1. INTRODUCTION

The exogenous ingestion of creatine (Cr) is typically used as a performance enhancing (ergogenic) supplement because it is known to improve performance in muscular strength and power activities, enhance short bursts of muscular endurance, and allow for greater muscular overload in order to improve training effectiveness. Creatine has become one of the most popular ingested nutritional supplements due to its potential enhancement of athletic performance. Creatine is primarily located in skeletal muscle and plays a pivotal role in cellular bioenergetics, specifically towards the reformation of a molecule essential for muscular contraction, adenosine triphosphate (ATP). The vast majority of research indicates that high-intensity, short duration, and repeated exercise bouts are the most effective modes of exercise that can be enhanced by creatine supplementation. Oral creatine supplementation has been shown to provide numerous benefits, including increases in lean muscle mass, muscular strength, and enhanced performance in various athletic capacities. The creatine transporter is a protein that mediates the entry of creatine from the circulation into the muscle cell.

2. CREATINE’S ROLE IN MUSCULAR STRENGTH AND POWER

Numerous research studies have demonstrated that supplemental creatine (Cr) monohydrate is an effective nutritional compound in increasing short-term (1–3 wk) and long-term (4–12 wk) muscle performance, as indicated by an increase in strength and power. In addition,
supplemental Cr appears to also be a beneficial catalyst in increasing muscle hypertrophy and total body mass when combined with resistance training. Based on the overwhelming number of studies conducted in the last 10 yr that have demonstrated that Cr supplementation improves exercise performance and/or training adaptations, Cr has quickly become one of the most popular ergogenic sport supplements used today. Most of the studies with Cr supplementation have used male participants. However, about one-third of the studies have evaluated women and/or mixed cohorts of men and women and have demonstrated women to undergo ergogenic benefits following Cr supplementation. Although, gains in body mass, fat-free mass, and muscle strength and power are generally not as rapid as men, these studies do suggest that women do benefit from Cr supplementation.

However, one must consider that the impact of Cr’s effectiveness in increasing muscle strength and power is predicated on the duration and dosage of Cr supplementation, as well as the muscle-Cr transport and uptake capacity. Cr is typically ingested at an approximate dosage of 20 g/d (0.3 g/kg body mass/d) for 5–7 d during a loading phase and then around 5 g/d for several weeks during a maintenance phase. The majority of Cr uptake during a loading phase typically occurs during the first 2–3 d of the loading period, and research has shown that the most rapid way to increase muscle-Cr stores is to use a loading method. However, there are studies that have reported that 5–6 g/d of Cr supplementation for 10–12 wk promoted greater gains in strength and muscle mass during training when compared with placebo. In addition, a 4-wk study that did not use a loading phase, but rather provided a maintenance dose of 3 g/d for the duration of the study, still showed significant Cr-induced performance benefits. However, in light of this, using a loading phase and then using a maintenance dose of 5–6 g/d (0.07 g/kg body mass/d) appears to be necessary to maintain Cr stores in most individuals owing to the fact that larger individuals are likely to retain 2–4 g/d of Cr after loading periods, if adequate Cr is ingested during the maintenance phase.

Evidence suggests that Cr supplementation is more likely suited to improve performance in the sports/activities that require more of an anaerobic performance component (1) such as weight lifting, sprinting, football, and ice hockey. Cr enhances short-term, anaerobic endurance through its inherent ability to enhance muscle bioenergetics. In addition, Cr indirectly promotes muscle anabolism (growth) through long-term supplementation coupled with resistance training by extending exercise output, again through enhanced muscle bioenergetics. As a result, muscles then compensate for the increased mechanical load through the production