

# **Acceleration: The Key to Athletic Performance**

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When we think about a recipe for success in sports such as hockey, soccer and lacrosse, we think of speed, power, strength and anaerobic capacity. Although these are all mandatory ingredients needed to enhance the final product (athletic potential), one of the ingredients missing in many of today's strength and conditioning programs is the ability to accelerate. Acceleration is simply the rate at which speed increases. Very few times in the sports mentioned above do we reach top velocity and sustain this for prolonged periods of time. However, we do accelerate constantly! Simple physics states: **"The higher the velocity, the lower the rate of acceleration."** If we don't sustain top velocity on a regular basis, acceleration is then one of the keys to success.

Charlie Francis (one of the most recognized sprint coaches in the world/former Canadian sprint coach to Ben Johnson) stated that the majority of 100-meter sprinters do not reach top velocity until 60 meters in the race. Up to this point it's pure acceleration! This has major implications on how we train athletes in explosive sports where 100 meters is over half the distance of a normal puck race in the game of hockey. According to Coach Francis the major requirements for the 100-meter race are broken down as follows:

- **Start/acceleration: 0-30meters**
- **Speed or maximum velocity: 30-60 meters**
- **Speed Endurance: 60-120 meters**

After looking at the above information, we need to ask ourselves: When in the course of a hockey game does a player reach top velocity for a period over 30 meters (90+ feet) in length (maybe rushing for a touch icing, but certainly not consistently)? When during the course of a soccer game does a player sprint at full capacity for 60+ meters without passing, cutting or changing direction? In these sports, speed is constantly changing and rarely sustained for periods over 30-60 meters. Due to these demands, acceleration needs to be trained. The fastest skaters in the world are not the fastest because they can sustain top speed for prolonged periods of time (hockey is not speed skating), they are fast because they can reach top speeds quickly and accelerate efficiently, thus, reaching and maintaining top speed faster than the competition.

- **Hockey Rink Dimension: 200x85:** Imagine skating full speed the length of the ice without changing direction, or altering speed. Although this can certainly happen, the majority of the game is puck races of 10-15 feet or less (blue line to blue line). Increasing the capacity to accelerate has a direct correlation to performance enhancement. I would much rather have a player that has exceptional acceleration between blue lines; compared to the player that has tremendous speed around the length of the ice. In many respects the



truth of the matter is that all of these attributes should be covered in a well-structured strength and conditioning program (concurrent periodization). The secret is that there is no secret! The following elements will make a profound improvement on the athletes' ability to accelerate.

- **Plyometric training:** This form of training aids in power development ( $\text{Power}=\text{Work}/\text{Time}$ ) and excitation of the body's Central Nervous System. It is defined as a quick eccentric contraction; followed immediately by an explosive concentric contraction. Plyometric training has a direct impact on acceleration and power by stimulating elastic properties in the muscle/tendons to generate maximal force in minimal time. Taxing the CNS anywhere can produce results everywhere. Therefore, both upper and lower body plyometrics are necessary. As Francis states, "The top sprinter accelerates faster than either of the other sprinters, because he has more power out of the starting blocks."
- **Speed/Acceleration Training:** Speed work aids in promoting fast twitch muscle fiber while taxing the body's musculoskeletal and anaerobic energy system(s). It also serves as one of the most transferable components in regard to sports performance. Most speed training for sports such as hockey should take place in distances of 15 yards or less. In actuality, this is really acceleration training. Coach Mike Boyle (one of the most respected strength and conditioning coaches in the world) trains/prepares his athletes for the 40-yard dash at the NFL combine using a distance of 10-15 yards, both for injury prevention and performance enhancement. He states: "In fact, over eighty percent of our training is done for ten yards, working to increase power and decrease steps. Less than twenty percent is done for 15-20 yards. In fact in over twenty years of training athletes for the NFL Combine I have never had an athlete run a forty yard dash prior to being tested by a pro scout."
- **Strength Training:** If strength is defined as the ability to apply force against resistance, sprinting/acceleration may be defined as the ability to apply force to the ground. Simply put, if we're stronger, we can produce more force! Strength has a direct impact on speed gains. If we can produce more force into the ground by activating high threshold motor units (strength training is key), we can propel ourselves over the ground more efficiently. This is Newton's third law: The Law of reciprocal actions. "To every action there is always an equal and opposite reaction: or the forces of two bodies on each other are always equal and are directed in opposite directions". Notice I said strength training and not bodybuilding/non-functional hypertrophy (beach body) training. Non-functional hypertrophy is the equivalent of building a bigger car without adjusting the size of the engine. Strength training builds bigger engines!

There you have it, the ability to accelerate has major implications for explosive, anaerobic sports. This doesn't mean specialized programming for each and every component trained. It means a well-organized program incorporating soft tissue work, dynamic elements, speed/acceleration, plyometrics, strength training, and speed endurance (energy system) work! These attributes need to be trained. As strength and conditioning coaches, our goal should be to reduce the chance of a sports related injury, while building bigger cars, and more powerful engines for our athletes.

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