



Warriors Versus Worriers and Return to Sports

Returning to sports after ACL surgery requires time for the new ligament to mature and get strong. In addition, muscle strength and power and neuromuscular coordination need to be restored. Each of these factors may need at least 9-12 months to be at relatively safe levels. A fourth factor, the psychological readiness to return to sports, can often take longer than the 9-12 months.

The psychological readiness can be influenced by the other factors. If an athlete feels weak and uncoordinated, they often (but not always) feel like they are not ready from a psychological standpoint to return to competition. How an athlete handles stress can affect their psychological readiness.

Enter the **COMT** gene, or the Warrior/Worrier gene. The COMT gene provides the code for making the enzyme **Catechol-O-Methyl Transferase (COMT)**. COMT enzyme breaks down the catecholamine neurotransmitter dopamine (along with epinephrine and norepinephrine) in the prefrontal cortex of the brain. The prefrontal cortex is the part of the brain responsible for executive function which includes decision making, problem solving, self-control, working memory, and planning. The prefrontal cortex performs it's best when dopamine levels are maintained in a certain range; too high or too low and executive function declines. Stress increases dopamine levels in the brain and COMT breaks down the dopamine to try and maintain the optimal level.

The warrior versus worrier concept is based on the type of COMT enzyme found in each individual. Each enzyme is comprised of a pair of subunits. These subunits can have either a methionine (Met) amino acid in their structure or a valine (Val) amino acid. Our genetic code, that we inherit from both parents, determines which combination of subunits we end up with. The possible subunit combinations for the COMT enzyme are Met/Met, Val/Val, or Met/Val. The Met form of COMT has a lower activity level for breaking down dopamine compared to the Val form. Val/Val has 3-4 times greater COMT activity as compared to Met/Met. The Val/Met heterozygote has intermediate levels of COMT activity. This means that the Val/Val types will break down dopamine faster than the Met/Met types. During relatively calm times, dopamine is being produced in small amounts and the slower Met forms will do a better job at maintaining the dopamine levels in the optimal range. The Val forms may clear out the dopamine too quickly, resulting in dopamine levels dropping below optimal. In times of stress, dopamine levels may surge and the Val forms will be better at maintaining optimal dopamine levels.

As you might surmise, those individuals with the Val/Val COMT are the “warriors” and those with the Met/Met COMT are the “worriers”, and those with a combination of Val/Met are somewhere in between in their response to stress. Approximately 25% of the population is either Val/Val or Met/Met and 50% is a combination (Val/Met). In a large group of athletes (like a college football team) there will be a wide range of how athletes handle stress.

There can be advantages and disadvantages for either type

From a practical standpoint, the Val/Val types (“Warriors”) perform better under stress. Because Warriors break down dopamine quickly, they need some stress in their life just to keep dopamine levels elevated to the optimum level. They may have an advantage in rapidly processing stressful stimuli. The Met/Met types (“Worriers”) need ways to decrease stress and decrease dopamine to the correct levels. Worriers have an advantage on tasks that require memory, complex planning and sustained attention. However, all of these responses to stress are also moderated by factors such as age, gender, ethnicity, and adverse life events (like an ACL injury).

Back to return to play after ACL surgery

Specific points need to be addressed for the return to sports after ACL surgery: time for graft maturation, muscle strength, neuromuscular coordination and psychological readiness.

The Warrior-type may need the stress of competition to feel complete and may try to push to return to sports sooner than they are physically ready. For them, the sports are more important than the possible adverse consequences. The warrior athlete needs to be educated about the risks of early return. The education process needs to begin soon after the first diagnosis of the injury and repeated throughout the recovery process giving the athlete time to absorb the information. Parents of younger athletes need to step up and help protect their children from ill-advised decisions.

During the rehab process, the Warrior may be less pain sensitive than the Worrier and ends up pushing through pain that ultimately delays the overall progress. Again, early education helps the Warrior understand that pain will slow progress and potentially delay the return to sports. Warriors may need progressive short-term goals (challenges) to induce a reasonable amount of stress. More challenging tasks are also good for the Warrior.

The Worrier-type athlete does not want to get re-injured. It is important that these athletes understand that almost all athletes experience some degree of apprehension about returning to play. It is normal to be nervous. Worriers tend to do better when they are put in control of the situation. A well-planned progression in the rehab process can help the Worrier have less anxiety. Experience, or consistent exposure, will help slowly build confidence

The Worrier tends to be more pain-sensitive than the Warrior. The advantage here is that the Worrier will speak up before a problem gets worse. Assuring the Worrier that certain amounts and types of pains are normal can help alleviate stress. Also, exercises can be modified to minimize pain. The Worrier can also do more challenging tasks and have short-term goals, but these need to be worked on more gradually.

The Warrior/Worrier mix gets to feel all of the advantages and disadvantages of each singular type. Different environments and experiences will help shape your responses.

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