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FRIENDS OF NVT

OFFICIAL NEWSLETTER OF INNEURACTIVE

INTRODUCTION

Welcome to the sixth issue of Volume 8 of our Friends of NeuroVisual Training Newsletter, where we aim to provide you with the latest news and insights regarding NVT! Our goal is to help you understand how NVT can prevent injuries, facilitate rehabilitation, and enhance overall performance. We also provide no-cost actionable instructions to incorporate into your training, practice, and/or general everyday routine.

In this issue, our feature content reviews an article on visual risk factors of ACL injury of the knee joint.

Additionally, for our How-To section, we will be providing instructions on how to design an NVT program that may decrease the risk of lower extremity non-contact injuries.

We hope you enjoy reading this issue and continue to support us in our mission to promote the benefits of NeuroVisual Training.

If you missed an issue, please visit https://inneuractive.com where all issues are available for free. Please tweet and share with your friends as we plan to release more great content. @FriendsofNVT.

WHAT'S IN OUR LATEST ISSUE:

@FriendsofNVT

Analysis of Visual Risk Factors of ACL Injury of Knee Joint

Among athletes, an ACL (anterior cruciate ligament) injury is one of the most common sports injuries, accounting for 50% of knee injuries (Chen et al., 2022). Furthermore, ACL injuries leave athletes with both long-term and short-term effects and often require surgery. Short-term impacts include ligament surgery and rehabilitation training. Long-term effects may include an increased risk of knee osteoarthritis and disability. The number one predictive factor for an ACL injury is the history of a first ACL injury. There are those who suggest that the return to play decision on all ACL reconstructive (ACLR) surgery patients be two years post ACLR. Currently most ACLR decision metrics include things like symmetric quad strength, which has little to do with the ACL or the knee mechanics of the TWO knees at risk for injury. What is needed is a method to better characterize the knees and the risk of the ACL injury including the brain's ability to control the knees at risk of ACL injury.

Chen et al. divided the risk factors for ACL injury into external and internal factors. External factors include those related to the athlete's physical condition, environmental factors, and sports-specific factors. On the other hand, internal factors encompass demographic, physiological, neuromuscular, joint, and bone risk factors. Additionally, the athlete's motor and balance function play a significant role in their ability to modulate their balance and gait speed. Linking the brain and body axis, recent studies have indicated that people with poorer vision have decreased postural stability. Fortunately, vision training can enhance stability and visual motor reaction times, which in turn improve balance, ultimately helping to prevent ACL injuries.

Given the prevalence of ACL injuries in athletes, the economic toll of ACL injuries, and the lack of literature surrounding brain and visual factors' influence on ACL injuries, the authors sought to explore the numerous risk factors surrounding ACL injuries (Chen et al., 2022).

Dr. Chen and his team utilized a questionnaire-type survey to investigate the external and internal factors of patients who suffered an ACL injury and met the inclusion criteria, as well as the control group whose members had no history of knee injury. In addition to the questionnaire, all study participants underwent a visual examination using a synoptophore by an ophthalmologist. Details regarding "dominant eye, pupil distance, binocular vision, subjective and objective oblique angle of view, fusion range, and stereo visual sensitivity" were collected (Chen et al., 2022).

Initial data from the questionnaire revealed a strong correlation between strabismus and rapid redirection (injury action such as quickly turning). However, these findings were inconsistent and may reflect personal bias due to the subjective responses of the participants. Given the researchers were using the questionnaire responses to establish whether participants had strabismus, the researchers found the results to be inconsistent (Chen et al., 2022). Low vision fusion range also had a correlation with ACL injury risk. It is interesting to note that athletes with a low vision fusion range had an increased risk of both contact and non-contact ACL injuries (Odds Ratio = 13.208). Thus, they may have an increased risk of injury from rapid redirection or abrupt stops on hard floors on cloudy days (Chen et al., 2022). This deficit is of concern because fusing the image is a cortical task that is essential in gauging one's surroundings. When an athlete's fusion range is decreased, they are more likely to suffer from an ACL injury, per Chen's conclusions. Our "How To" below details methods for improving visual fusion range and preventing ACL injury.

While the authors did not find a direct correlation between abnormal vision and ACL sports injury, they note that vision and visual fusion range are related in that fusion range is closely related to ametropia, a condition in which an image does not focus due to a refractive abnormality. Thus, there is a connection between visual factors and ACL injury risk.

Dr. Chen and his team also note that hard floors are more likely to cause ACL sports injury due to the nature of ACL injuries and the loading effect of shear force on the joint. As for weather, cloudy conditions entail variable amounts of light distribution, which can negatively impact fusion and proprioception.

Overall, this study demonstrated a connection between visual factors and ACL injury risk. There appears to be a growing body of evidence that ACL injury, ACLR return to play and ACL reinjury may have risk factors concerning central (brain) related factors. Visual processing, reaction times and skeletal muscular control systems may need to be accounted for when assessing ACL risks and return to play. For Friends of NeuroVisual Training (@FriendsOfNVT), this study highlights the relationship between visual factors and sports injury.

References:

Chen, Z., Li, Y., Zhang, Y., Zhang, Z., Wang, J., Deng, X., Liu, C., Chen, N., Jiang, C., Li, W., & Song, B. (2022, September 23). *Analysis of visual risk factors of anterior cruciate ligament injury of Knee Joint*. Journal of clinical medicine. Retrieved April 20, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9573435/

“How To” – Designing an NVT Program That May Decrease the Risk of Lower Extremity Non-Contact Injury

NeuroVisual Training can do a lot to enhance peripheral vision, reaction time, and overall performance. There is also data suggesting that it may be effective in preventing injuries. In a previous article (V3I2), we discussed how NVT can decrease the incidence of concussions. There is a growing body of literature indicating that slower visual reaction times are associated with a higher risk of lower extremity injuries. While a definitive study demonstrating the risk reduction of lower extremity injuries after NVT is lacking, there are NVT tasks that might be able to reduce injury risk through reaction time training. In today's "How To" section, we will present some of these tasks, and you can decide for yourself if this is something to consider when contemplating methods to mitigate lower extremity injury.

Wilkerson et al. (https://tinyurl.com/y5csyfdt) have shown that slower reaction time is associated with a higher risk of lower extremity injury. Throughout our newsletters, we have discussed several performance enhancements that are relevant to visual reaction times, and we have shown that those reaction times can be improved with training. The Dynavision is an excellent eye-hand coordination task that has built-in programs such as the reaction test that can improve visual reaction time (V2I4). The theory is that if your reaction time is sufficiently rapid, you may be able to sense an injury risk situation and react quickly enough to prevent injury.

This could be a visual reaction or a sensory reaction, sensing the lower extremity. Because body position is often critical when a non-contact lower extremity injury occurs, we fully endorse doing the Dynavision and NVT with extrinsic stresses. Extrinsic stresses, such as being on a half-bosu, rhythmic stabilization, standing on one leg, one leg on an Aerex, and other activities, should be considered while doing the Dynavision or a pitch and catch activity such as the Marsden ball (V2I1, V6I4). The goal here is to increase the speed with which the lower extremity responds while working visual reaction times as well. Often, non-contact lower extremity injuries occur when a person is distracted with an upper extremity or visual activity. Therefore, this dual-task activity should be considered for injury risk mitigation.

We have also talked about peripheral vision concerning performance enhancement and injury prevention (V3I2), central and peripheral reaction time (V5I4), Pinhole peripheral sheets, and Hart chart peripheral reaction time (V5I4). Improving the speed of peripheral vision will also improve the reaction time to react to an injury risk situation. Therefore, the various peripheral vision activities can help improve reaction time and may decrease injury risk. We are not suggesting that these methods can prevent all lower extremity injuries. We are offering a possible mitigation strategy targeted at non-contact injuries of lower extremities.

The thesis here is that two major system failures occur leading to many non-contact lower extremity injuries. Failure 1 is when the body puts itself in a high-risk situation, such as a poor body position, and fails to sense the danger. The failure to sense the danger may be because the brain is focusing on other tasks. Failure 2 is when an injury risk situation is occurring because Failure 1 put the body in that situation, and the body fails to adjust quickly enough to avoid injury.

We suggest that dynamic exercises such as rhythmic stabilization and eye-hand tasks on an unstable platform will aid the body in better sensing the body position – better proprioception. The speed of reaction times (visual, central visual, eye-hand, peripheral visual) may provide a rapid enough response to prevent an injury risk situation and adjust the body position to avoid injury.

While much research is still needed to establish the role of NVT in preventing non-contact lower extremity injuries, the potential benefits of NVT in mitigating such injuries make it a promising avenue for further investigation.

Announcements

We have added a new comment section to the newsletter, the chat icon can be found to the right. We encourage you to ask questions and interact with the NVT community.

Tricerapro is on sale for a limited time, while supplies last for $35.00 plus S&H (normally > $60.00). If you are interested in trying 1 month supply of Tricerapro email clarkjf@gmail.com to place an order.

Looking to get started with NVT Training? Check out Inneuractive’s NVT Starter Pack! https://inneuractive.com/product/nvt-starter-kit-2/

As always, if you’re interested in learning more about Inneuractive our mission, our products and service offerings, or just Neuro-Visual Training in general, please click the following link: www.inneuractive.com.

Have suggestions for a future issue? Please reach out to clarkjf@gmail.com or info@inneuractive.com and we will do our best to include your request in the future.