, etc. Yet a relatively small number incorporating modern training methods exist specifically for martial artists. Thus, martial artists, particularly Muay Thai practitioners, must borrow from the training methods other disciplines to optimize our own.

The question is, "Which training methods best accomplish this task?" This is a difficult question to answer because gross motor skills such as the delivery of a roundhouse kick are actually very complex movements from the point of view of a kinesiologist. Just think of all the muscles involved that must contract with precise timing. In a way, such coordinated muscle movement parallels that of a baseball player swinging a bat. Certainly, repetition may be the most important factor to developing a powerful kick, punch, etc., but this type of training is augmented by a wide variety of other exercises.

One of many things to consider is the type of muscle tissue involved in the action you wish to invoke. "Slow twitch" (type 1) and "fast twitch" (type 2) are the two major types of voluntary muscles. The slow twitch fibers are typically the ones that endurance athletes develop. Fast twitch fibers produce maximal force for short periods of time [2]. The conditioning of slow twitch fibers tends to be associated with aerobic exercise and the conditioning of fast twitch fibers is generally associated with anaerobic training. Martial artists are generally concerned with conditioning their fast twitch fibers which

provide speed related characteristics. Our genetic background determines the proportion of each muscle type we possess. Proper physical conditioning allows us to train these muscles to function at their peak performance level.

Now that we have some idea of the muscle fibers involved, the next question is "How do we develop/condition those muscles specifically involved in our martial art training?" Modern Muay Thai training and rules have made it a sort of "superset" of boxing. That is, if you took boxing, then added a repertoire of other weapons to it (kicking, knees, elbows, etc.) you would get Muay Thai. Thus, boxing is a good place to start for training that would benefit Muay Thai. But what about those aspects of Muay Thai not found in boxing? How do we condition our bodies to deliver lightning fast, powerful kicks, for example? Plyometric conditioning, a form of anaerobic exercise, is probably the most applicable form of training for accomplishing this task. Plyometric training involves a forceful contraction of the muscles such as that found in jumping, clapping pushups, throwing a medicine ball, etc. The primary reason why I believe plyometrics is the most relevant form of exercise for martial arts such as Muay Thai is because of the "law of specificity". Put simply, if you want fast, explosive muscles, you must train with fast, explosive movements [2]. The law of specificity is also known as the SAID (**S**pecific **A**daptation to **I**mposed **D**emands) Principle which states that you can train for a specific result and the body will respond accordingly [3].

The upper body plyometric exercises with which we are most concerned are the ones that develop powerful punches. Exercises that involve pushing the hands away from our body forcefully should help achieve this goal.

1. *Hopping pushups*: Start from the down position of a regular shoulder width grip pushup. Forcefully push yourself upward with enough velocity so that your momentum lifts your hands off the ground when your arms are extended (but not locked) in the up position. Emphasize full arm extension so you work the entire range of motion.

2. *In and out hopping pushups*: If regular hopping pushups are easy, move on to "in and out hopping pushups." This is similar to "hopping pushups" except you start from a narrow grip and land in a wide grip. Thus, you need to be able to adjust your grip in the air during the up position. On the next rep, push from a wide grip to a narrow grip. In addition to being more difficult than regular "hopping pushups", the "in and out pushups" work both the inner and outer pectoral muscles.

3. *Clapping pushups*: Again, this is simply another modification of the "hopping pushup". As an added test of skill and strength, push yourself upwards with enough velocity so that you can lift high off the ground giving yourself enough time to clap your hands in the air. You should find "hopping pushups" relatively easy before attempting this exercise. See photograph.

The goal of lower body plyometric exercises is to develop fast and powerful kicks. With kicking involving so many different muscles, the emphasis for lower body plyometric training should be variety so that no muscle group is overlooked.

1. *Squat jumps*: An old favorite for many Muay Thai practitioners, this exercise begins from a standing position with feet shoulder width apart and hands behind the head. Squat down then immediately jump while rotating the entire body 180 degrees. Then squat and jump again turning back to the starting position without hesitation. To work the full range of motion, the body should be upright in the air with legs fully extended (but not locked).

2. *Side to side jumps*: Muay Thai employs a significant amount of lateral movement both offensively and defensively. While most lower body plyometric exercises involve a good deal of forward/backward or vertical movements, "side to side jumps" develop power in the lateral direction. First, place an aerobic step (or similar apparatus) on the floor with the long portion of the step facing front. Stand next to the step with feet shoulder width apart and let the arms hang freely for balance. Next, jump over the step pushing off with both feet simultaneously. Still facing front, jump back and repeat. The height of the step can be raised or the lateral jump distance can be increased for added difficulty.

3. *Tuck jumps*: The lower body exercises described thus far emphasize pushing the legs away from the ground. "Tuck jumps" require this same motion but with the added test of pulling the knees to the chest at the apex of the jump. You should find "squat jumps" relatively easy before attempting this exercise. See photograph.

One thing to keep in mind with all plyometric exercises is the wear and tear on your joints. If you are prone to high impact injuries, you might want to avoid plyometric exercises or at least practice with extreme caution. To minimize such injuries, try to make your landings smooth and quiet. For any squatting exercises, avoid bending the legs in a way that creates an angle behind the knee of less than 90 degrees when absorbing impact.

A wide variety of plyometric books, videos, and apparatus are available from **Ringside** (1-877-4-BOXING or *www.ringside.com*) and **Power Systems** (1-800-321-6975 or *www.power-systems.com*).

Plyometrics can certainly enhance speed, but Muay Thai fights aren't fought like the typical point style Karate/Tae Kwon Do matches where a quick, clean strike scores a point followed by reset. Muay Thai fighters need to be able to fight intensely for three 2 minute rounds with 1 minute of rest between rounds in amateur competitions, or five 3 minute rounds with 2 minutes of rest between rounds in professional fights. This blend of vigorous activity followed by short rests is best enhanced with interval training. Interval training uses short bursts of intense anaerobic activity combined with a more

lengthy and less intense aerobic activity. In a running workout, this is ordinarily accomplished by mixing sprinting with jogging [4]. However, the same principle can be applied to virtually any aerobic discipline such as bicycling, step machine training, etc.

To achieve the desired level of conditioning, one might try any of the following interval training routines, listed in order of difficulty:

Sprint 50 yards after every mile jogged.
Sprint 100 yards after every mile jogged.
Sprint 100 yards after every half mile jogged.
Sprint 200 yards after every half mile jogged.

Since knowledge of distance is essential for a controlled workout, these routines are best accomplished on a track [4]. One mile = 1760 yards.

Both plyometric conditioning and interval training are considered advanced forms of exercise because they require that the individual achieve a satisfactory level of aerobic conditioning and weight control. It could be detrimental for an overweight person to practice plyometrics or a person with poor cardiovascular conditioning to attempt interval training.

Furthermore, the reader should understand that plyometrics and interval training should never be thought of as a substitute for Muay Thai or other martial art training. Rather, they should be viewed simply as supplements because they serve to enhance those physical attributes we seek.

Lastly, plyometrics and interval training are by no means the only forms of supplemental training available for Muay Thai or other martial art practitioners. These two forms of training were chosen because together they serve to balance speed, intensity, and explosive strength with the appropriate level of endurance. Hence, those of us who already train hard can start to train "smart."

Sources

1. "Random House Webster's College Dictionary" published by Random House, Inc., 1992.

2. "Explosive Power and Strength" by Donald A. Chu, Phd, published by Human Kinetics Publishers, Inc., 1996.

3. "Weight Training Manual" by Dr. Bill Kutzer, published by California State University, Sacramento Department of Health and Physical Education, 1988.

4. "Sports Injury Handbook" by Allan M. Levy, MD and Mark L. Fuerst, published by John Wiley and Sons, Inc., 1993.