**Lead Presenter name, credentials, email**

* + Lead presenter name, credentials
	+ email

**Additional presenters, credentials**

* Presenter 2 name, credentials
* Presenter 3 name, credentials

**Session Title**

* Enhancing Explosive Abilities– Applying the Principles of Rate of Force Development and Impulse in the Athlete’s Clinical Assessment, Rehabilitation, and Training

**Session Description**

Much literature exists regarding lower extremity training and testing for various physical qualities. Explosive strength (i.e., power) metrics such as rate of force development (RFD) and impulse have become increasingly popular topics of discussion as many athletic endeavors involve applying force quickly to the ground surface area with ground contact times measured at a fraction of a second. Additionally, common injuries such as ankle sprains and anterior cruciate ligament (ACL) injuries may occur within 50ms of initial ground contact. Deficits in RFD have been documented in individuals with various injuries and conditions such as ACL reconstruction, patellofemoral pain, Achilles tendinopathy, and hamstring strains. However, literature is limited for the training and testing of RFD and impulse in the rehabilitation setting. Although reliably assessing these metrics is not readily available in most clinical settings, understanding the training principles and force profiles of various forms of explosive exercise allows clinicians to address potential deficits in a safe and logical manner. Data from available research will be translated to clinically applicable approaches for progressing interventions to maximize adaptations of RFD and impulse. Recognizing the barriers to quantitative assessments, task-oriented clinical assessments will be discussed along with program design considerations as well as various interventions to improve lower extremity RFD and impulse performance.

**Course Objectives**

1. Understand the background and importance of RFD and impulse to athletic tasks
2. Recognize current methods of explosive strength assessment and limitations in the clinical setting
3. Incorporate the available data from the literature to assist in the critical thinking and clinical application of RFD and impulse training progression
4. Utilize task-based assessments to guide potential training interventions and rehabilitation/training progress
5. Develop and implement appropriate rehabilitation/training program designs to enhance RFD and impulse

**References**

1. Andersen LL, Aagaard P. Influence of maximal muscle strength and intrinsic muscle contractile properties on contractile rate of force development. *Eur J Appl Physiol*. 2006;96(1):46-52. doi:10.1007/s00421-005-0070-z
2. Knudson D V. Correcting the use of the term “power” in the strength and conditioning literature. *J Strength Cond Res*. 2009;23(6):1902-1908. doi:10.1519/JSC.0b013e3181b7f5e5
3. Maestroni L, Read P, Bishop C, Turner A. Strength and power training in rehabilitation: Underpinning principles and practical strategies to return athletes to high performance. *Sport Med*. 2020;50(2):239-252. doi:10.1007/s40279-019-01195-6
4. Maffiuletti NA, Aagaard P, Blazevich AJ, Folland J, Tillin N, Duchateau J. Rate of force development: physiological and methodological considerations. *Eur J Appl Physiol*. 2016;116(6):1091-1116. doi:10.1007/s00421-016-3346-6
5. Nunes GS, Barton CJ, Serrão FV. Hip rate of force development and strength are impaired in females with patellofemoral pain without signs of altered gluteus medius and maximus morphology. *J Sci Med Sport*. 2018;21(2):123-128. doi:10.1016/j.jsams.2017.05.014
6. Taber C, Bellon C, Abbott H, Bingham GE. Roles of maximal strength and rate of force development in maximizing muscular Ppower. *Strength Cond J*. 2016;38(1):71-78. doi:10.1519/SSC.0000000000000193
7. Turner AN, Comfort P, McMahon J, et al. Developing powerful athletes Part 2: Practical applications. *Strength Cond J*. 2021;43(1):23-31. doi:10.1519/SSC.0000000000000544
8. Turpeinen J-T, Freitas TT, Rubio-Arias JÁ, Jordan MJ, Aagaard P. Contractile rate of force development after anterior cruciate ligament reconstruction-a comprehensive review and meta-analysis. *Scand J Med Sci Sports*. 2020;30(9):1572-1585. doi:10.1111/sms.13733

**Desired conference**

* Fall 2022

**Suggested session length**

* 75 minutes

**Practice areas and settings**

* Orthopedics
* sports