Performance InMotion
Enhancing The Movement System

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Winning the War Against Tissue Stress

It was an honor to attend the 30th Olympic games of the modern era in London, England as a Performance Physical Therapist and a member of the support team for several individual athletes, including now current bronze medalist, current World Champion, and former Olympic Gold Medalist (2004) in the Men's Hammer Throw event, Koji Murofushi. In August of 2011, in Daegu, South Korea, Koji bounced back from a career hampered with various injuries to become the oldest athlete ever to win a gold medal in the Track & Field World Championships. Winning the bronze in the recent London games a year later proved that his 2011 win was no fluke and is a tribute to Koji's fervent work ethic, his commitment to taking care of his body, and his meticulously designed and executed training program leading up to his competition.

As with all athletes, preparing for one's lifelong dream of competing on the world stage at the Olympic games is a constant battle for the body against the intense rigors of training. After all of the stress that each athlete's tissues endure throughout their journey to the games, it is a victory in itself for each individual that steps into the arena for the Opening Ceremony itself. This is especially true as an older athlete in his fourth Olympic games.

In their 2002 commentary, Mueller and Maluf introduce the *Physical Stress Theory*[1], which provides an illustration of how all of the tissues in the body respond in a predictable way to the relative physical stress that is placed on it. They propose that all biological tissues exhibit five adaptive responses to physical stress: Death, Decreased tolerance, Maintenance, Increased tolerance, Injury, and once again, Death (see Fig 1), and a threshold exists between each response depending on the level of stress the tissue endures. They also explain how these thresholds can

change as the body is allowed time to adapt or recover from the stress that is placed on it (see Fig 2).

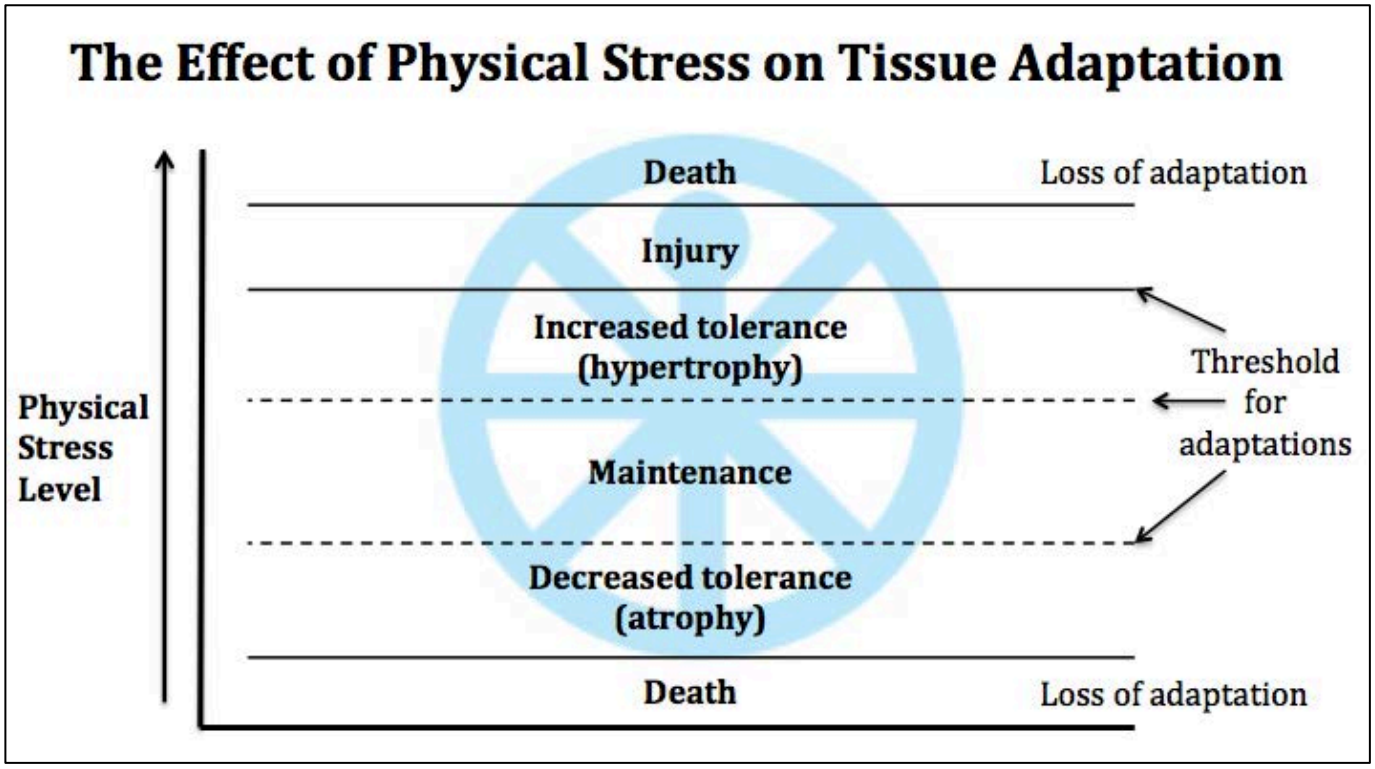

Fig 1 – The effect of physical stress on tissue adaptation- from the *Physical Stress Theory*[1]

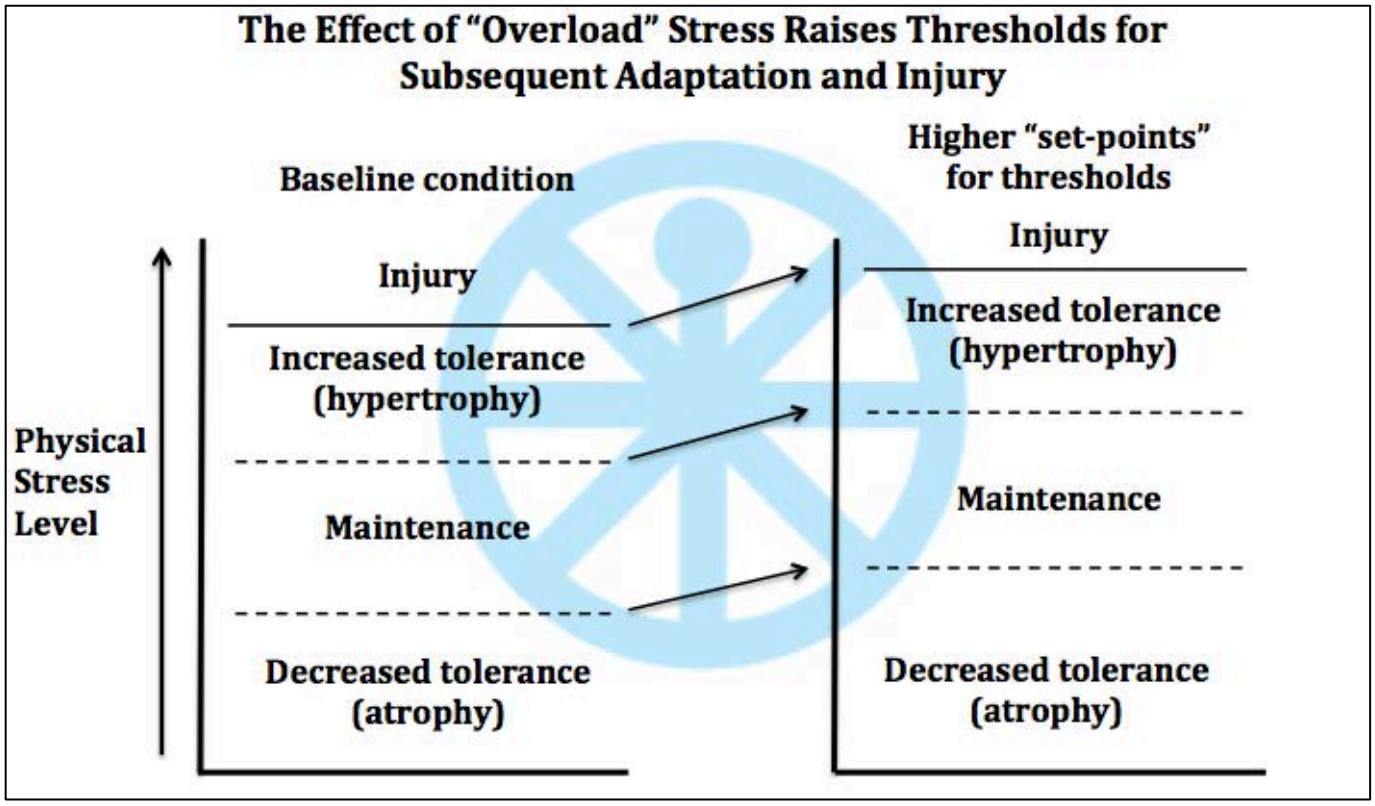

Fig 2 – The Effect of "Overload" stress raises thresholds for subsequent adapatation to injury[1]

The *Physical Stress Theory* provides a great illustration for the challenge faced by all athletes training at the highest level on the road to a competition such as the Olympics as their bodies wage a continual war against the physical stress placed upon with each workout, repetition, and preliminary competition. Those who are able to train and compete staying under the threshold between "increased tolerance" and "injury" and allow for their bodies to recover appropriately and subsequently adapt to the stress placed on it will succeed and march into the stadium to compete, while those who do not may not have been able to reach their final destination of the London games, let alone win a medal.

Being an older athlete with a history of musculoskeletal injuries, Koji's thresholds from one tissue response to another was lower and his ability to adapt these thresholds between loads was less than the average Olympian. On the road to London, as a team, specific measures were taken to ensure that we stayed below his tissue's injury threshold. A few of these key measures included:

Minimizing the stress placed on the tissues through emphasizing proper movement

In her book, *Diagnosis and Treatment of Movement Impairment Syndromes*, Shirley Sahrmann PT, PhD, FAPTA, states that the sustained postures and repetitive movements that we go through from day to day result in tissue adaptations and our bodies developing a susceptibility to move in specific directions.[2] For example, an office worker who sits slouched in a chair all day in a state of lumbar flexion will develop a susceptibility towards this movement over the course of time. When that individual forward bends to pick up something from the floor, he will in turn move right into lumbar flexion to do so. This repetitive, impaired movement places excessive stress on certain tissues of that individual's body (ie – the intervertebral discs), without allowing for proper time to adapt, eventually resulting in injury. Dr. Sahrmann has clearly identified and described these specific directional susceptibilities of movement into what are known as *Movement System Syndromes*.[2]

From our first Physical Therapy evaluation over two years ago, Koji and I have worked to identify and correct his underlying *Movement System Syndromes*. Everything from his warm-up to his performance training program has been designed with this in mind. This has allowed him to not only avoid injury by placing less unnecessary physical stress on his body during his training, but we feel it has increased his performance capacity, allowing him to train harder, move more efficiently, and as a result, throw farther.

Allowing for recovery time in the training schedule

As mentioned earlier in the *Physical Stress Theory*, the body adapts to the physical stresses placed on it, however, it needs time to do so. Because stress on each tissue of our body accumulates with each consecutive training session, it is imperative that we respect the detrimental effect it can have on not only our physical, but our mental condition, and make it a priority to schedule in specific days in one's training for *Regeneration.*

In his book, *Core Performance*, Mark Verstegen promotes the idea that "Work + Rest = Success."[3] This is a common theme we have kept throughout Koji's training regimen over the past two years, consistently scheduling in regeneration days and taking them just as serious as his training days. Especially being an older, very experienced athlete, it was clear that some weeks he benefitted more from his regeneration days than his heavy training days.

Take measures to stimulate faster tissue recovery

Throughout the past few years, Koji and I have continually evolved in the measures we utilize to facilitate his body's ability to recover from the physical rigors of his training. We consistently utilize dry needling and vacuum therapy through the Integrative Systemic Dry Needling approach developed by Dr. Yun-Tao Ma and feel that it has been a modality that has been instrumental in stimulating Koji's healing response to physical stress.[4] In addition, I also regularly utilize tool-assisted soft tissue techniques (ASTYM), manual release techniques, and multiple elements of the Dynamic Neuromuscular Stabilization approach developed from Dr. Pavel Kolar of

the Prague School of Rehabilitation.[5] The impact of emphasizing proper nutrition and fueling throughout Koji's training cannot be overstated as well.

Over the last year, I have also been able to integrate the MR4Activ Laser from Multi Radiance Medical into my arsenal as a Physical Therapist on Koji's support team. Because of its portability, it has been easy to keep with me on the road and has been a "go to" modality in instances of acute muscle strains[6] or local inflammation[7].

As always, it is very gratifying to leave a competition with a medal in hand, and as a part of Koji Murofushi's support team, this past Olympic games in London was no exception as he brought home a bronze to his country of Japan. However, the journey to get him there competing at the highest level on that special stage, was the best part of it all. So much goes in to each athlete's preparation as they fight through aches, pains, injuries, fatigue and whatever else the physical stress of training throws their way. I look forward to learning of more and more strategies I can utilize as a Performance Physical Therapist to assist my athletes in achieving their goals and winning their personal "wars" against tissue stress.

References

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