

Physical Aspects



Muscular Strength

A simple force is initiated by direct muscular contraction and increases total power dramatically when it incorporates other power creators such as speed, focus, body dynamics, flexibility, balance and spirit. The muscles, which are composed of many fibres, are attached to the bones in the body by tendons. These bones make up the skeletal system which are joined together at the joints of the body.

Physical force is a proportional relationship between mass and acceleration. In the art of Tang Soo Do, mass itself does not play a significant part in the calculation of total power. However, it is important to have as much mass as possible behind the powerful movements, which means putting the whole body into the movement - a concept of defence and offence produced by the body at the same time.

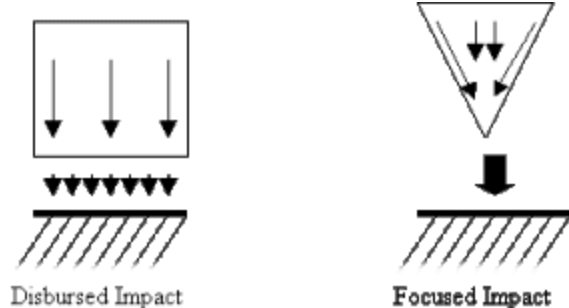
There are two main ways in which muscles contract in developing force: simultaneous contraction and sequential contraction. Simultaneous contractions refer to the movement of various muscles used to the action of a single joint. Bending the lower arm, for example, is an example of this. In this case there is a definite sequence of joint movements and the muscles which move them. With proper timing and body mechanics, the force of each subsequent action of the joint would be added to the preceding one. An example of this, is the side kick, where the joints of the ankle, knee and hip move in sequence to perform the movement.

Focus

The target area of which a force is applied (i.e. impact area or contact space) is called focus. As a result of focus impact, pressure is produced. Impact pressure is defined as:

$$\text{Impact pressure} = \frac{\text{Force (applied)}}{\text{Area (contact space)}}$$

The focus area is directly proportional to the applied force and indirectly proportional to the area of impact. In practical terms, the smaller the area to which force is applied, the greater the impact. Conversely, the larger the area or contact space, the smaller the impact. Concentrated and focused power (i.e. large applied force and small contact space or area) has more strength than dispersed power (i.e. large applied force and large contact area).



Impact Comparison

Maneuvering focused power is a physical act, which requires harmony of all body functions. The ultimate power movement when the mind is empty, the body remains relatively relaxed, and simultaneously, all involved muscles contract intensively and momentarily. Breath is released and the entire body force explodes at the given moment on a specific target. This entire series of events is called focused movement.

Hur Ri Twul Ki - Hip Twisting

One of the most effective techniques for developing greater force works with the principle of body dynamics in which the whole body structure supports the action and generates power through balance and speed. Known as the centralized balance point of the body, Hur Ri (waist), must be used in a twisting action, coiling upper and lower body, which is called "Hur Ri Twul Ki" and when it is released the coiled tension, develops tremendous power to the impact pressure. Also, the area of the hips coordinates the perfect balance of upper and lower body and transfers power from one part to another. Hur Ri Twul Ki generates not only elastic power, flexibility and speed, but also makes possible a variety of movements without repositioning.

Flexibility

It is common to believe that stiff and tough is equal to strong and that fragile and tender are weak. This is not true to the Tang Soo Do student. Muscular strength on it's own is not sufficient for full scale power. A higher dimension of strength lies in softness and relaxation. Relaxed muscles not only create elastic and dynamic power and speed, but also are vitally important for flexibility in order to deliver effective techniques. The human body is a system of integrated working components.

Prior to training it is important to warm up the body, loosening the muscles. This is important for serious training in developing power and speed. Commanding or controlling the combinations of soft and stiff is the art and true skill of Tang Soo Do. We should be able to launch extensive tension for power while, at the same time, the other portions of the body are able to relax in order to support balance, speed and concentration. Methods for developing flexibility include warm up breathing, meditation and exercise.

Breathing

The practice of Tang Soo Do places a great demand on the human body to be physically prepared and mentally alert at all times. Proper breathing is one of the keys to sustaining such a condition. It is achieved by a thorough knowledge of the respiratory system and the biochemical properties of respiration coupled with a daily program of breathing activities.

The respiratory system consists of a group of passages that filter incoming air and transport it from the outside of the body into the lungs, and finally into numerous microscopic air sacs (alveoli) in which gas exchanges take place.

Although the entire process of exchanging gases between the atmosphere and the body cells is called respiration, the process involves several events. These include the moving of air in and about of the lungs, commonly called breathing or pulmonary ventilation, the exchange of gases between the air and the lungs and the blood, the transport of gases by the blood between the lungs and body cells, and the exchange of gases between the blood and body cells.

The utilization of oxygen and the production of carbon dioxide by the body cells is called cellular respiration.

Just as fanning a flame causes it to burn faster and hotter because of the additional oxygen, so do muscle cells gain strength as additional oxygen is provided to them. Skeletal muscle cells possess hundreds of microscopic bodies that are called mitochondria. These small bodies are the source of power for muscle cells to contract because they produce a very high energy substance called adenosine triphosphate (ATP) from sugar or food. Increasing the oxygen supply to these mitochondria allows production of more ATP which increases the power and strength of muscle contraction. The student must realize that proper breathing is a very important part of the martial art of Tang Soo Do. Proper breathing not only sustains life at a high level but is also the foundation of Ki power or energy. Ki power is a vital energy that is intrinsic to martial arts. It is sustained and increased through breathing exercises. According to prevailing thought, the reservoir for Ki energy is located in the lower abdomen area called the Dan Jun. It is here that energy is concentrated and then flows throughout the body. Good breathing is essential for concentrating Ki in the Dan Jun and then channeling this energy whenever and wherever it is needed.

Breathing in and out are the two parts of the process of respiration. This process can be considered in the context of the Um-Yang concept of opposites. During the intake of oxygen, the body is replenished but it is not in a state of powerful readiness. However, during exhalation the body assumes a condition of power. This condition can be observed during sparring or breaking activities. In fact, every power technique will be accompanied by exhaling air, usually with an audible kihap. In sparring, the defender should initiate an attack when the opponent is in the process of inhaling. In an activity such as breaking, Ki power is concentrated in the Dan Jun through focused and controlled deep breathing and is then released in an almost violent exhalation of breath

and power.

There are many techniques for practicing breathing and breath control. Keep the following points in mind when practicing:

1. Breathe using the diaphragm rather than the upper chest, This will expand the lungs and bring more oxygen deeper into the lungs. Be conscious at all times of the movement of the diaphragm and lower abdomen.
2. Be conscious of breathing throughout all daily activities. Control breathing in a rhythmic fashion and developed awareness of power during the process of exhaling.
3. Be aware of your entire body during breathing practice. Note that muscles tend to relax during inhaling and contract during exhalation. In your mind imagine that Ki is being built up or replenished in the Dan Jun and from there it is flowing throughout your body.
4. Practice breathing exercises for a few minutes every day. Only through repeated practice and concentration can proper breathing be achieved and maintained.

Breathing is a source of life for all human beings. It is a process that is taken for granted because it is automatic, but it should be nurtured and practiced as an integral part of the lifelong pursuit of the achievement of power through a greater knowledge of the body and its functions