What is an EC?

The translation for “eccentric” means away from center. This is referring to the negative phase of performing any strength training exercise. There is a common misconception in the world of strength training that the benefits and gains associated with it come from the “up” or concentric phase of the lift. This is where the muscles of the body are generating force greater than the weighted load they are overcoming. What the exercise research actually shows is that many benefits cannot be maximized without a balanced effort between concentric and eccentric contractions. This means that one full repetition should include both phases of the lift until it is considered complete. If done correctly, EC’s have a number of physiological and training benefits compared to concentric training alone. Neglecting of it is one of the most common exercise mistakes. Pictured below is a diagram of a bicep curl that details both phases of the lift.

EC’s Inside the Body

During the down or eccentric phase of a lift, the muscle and its sarcomeres (individual unit of contractile muscle) are actually lengthening longer than its desired resting length. This is because the duration of this phase actually has the weighted load having more force than the muscles trying to overcome it. Enough repetitions of this fashion will cause small microscopic tears in the involved muscles and tendons. This allows the muscle to rebuild and repair stronger than previous when in the presence of protein consumed in the diet. On the physiological level, the action of actin and myosin filaments, which are responsible for all muscle contraction, are behaving differently during an EC. Research shows that constant tension during the EC will actually yield less cross bridge detachment. The cross bridge is the binding of the actin and myosin within the sarcomeres that cause the “power stroke” or contraction of the muscle that allows it to exert force. The implications of this information mean the muscle involved can exert more force on the next repetition given less cross bridge detachment is occurring. More stress generated in the muscle will eventually mean more gains.

Long-Term EC Use Effects

Much of the discussion so far has been about EC in the moment of exercise and its immediate effects on the body. If these same effects are displayed on a consistent basis, the body produces several long term benefits for the human body. Some of these include:

• Protection and Prevention of future injuries.
• Peak muscle strength and size.
• Bouts of fatigue are shortened or reversed.
• Energy Maximization: EC’s use less ATP and are able to generate more force.
• Further development of muscle coordination and balance.
• Show decreased cardiovascular stress compared to Concentric contractions.
• Additional strength across entire range of motion of joint.
• Additional strength throughout different speeds of movement.
• Better power and athletic performance.
• Increased ability to recover from exercise or injury.

Eccentric Contractions (EC)

Sarcomere and Cross Bridges
References (APA)


