McLean SA, Diatchenko L, Lee YM, Swor RA, Domeier RM, Jones JS, Jones CW, Reed C, Harris RE, Maixner W, Clauw DJ, Liberzon I

BACKGROUND FROM DAN MURPHY

In non-chiropractically treated whiplash-injured patients, approximately 40% develop chronic symptoms. Many of these patients also have an abnormal psychological profile. There is persistent controversy as to:

- Does chronic musculoskeletal pain cause an abnormal psychological profile?  
- Or  
- Does an abnormal psychological profile cause chronic musculoskeletal pain?  
- Or

Is there another unifying explanation for both phenomenon?

KEY POINTS FROM THIS ARTICLE:

1) “Musculoskeletal neck pain development after motor vehicle collision (MVC) is an international public health problem.”

2) Catechol O-methyltransferase (COMT) enzyme “is the primary enzyme which degrades catecholamines, including epinephrine, norepinephrine, and dopamine.”

3) Genetic variations in the catechol-o-methyltransferase (COMT) gene have been associated with “risk of chronic pain development, but no studies have examined genetic predictors of neck pain intensity and other patient characteristics after motor vehicle collision (MVC).”

4) This study evaluated the association between COMT genotype and acute neck pain intensity and other patient characteristics in 89 individuals presenting to the emergency department after MVC.

5) In the emergency department in the hours after MVC, individuals with a COMT pain genotype were more likely to report:

- moderate to severe musculoskeletal neck pain (76% vs. 41%)
- moderate or severe headache (61% vs. 33%)
- moderate or severe dizziness (26% vs. 12%)
<table>
<thead>
<tr>
<th></th>
<th>YES COMT Pain Gene</th>
<th>NO COMT Pain Gene</th>
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<tbody>
<tr>
<td>Mod-Severe MS Pain</td>
<td>76%</td>
<td>41%</td>
</tr>
<tr>
<td>Mod-Severe Headache</td>
<td>61%</td>
<td>33%</td>
</tr>
<tr>
<td>Mod-Severe Dizziness</td>
<td>26%</td>
<td>12%</td>
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6) Individuals with COMT pain genotype also experienced more dissociative symptoms, took twice as long for physical recovery, and a longer time for emotional recovery.

7) “These findings suggest that genetic variations affecting stress response system function influence the somatic and psychological response to MVC, and provide the first evidence of genetic risk for clinical symptoms after MVC.”

8) “Soft tissue damage is difficult to directly assess, and therefore crash characteristics (e.g. direction of collision, severity of vehicle damage, presence/location of headrest) have been used as indirect measures of mechanical force experienced by neck tissues during the collision. However, such crash characteristics are poor predictors of pain outcomes.”

9) “In addition to exposing soft tissues to biomechanical stress, a MVC is also a potent stressor.” This increases the production of sympathetic catecholamines epinephrine and norepinephrine.

10) “Acute stressors activate the sympathetic nervous system and adrenomedullary hormonal system, resulting in the release of epinephrine and norepinephrine.”

11) “Sympathetic activation may contribute to pain development via mechanisms both independent from and interactive with pain mechanisms related to tissue injury and inflammation. Such adrenergic mechanisms may influence the development of neck pain symptoms after MVC.”

12) “Genetic variations affecting the function of important adrenergic system components may contribute to individual variation in vulnerability to musculoskeletal pain symptoms after MVC.”

13) The COMT gene has been associated with pain sensitivity and with vulnerability to both chronic pain and anxiety disorders.

14) Individuals with a COMT pain genotype have relatively high catecholamine levels and experience more intense post-MVC neck pain, as well as headache, dizziness, and anxiety.

15) 40% of participants had a COMT pain genotype. [It is interesting that this is the approximate percentage of individuals who suffer chronic pain after being injured in a MVC].
16) A significant association was observed between having a COMT pain vulnerable genotype and moderate or severe headache (61% vs. 33%) and moderate or severe dizziness (26% vs. 12%).

17) A significant association was observed between COMT pain vulnerable genotype and increased dissociative symptoms.

18) COMT genotype predicted acute somatic and psychological symptoms after motor vehicle collision injury.

19) “The association between COMT pain vulnerable genotype and moderate or severe emergency department neck pain remains when stratified by crash type.”

20) Individuals with a COMT genotype are at “increased risk of chronic pain.”

21) “Individuals with a COMT pain vulnerable genotype experience more intense acute pain and somatic symptoms after a collision.”

22) “Because of increased initial symptoms, individuals with a COMT pain vulnerable genotype may also be more likely to seek emergency department care after MVC.”

23) “Improved understanding of biological processes contributing to post-MVC symptom development may also reduce the stigma that is unfortunately still commonly experienced by individuals developing pain and psychological symptoms after MVC.”

24) The association of COMT genotype with pain symptoms, psychological symptoms, and recovery beliefs exemplifies the pleiotropic effects of stress-related genes which may provide the biological substrate for the biopsychosocial model of post-MVC pain.”

COMMENTS FROM DAN MURPHY

It has been know since the clinical investigations and writings of Princeton physiologist Irvin Korr, PhD, that segmental spinal dysfunctions (subluxations) result in increased production of the catecholamines epinephrine and norepinephrine.

Increased production of the catecholamines epinephrine and norepinephrine alter the threshold of the pain afferents, increasing the severity and duration of the pain experience.

The body has an enzyme (COMT) that metabolizes the catecholamines epinephrine and norepinephrine, reducing pain. The amount of CMOT enzyme an individual has is genetically determined. This creates a genetic biological reason for why some individuals experience heightened or prolonged pain following a traumatic event.
It is known that chiropractic spinal adjusting inhibits the sympathetic production of the catecholamines epinephrine and norepinephrine.  
(Article Review #05-03; Article Review #21-03)

This article indicates that the COMT metabolism of the sympathetically derived catecholamines epinephrine and norepinephrine reduces pain perception. I would also suggest chiropractic spinal adjusting reduces the production of the catecholamines epinephrine and norepinephrine, thereby reducing pain.

There are studies that show that chronic whiplash patients experience significant improvement in their chronic pain following chiropractic spinal adjusting.  
(Article Review #45-99; Article Review #40-07)