

## Theory of Power

The power of Tae Kwon Do (TKD) is attributed to the utilization of a person's full potential through the mathematical application of TKD techniques. The factors, which will result in a high degree of physical power are: reaction force, concentration, equilibrium, breath control and speed.

**Reaction Force:** According to Newton's Law, every force has an equal and opposite force. If your opponent is rushing towards you at high speed, and you throw the slightest blow at his head, the force at which you strike his head would be that of his own onslaught plus that of your own blow. The two forces combined are quite impressive. Another reaction force is your own, a punch with the right fist is aided by pulling back the left fist to the hip.

**Concentration:** By applying the impact force onto the smallest target area, it will concentrate the force and therefore, increase the effect. For example, the force of water coming out of a water hose is greater if the opening is smaller. The blows in TKD are often concentrated onto the edge of the open palm or to the crook of the fingers. In addition to this one must concentrate every muscle of the body, particularly the bigger muscles of the hip and abdomen, towards the appropriate movement.

**Equilibrium:** By keeping the body always in equilibrium, that is, well balanced, a blow is more effective and deadly. Conversely, the unbalanced one is easily toppled. The stance should always be stable yet flexible. To maintain good equilibrium, the center of gravity of the stance must fall on a straight-line midway between both legs, or in the center of the foot if it is necessary to concentrate the bulk of weight on the foot. *The heel of the rear foot should never be off the ground at the point of impact. This is not only necessary for good balance but also to produce maximum power at the point of impact.*

**Breath Control:** Controlled breathing not only affects one's stamina and speed but can also condition a body to receive a blow and augment the power of a blow directed against an opponent (Kihap). Never inhale while focusing a block or blow against an opponent. This not only will impede movement but it will also result in a loss of power.

**Mass:** Mathematically, the maximum kinetic energy or force is obtained from maximum body weight and speed. The hip and the large abdominal muscles are twisted to provide additional body momentum. Thus the hip rotates in the same direction as that of the attacking or blocking movement. Another way of increasing momentum is through use of knee spring.

**Speed:** Speed is the most essential factor of force or power. Scientifically, force equals mass multiplied by acceleration: ( $F=MA$ ). Factors that contribute to acceleration or speed are reaction force, breath control, equilibrium, concentration and relaxation of the muscles. If the speed is increased by a factor of three (with mass kept constant) then the power is increased by a factor of nine. This clearly demonstrates why speed is the most important factor in the production of power.