

# Sport Performance News

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Edition 1

The Prevea Sport Performance Newsletter is aimed to help young athletes and coaches navigate the vast amount of information related to athletic performance. Quarterly newsletters will cover topics related to strength and conditioning, nutrition, and athletic health.

## Hang Cleans: The Only Option For Lower Body Power Development?

Suchomel, TJ, Wright, GA, Kernozek, TW, and Kline, DE. Kinetic comparison of the power development between power clean variations. *J Strength Cond Res* 28(2): 350-360, 2014.

**INTRODUCTION:** It is well known among coaches and athletes that power production is important for sport performance. Studies suggest higher-level athletes generate more power compared to lower-level athletes of the same sport. For example, a study by Sierer and colleagues indicated college football players selected in the NFL draft outperformed undrafted players on combine tests requiring high levels of power output, such as the 40-yard dash and pro-agility tests (1). For this reason, strength coaches often use different methods to enhance power production in athletes they train. One of the most common methods used in the weight room is the execution of hang cleans. Although hang cleans are an effective power training method, the lift is very technical requiring athletes to spend large amounts of training time perfecting the movement. To navigate this issue, strength coaches frequently employ less technical, abbreviated versions of the hang clean exercise. The purpose of this article is to inform the reader of hang clean derivatives that can be used to improve lower body power production by highlighting a study that compared hang clean variations to the standard hang clean used in many training programs.

**PURPOSE:** Suchomel and his team of researchers looked to compare athletes' ability to produce lower body power using the hang clean, high pull, and jump shrug. *High pulls and jump shrugs are offshoots of the hang clean exercise. These exercises emphasize lower body explosive triple extension but do not involve catching the bar in a front racked position.*

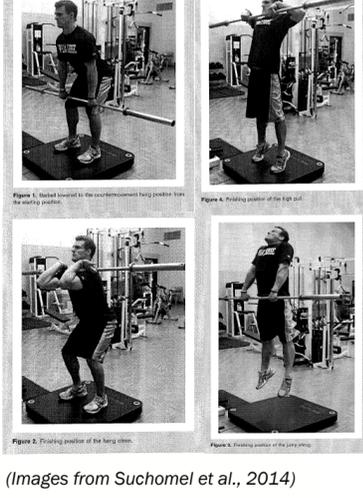
**SUBJECTS:** Seventeen college-aged men familiar with hang cleans participated in the study.

**METHODS:** Subjects completed a familiarization session to determine 1-repetition max on the hang clean and to learn the jump shrug and high pull exercises. Following the familiarization session, subjects performed three testing sessions. Each testing session was performed on a separate day, with a minimum of 2 days rest between sessions. During a testing session, subjects performed one of the three lifts (hang clean, high pull, jump shrug) with loads of 30, 45, 65, and 80% of their determined hang clean 1-repetition max. Three repetitions were performed at each load while researchers recorded peak power output, peak force, and peak velocity (of lifter plus bar) using a force plate.

**RESULTS:** Subjects displayed significantly higher peak power output and peak movement velocity during the performance of the jump shrug compared to both the hang clean and high pull. Subjects also displayed significantly greater power output and velocity during the high pull when compared to the hang clean. Force output was significantly greater during the execution of the jump shrug compared to both the hang clean and high pull. Furthermore, researchers found that loads of 30 and 45% of hang clean 1 repetition max appear to produce greater power outputs (a

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(Images from Suchomel et al., 2014)

combination of both force and velocity) compared to heavier loads.

**CONCLUSION:** The results from this study indicate that both jump shrugs and high pulls are effective power-producing exercises. The study points out the power producing efficacy of hang clean variations is similar or possibly superior to the hang clean exercise. Subjects were likely able to produce greater power outputs during the jump shrug do to its simplistic nature. The athletes can focus more attention on jumping and being "explosive" during the jump shrug. On the other hand, as stated earlier hang cleans are a more complicated lift. Athletes must divert attention to rhythm, timing, and catch to successfully complete the lift. This leaves less attention for the athlete to direct towards lower body explosiveness. In conclusion, jump shrugs appear to be a great exercise for developing lower body power. Coaches should consider its application when designing a strength training program.

*Authors note: This article is not intended to prove that one exercise is better than another; rather, it is intended to show that a variety of exercises can be used to train for power adaptations. Selecting the proper exercise for you or your athletes depends on multiple factors, including training experience, available training time, and desired training goals.*

1. Sierer, SP, Battaglini, CL, Mihalik, JP, Shields, EW, Tomasini, NT. The national football league combine: Performance differences between drafted and nondrafted players entering the 2004 and 2005 drafts. *J Strength Cond Res* 22(1): 6-12, 2008.

## Vitamin D and the Athlete

Ogan D, Pritchett L. Vitamin D and the Athlete: Risks, Recommendations, and Benefits. *Nutrients*. 2013;5(6):1856-1868. Doi:10.3390/nu5061856

**INTRODUCTION:** Vitamin D has gained popularity in recent years as an overall health and performance nutrient. Vitamin D is unique from other vitamins in that it can be obtained both through consumption and through sun light exposure. Deficiencies and insufficiencies of Vitamin D are very common among the normal population and in athletes. In fact 77% of the general population is considered vitamin D insufficient. Specifically, athletes who practice and perform indoors, who live far from the equator, and who have darker complexions are at the highest risk. Vitamin D plays a role in immune function and bone mineral deposition as well as gene expression, protein synthesis, electrolyte metabolism, and hormone synthesis. Research also supports the role of vitamin D in the prevention of chronic and acute diseases, such as: cancer, cardiovascular disease, type 2 diabetes, autoimmune diseases and infectious diseases. For many years, vitamin D was known only for its endocrine functions, such as bone growth and maintenance. Recently, more interest and research has gone into the autocrine functions thanks to the discovery of Vitamin D Receptors (VDR) in muscle and other tissues.

**ENDOCRINE FUNCTIONS:** The endocrine functions of vitamin D are well researched and are understood more fully than the autocrine functions. These functions are also the first to be satisfied by vitamin D in the body. That is, if there is a limited amount of vitamin D, these functions will be prioritized and autocrine functions will be pushed off until more vitamin D is available. The main endocrine functions are increasing intestinal calcium absorption and decreasing parathyroid hormone (PTH) levels. The net effect of these functions results in an increase in bone remodeling, density, and growth. Studies have shown athletes with higher blood levels of vitamin D have lower incidences of stress fracture and other injuries. (See Figure 1.)

**AUTOCRINE FUNCTIONS:** The autocrine functions are not as well researched but are being explored due to the possible connection between vitamin D and athletic performance. It is suggested that increased levels of vitamin D can improve muscular strength through an increase in Type II muscle fibers, however, this needs more research. Other studies have shown improvements in various performance measures (10 yd sprint times, vertical jump) but not in others (1rm squat, bench press). There are also many studies showing improvements in muscular strength and other measures in the elderly population. These studies are in a different population and therefore might not hold true in the athletic population but do warrant the need for more research. While the research seems promising, more must be done before

any conclusions can be drawn on vitamin D status and athletic performance.

**LEVELS AND RECOMMENDATIONS:** The current RDA for vitamin D, set by the Institute of Medicine, is 600 IU/day for adolescents to adults <70 years old. This value is increased from the previous recommendation and many experts believe this figure will continue to rise as more research is conducted. In fact, some experts and organizations argue for higher intakes. For example, the Endocrine Society recommends 1500-2000 IU/day in addition to adequate sun exposure. Vitamin D does have a toxic level that can cause adverse symptoms, so excessive intakes should be avoided. However, truly toxic levels are probably very hard to reach unless excessively supplementing. For reference, a light skinned individual exposed to 15 minutes of sun with no protection (sleeves, hats, sun screen, etc.) produces 10,000 - 20,000 IU of vitamin D. With this amount being naturally produced rather quickly, it would be expected that individuals who work outside in sunny environments experience vitamin D toxicity often. This, however, is simply not the case as there has never been a case of vitamin D toxicity from sun exposure alone. The tolerable upper limit set by the IOM is 4,000 IU/day while the Endocrine Society sets the limit at 10,000 IU/day. Therefore, if choosing to supplement vitamin D, it would be prudent to keep intakes from supplementation below these limits unless otherwise prescribed by a medical professional. Before choosing to supplement vitamin D, consider trying to get more sun exposure, eating more vitamin D rich foods, and only supplementing in winter months.

**CONCLUSION:** Athletes D deficiencies are very common among athletes and the general population. Athletes who practice and compete indoors, have darker complexions, and/or live in areas away from the equator, are at the highest risk for vitamin D deficiencies. Vitamin D deficiencies can be avoided with 15 minutes of unprotected sun exposure daily between 10 a.m. and 3 p.m. during summer months. Another way to avoid vitamin D deficiencies is to consume more vitamin D rich foods, such as, fatty fish, liver, egg yolks, mushrooms, and cheese. Consuming more vitamin D fortified foods like milk, yogurt, some orange juices, and breakfast cereals is another way to increase vitamin D intake. If choosing to supplement vitamin D, only choose supplements in the vitamin D3 form, as this is the more potent form. Vitamin D2 is another supplemental form of vitamin D but is less active and available for use in our body. It would also be wise to follow the upper limits discussed earlier for supplemental intake. While vitamin D's effects on muscle and performance has not been fully elucidated, its effects on strengthening bones and reducing stress fractures is enough for all athletes to consider optimizing their vitamin D intake.

- ↑ Vitamin D = ↑ Calcium Absorption = ↑ Bone Deposition (building of bone)
- ↑ Vitamin D = ↓ Parathyroid hormone = ↓ Bone Resorption (breaking down of bone)
- ↑ Bone Deposition + ↓ Bone Resorption = ↑ Bone Density

Figure 1. Explaining the two-pronged relationship between vitamin D and bone resorption/deposition leading to an increase in bone density.

## Program Writing 101: An Introduction to Writing Your Own Workouts

Often times, sport coaches and young athletes find themselves without access to a strength coach. As a result, the task of developing a strength training program falls either on the individual or the sport coach. Challenged with this chore, athletes may go straight to Google or the nearest muscle magazine to find a workout program boasting amazing results in 6 weeks. Many problems arise when young athletes follow programs designed for body-builders or an advanced athlete of their same sport. It should be known that with a little time and effort, athletes can write their own workout program tailored to their ability level and the equipment available to them. This is part one in a multi-part series aimed to help athletes and sport coaches develop their own strength training program.

It is my belief, and the belief of many, that athletes should train movements not muscles. This is the opposite philosophy of many bodybuilding programs and one reason following a program found in a fitness magazine might not be your best bet. Compound movements that involve multiple joints integrate many muscle groups and are more specific to sport than isolating individual muscles. With this in mind the basic movements to consider are a squat, hip hinge, push, and pull. Within each movement category, many exercise options exist. I find it helpful to break down the movement categories slightly further, the following categories are a good place to start for athletes:

- Squat (e.g. Back Squat)
- Single Leg Squat (e.g. Lunge)
- Hip Hinge (e.g. Deadlift)
- Single Leg Hip Hinge (e.g. Single Leg RDL)
- Upper Body Vertical Push (e.g. Shoulder Press)
- Upper Body Horizontal Push (e.g. Bench Press)
- Upper Body Vertical Pull (e.g. Pull-Up)
- Upper Body Horizontal Pull (e.g. Bent-Over Row)

After determining exercise categories, the next step is to organize those categories into daily workout templates. Before you start throwing categories together, you must ask yourself a few questions:

- How many days a week can I strength train?
- How much time do I have each strength training session?
- Do I want to do full body workouts or split body workouts?

Answering these questions will help you properly group specific exercise categories as well as select the proper amount of categories per workout. For example, if I answer the three questions as follows:

- I can train 3 days per week.
- I have 60 minutes each day to strength train.
- I want to work the entire body each training session.

I now have enough information to organize exercise categories and build my workout templates. One hour is a reasonable amount of time to organize to complete a strength training session. Typically, I spend 15 minutes on a warmup, leaving approximately 45 minutes to strength train. Understanding this time constraint, I generally plan to complete four different exercises during a workout, which allows just over 10 minutes to be spent on each exercise. It is better to start out with fewer exercises when beginning a training program to allow more emphasis to be placed on proper technique and safety. Doing so will reduce the tendency of rushing just to make sure everything gets done. Using the information provided, workout templates can be organized to include both lower and upper body exercises each session.

Workout 1
Squat
Upper Body Vertical Pull
Single Leg Hip Hinge
Upper Body Vertical Push

Workout 2
Hip Hinge
Upper Body Horizontal Push
Split Squat/Lunge
Upper Body Horizontal Pull

In this case, I decided to make two workouts. Some of you reading this may be thinking, "but I thought he was training 3 days per week?" That is true; one of the workouts is repeated each week. I find that with novice individuals, keeping things simple and not introducing too much variety improves exercise performance. How to structure movement categories within each workout can vary. For the workout examples above, I chose to alternate between lower and upper body movements. In addition, it is common to place movements that require large amounts of muscle (exercises that you use the most weight) early in the workout. Now all that is left to do is select exercises that fit into the categories and prescribe sets and reps. Details on how to do this will be discussed in a future article.

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