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## Musician's Focal Dystonia: A Guide to Treatment and Prevention

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### Annotated Bibliography

The development of musician's focal dystonia has been directly correlated to dysfunctional or maladaptive brain plasticity. Neuroplasticity is the ability for the brain to alter itself over time in response to stimuli outside and inside the body. The acquisition of musical skill is completely dependent on the plasticity of the brain and the brain changes structurally because of this motor skill acquisition. While plasticity is required, the brain can become changed in incorrect and debilitating ways. Musician's focal dystonia is the result of a breakdown in the central nervous system specifically in the sensory cortex and the sensorimotor cortex of the brain. It causes task-related cramping or convulsion of specific muscles, usually painless, that can cause a musician to lose his or her ability to play entirely. Various treatment methodologies have been discovered and function with varying degrees of success, however a very small number of musicians ever return to full ability. Therefore, it is important to understand fully what causes dystonia to develop, and what can be done to prevent its development in order to ensure that one can have a long and fulfilling career in music, unaffected by this debilitating disorder.

Altenmüller, Eckart. "The End of the Song? Robert Schumann's Focal Dystonia." In *Music, Motor Control and the Brain*. 251-263. Oxford, United Kingdom: Oxford University Press, 2006.

Altenmüller presents Robert Schumann, the famous composer and once prolific pianist, as an early case study of focal dystonia in musicians. His career is discussed as well as the development of the condition which is documented in letters that he wrote and received. Altenmüller discusses some prominent risk factors that contribute to the development of focal dystonia, all of which can be displayed in Robert Schumann making him an exemplary example. Some of these factors include male gender (six times more likely than female gender), over practice leading to maladaptive brain plasticity, and certain personality traits including being a perfectionist and being prone to anxiety. While this essay focuses on a case of the development of focal dystonia, I believe that by examining these risk factors and the way they influenced Schumann, aspects of preventative therapy can be uncovered. By working to alleviate unhealthy perfectionism and anxiety surrounding music making and monitoring practice time with the intention to not over practice, risk of developing the condition should be reduced.

———, Sabine Schneider. "Planning and Performance." In *The Oxford Handbook of Music Psychology*. 332-343. Oxford, United Kingdom: Oxford University Press, 2009.

Altenmüller and Schneider examines the activities related to training in music such as practice and performance. They cover issues of how the brain acquires fine motor skill through the integration of repetitive practice leading to an uptake in neuroplasticity. They discuss research that concludes that the onset of focal dystonia can be caused by "reduced sensory perception and integration and impaired sensorimotor integration[, which] are mainly believed to originate from dysfunctional brain plasticity." It is concluded that overuse and fatigue can lead to a breakdown of these sensory and sensorimotor integration functions and that pushing through fatigue does not aid in development of fine motor skills and actually has a worsening effect on them. This shows that one of the most effective tools in the prevention of the development of focal dystonia is to structure practice in a way that promotes plasticity

to occur. This can be done through giving adequate rest time during practice, and not actively over practicing.

— — —, Eckart, and Hans-Christian Jabusch. "Focal Dystonia in Musicians: Phenomenology, Pathophysiology, Triggering Factors, and Treatment." *Medical Problems of Performing Artists* 25, no. 1 (March 2010): 3–9.

The article discusses the neurological reasons for the development of dystonia in musicians found in the other present articles. In this article, genetic predisposition to the development of dystonia is addressed. Additionally, several pharmacological treatments as well as retraining methods are discussed. It is found that greater success is to be had in tailoring treatment strategies to specific patients rather than using all-encompassing methods. Altenmüller and Jabusch discuss how only a small percentage of patients can find their way back to full playing ability and motor control with the therapies that are available at present. In this light, it is profoundly more important to instill good habits in practice early in life and continue to exercise those good habits in order to prevent dystonic development.

Byl, Nancy N., and Alberto Priori. "The Development of Focal Dystonia in Musicians as a Consequence of Maladaptive Plasticity: Implications for Intervention." In *Music, Motor Control and the Brain*. 293-307. Oxford, United Kingdom: Oxford University Press, 2006.

In this essay, Byl and Priori link the onset of focal hand and embouchure dystonia in musicians to maladaptive neuroplasticity. Byl and Priori state that "At least three specific training conditions must be met to drive large-scale cortical plasticity in sensorimotor control systems in the adult brain [which are learning, progressivity within learning, and repetition/effort]" (3-4). They go on to describe how the central nervous system was consistently degraded in test patients with focal dystonia, meaning that maladaptive neuroplasticity is directly related to the onset of the condition. This informs the conversation around this condition because any pharmacological treatment (such as botox injections) only serve to mask the problem and do not get to the heart of it. Emphasis is placed on first bringing the body into a state of good health where plasticity of the brain is most achievable and then focusing on therapy techniques that are in line with the three principles of brain plasticity listed above.

Pascual-Leone, Álvaro. "The Brain That Makes Music and Is Changed by It." In *The Cognitive Neuroscience of Music*. 396-409. New York, U.S.A.: Oxford University Press, 2003.

Pascual-Leone discusses the way the brain is structurally changed, especially in the sensory and sensorimotor cortexes, by the fine motor skill acquisition for tasks such as music production. He stresses that an important aspect in the development of dystonia is not only the length of practice (i.e. over practice syndrome) but also the type of movement used in that practice. He gives the example of the Russian vs. the German school of piano playing. It has been proven that dystonia is developed more often in players who use forceful bent fingers than in those that more lightly caress the keys. Here it is found again that by learning about the biology of the brain as it relates to music practice, practice can be structured in a way that limits the potential development of faulty movement patterns and maladaptive brain plasticity, in order to prevent the onset of focal dystonia.

Stuart, Gregory W. "A Percussionist's Practice." DMA diss, University of California, San Diego, 2009.

Stuart describes his personal development of focal dystonia in his left hand as a percussionist. While in school, he started to notice a pain in a few of the fingers of his left hand. His initial reaction was to see a doctor who diagnosed him with overuse syndrome. However, even after giving his body much rest and recovery time the problem persisted and worsened. He describes an erosion that seemed to take place as he was able to simultaneously become a more virtuosic and less rooted player. He describes being able to progress into very difficult repertoire while also being unable to control his hand while playing a rudimentary exercise he learned at age twelve. This self-described erosion is an example of the effects that maladaptive brain plasticity can have on the central nervous system. It further shines a light on the necessity of practicing smarter not harder. Stuart states that at the time he started to experience symptoms he was practicing many hours per day with limited breaks. This is likely one of the main contributing factors of his development of the disorder. Here again, practicing with holistic health in mind becomes an increasingly important factor in reducing chances of developing dystonia.