
This is a general list of Risk Factors for Acute and Chronic Injury Post Motor Vehicle Trauma.

Acute Risk Factors:

1) Female sex

- Berglund A, Alfredsson L, Jensen I, et al. Occupant- and crash-related factors associated with the risk of whiplash injury. *Ann Epidemiol* 2003;13:66-72.
- Borchgrevink GE, Lereim I, Royneland L, et al. National health insurance consumption and chronic symptoms following mild neck sprain injuries in car collisions. *Scand J Soc Med* 1996;24:264-71.
- Brault JR, Wheeler JB, Siegmund GP, et al. Clinical response of human subjects to rear-end automobile collisions. *Arch Phys Med Rehabil* 1998;79:72-80.
- Bylund PO, Bjornstig U. Sick leave and disability pension among passenger car occupants injured in urban traffic. *Spine* 1998;23:1023-8.
- Cappon H, van Ratingen M, Wismans J, et al. Whiplash injuries, not only a problem in rear-end impact. . Proceedings 18th International Technical Conference on the Enhanced Safety of Vehicles (ESV). Nagoya, Japan, 2003.
- Chapline JF, Ferguson SA, Lillis RP, et al. Neck pain and head restraint position relative to the driver's head in rear-end collisions. *Accid Anal Prev* 2000;32:287-97.
- Dolinis. Risk factors for 'whiplash' in drivers: a cohort study of rear-end traffic crashes. *Injury* 1997;28:173-9.
- Giguere JF, St-Vil D, Turmel A, et al. Airbags and children: a spectrum of C-spine injuries. *J Pediatr Surg* 1998;33:811-6.
- Hell W, Hopfl F, Langweider K, et al. Cervical spine distortion injuries in various car collision directions and injury incidence of different car types in rear-end collisions. International IRCOBI Conference on the Biomechanics of Impact. Lisbon, Portugal, 2003:193-206
- Mayou R, Bryant B. Outcome of 'whiplash' neck injury. *Injury* 1996;27:617-23.
- Morris A, Thomas P. Neck injuries in the UK co-operative crash study. 1996;SAE 962433:317-29.
- Satoh S, Naito S, Konishi T, et al. An examination of reasons for prolonged treatment in Japanese patients with whiplash injuries. *J Musculoskel Pain* 1997;5:71-84.
- Temming J, Zobel R. Frequency and risk of cervical spine distortion injuries in passenger car accidents: significance of human factors data. International IRCOBI Conference on the Biomechanics of Impact. Göteborg, Sweden, 1998:219-33.
- Van den Kroonenberg A, Phillipens H, Cappon J, et al. Human head-neck response during low-speed rear end impacts. Proceedings of the 42nd Stapp Car Crash Conference, 1998:207-21.

2) Females weighing less than 130 lb in frontal crashes

- Banks R, Martini J, Smith H, et al. Alignment of the lumbar vertebrae in a driving posture. *J Crash Prevention and Injury Control* 2000;2:123-30.

3) History of neck injury

- Dolinis. Risk factors for 'whiplash' in drivers: a cohort study of rear-end traffic crashes. *Injury* 1997;28:173-9.
 - Jakobsson L, Norin H, Isaksson-Hellman I. Parameters influencing the risk of AIS 1 neck injuries in frontal and side impacts. Proceedings. International Research Council on the Biomechanics of Impact (IRCOBI) Conference. Montpellier, France, 2000.
- 4) Head restraint below head's center of gravity (males and females); large topset
- Chapline JF, Ferguson SA, Lillis RP, et al. Neck pain and head restraint position relative to the driver's head in rear-end collisions. *Accid Anal Prev* 2000;32:287-97.
- 5) History of CAD injury
- Khan S, Bannister G, Gargan M, et al. Prognosis following a second whiplash injury. *Injury* 2000;31:249-51.
- 6) Poor head restraint geometry/tall occupant (e.g., 80th percentile male)
- Ono K, Kanno M. Influences of the physical parameters on the risk to neck injuries in low impact speed rear-end collisions. *Accid Anal Prev* 1996;28:493-9.
 - Viano D. Head restraint position during normal driving: implication to neck injury risk in rear crashes. *Accid Anal and Prev* 1996;28:665-74.
- 7) Rear vs. other vector impacts
- Berglund A, Alfredsson L, Jensen I, et al. Occupant- and crash-related factors associated with the risk of whiplash injury. *Ann Epidemiol* 2003;13:66-72.
 - Borchgrevink GE, Lereim I, Royneland L, et al. National health insurance consumption and chronic symptoms following mild neck sprain injuries in car collisions. *Scand J Soc Med* 1996;24:264-71.
 - Borchgrevink GE, Stiles TC, Borchgrevink PC, et al. Personality profile among symptomatic and recovered patients with neck sprain injury, measured by MCMI-I acutely and 6 months after car accidents. *J Psychosom Res* 1997;42:357-67.
 - Bourbeau R, Desjardins D, Maag U, et al. Neck injuries among belted and unbelted occupants of the front seat of cars. *J Trauma* 1993;35:794-9.
 - Bylund PO, Bjornstig U. Sick leave and disability pension among passenger car occupants injured in urban traffic. *Spine* 1998;23:1023-8.
 - Foret-Bruno J, Dauvilliers F, Tarriere C. Influence of the seat and head rest stiffness on the risk of cervical injuries. 13th International Technical Conference on Experimental Safety Vehicles, S-8-W-19, 1991:968-74.
 - Krafft M. A comparison of short- and long-term consequences of AIS 1 neck injuries, in rear impacts. International IRCOBI Conference on the Biomechanics of Impact. Goteborg, Sweden, 1998:235-48.
 - Magnusson T. Extracervical symptoms after whiplash trauma. *Cephalalgia* 1994;14:223-7; discussion 181-2.
 - Morris A, Thomas P. Neck injuries in the UK co-operative crash study. 1996;SAE 962433:317-29.
 - Richter M, Otte D, Pohlemann T, et al. Whiplash-type neck distortion in restrained car drivers: frequency, causes and long-term results. *Eur Spine J* 2000;9:109-17.
 - Serra LL, Gallicchio B, Serra FP, et al. BAEP and E.M.G. changes from whiplash injuries. *Acta Neurol (Napoli)* 1994;16:262-70.

- Temming J, Zobel R. Frequency and risk of cervical spine distortion injuries in passenger car accidents: significance of human factors data. International IRCOBI Conference on the Biomechanics of Impact. Göteborg, Sweden, 1998:219-33.

8) Use of seat belts/shoulder harness (i.e., standard three-point restraints)

- Borchgrevink GE, Lereim I, Royneland L, et al. National health insurance consumption and chronic symptoms following mild neck sprain injuries in car collisions. Scand J Soc Med 1996;24:264-71.
- Evans E. Safety-belt effectiveness: the influence of crash severity and selective recruitment. Accid Anal and Prev 1996;28:423-33.
- Kallieris D, Mattern R, Miltner E. Considerations for a neck injury criterion, SAE 912916. Proceedings of the 35th Stapp Car Crash Conference, Society of Automotive Engineers. Detroit, MI, 1991:401-15.
- Lange JE, Voas RB. Nighttime observations of safety belt use: an evaluation of California's primary law. AJP 1998;88:1718.
- Morris A, Thomas P. Neck injuries in the UK co-operative crash study. 1996;SAE 962433:317-29.
- Richter M, Otte D, Pohlemann T, et al. Whiplash-type neck distortion in restrained car drivers: frequency, causes and long-term results. Eur Spine J 2000;9:109-17.
- Satoh S, Naito S, Konishi T, et al. An examination of reasons for prolonged treatment in Japanese patients with whiplash injuries. J Musculoskel Pain 1997;5:71-84.
- Versteegen GJ, Kingma J, Meijler WJ, et al. Neck sprain in patients injured in car accidents: a retrospective study covering the period 1970-1994. Eur Spine J 1998;7:195-200.

9) Body mass index/head neck index (i.e., decreased risk with increasing mass and neck size)

- Freeman MD, Croft AC, Rossignol AM, et al. Chronic neck pain and whiplash: A case-control study of the relationship between acute whiplash injuries and chronic neck pain. Pain Res Manag 2006;11:79-83.
- van den Kroonenberg A, Phillipens H, Cappon J, et al. Human head-neck response during low-speed rear end impacts. Proceedings of the 42nd Stapp Car Crash Conference, 1998:207-21.

10) Out-of-position occupant (e.g., leaning forward/slumped)

- Foret-Bruno J, Tarriere C, Le-Coz J-Y. Risk of cervical lesions in real-world and simulated collisions. 34th AAAM Conference Proceedings. Scottsdale, AZ, 1990:373.
- Olsson I, Bunketorp O, Carlsson G. An in-depth study of neck injuries in rear end collisions. 1990 International IRCOBI Conference. Bron, Lyon, France, 1990:1-15.
- Romilly D, Thomson R, Navin F, et al. Low speed rear impacts and the elastic properties of automobiles. Proceedings: 12th International Conference of Experimental Safety Vehicles. Gothenburg, 1989:1-14.
- Warner C, Strother C, James M. Occupant protection in rear end collisions: II. the role of seat back deformation in injury reduction. Proceedings of the 35th Stapp Car Crash Conference, Society of Automotive Engineers. Detroit, MI, 1991:379-89.

11) Non-failure of seat back ¹⁷.

- Foret-Bruno J, Dauvilliers F, Tarriere C. Influence of the seat and head rest stiffness on the risk of cervical injuries. 13th International Technical Conference on Experimental Safety Vehicles, S-8-W-19, 1991:968-74.

12) Having the head turned at impact ^{43,61,62}.

- Radanov BP, Sturzenegger M, Di Stefano G. Long-term outcome after whiplash injury. A 2-year follow-up considering features of injury mechanism and somatic, radiologic, and psychosocial findings. *Medicine* 1995;74:281-97.
- Winkelstein B, Nightingale R, Richardson W, et al. Cervical Facet Joint Mechanics: Its Application to Whiplash Injury. 43rd Stapp Car Crash Conference Proceedings 99SC15, 1999:243-52.
- Winkelstein BA, Nightingale RW, Richardson WJ, et al. The cervical facet capsule and its role in whiplash injury: a biomechanical investigation. *Spine* 2000;25:1238-46.

13) Non-awareness of impending impact

- Dolinis. Risk factors for 'whiplash' in drivers: a cohort study of rear-end traffic crashes. *Injury* 1997;28:173-9.

14) Increasing age (i.e., middle age and beyond)

- Radanov BP, di Stefano G, Schnidrig A, et al. Role of psychosocial stress in recovery from common whiplash. *Lancet* 1991;338:712-5.
- Satoh S, Naito S, Konishi T, et al. An examination of reasons for prolonged treatment in Japanese patients with whiplash injuries. *J Musculoskel Pain* 1997;5:71-84.

15) Front vs. rear seat position

- Carlsson G, Nilsson S, Nilsson-Ehle A. Neck injuries in rear-end car collisions: Biomechanical considerations to improve head restraints. Proceedings of the International IRCOBI/AAAM Conference on the Biomechanics of Impacts. Goteborg, Sweden, 1995:277-89.

16) Impact by vehicle of greater mass

- Chapline JF, Ferguson SA, Lillis RP, et al. Neck pain and head restraint position relative to the driver's head in rear-end collisions. *Accid Anal Prev* 2000;32:287-97.
- Kornhauser M. Delta-v thresholds for cervical spine injury. 1996;SAE Technical Paper Series 960093:1-13.
- Krafft M. A comparison of short- and long-term consequences of AIS 1 neck injuries, in rear impacts. International IRCOBI Conference on the Biomechanics of Impact. Goteborg, Sweden, 1998:235-48.
- Wood DP. Safety and the car size effect: a fundamental explanation. *Accid Anal and Prev* 1997;29:139-51.

17) Crash speed under 10 mph

- Foret-Bruno J, Dauvilliers F, Tarriere C. Influence of the seat and head rest stiffness on the risk of cervical injuries. 13th International Technical Conference on Experimental Safety Vehicles, S-8-W-19, 1991:968-74.

18) For rear struck occupant, when the bullet vehicle has a motor that is longitudinally mounted

- Krafft M. A comparison of short- and long-term consequences of AIS 1 neck injuries, in rear impacts. International IRCOBI Conference on the Biomechanics of Impact. Goteborg, Sweden, 1998:235-48.

19) Being the driver vs. front seat passenger

- Berglund A, Alfredsson L, Jensen I, et al. Occupant- and crash-related factors associated with the risk of whiplash injury. *Ann Epidemiol* 2003;13:66-72.

Late Risk Factors:

1) Female sex

- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. *Proceedings of the International IRCOBI Conference*. Graz, Austria, 2004:245-56.
- Carlsson G, Bunketorp O, Jakobsson L, et al. Medical and car impact-related risk factors for the prognosis of WAD. . 47th Annual Proceedings, Association for the Advancement of Automotive Medicine, 2003:598-600.
- Krafft M. A comparison of short- and long-term consequences of AIS 1 neck injuries, in rear impacts. *International IRCOBI Conference on the Biomechanics of Impact*. Goteborg, Sweden, 1998:235-48.
- Krafft M. When do AIS 1 neck injuries result in long-term consequences? Vehicle and human factors. *Traffic Injury Prevention* 2002;3:89-97.
- Krafft M, Kullgren A, Lie A, et al. The risk of whiplash injury in the rear seat compared to the front seat in rear impacts. *Traffic Injury Prev* 2003;4:136-40.
- Krafft M, Kullgren A, Lie A, et al. The risk of whiplash injury in the rear seat compared To the front seat in rear impacts. . *International IRCOBI Conference on the Biomechanics of Impact*. Munich, Germany, 2002:203-10.
- Richter M, Otte D, Blauth M. Acceleration injuries of the cervical spine in seat-belted automobile drivers. Determination of the trauma mechanism and severity of injury. *Orthopade* 1999;28:414-23.
- Richter M, Otte D, Pohlemann T, et al. Whiplash-type neck distortion in restrained car drivers: frequency, causes and long-term results. *Eur Spine J* 2000;9:109-17.
- Satoh S, Naito S, Konishi T, et al. An examination of reasons for prolonged treatment in Japanese patients with whiplash injuries. *J Musculoskel Pain* 1997;5:71-84.
- Scholten-Peeters GG, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303-22.
- Sterling M, Jull G, Vicenzino B, et al. Sensory hypersensitivity occurs soon after whiplash injury and is associated with poor recovery. *Pain* 2003;104:509-17.

2) Rear vector impact vs. other vectors

- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. *Proceedings of the International IRCOBI Conference*. Graz, Austria, 2004:245-56.
- Carlsson G, Bunketorp O, Jakobsson L, et al. Medical and car impact-related risk factors for the prognosis of WAD. . 47th Annual Proceedings, Association for the Advancement of Automotive Medicine, 2003:598-600.
- Krafft M. A comparison of short- and long-term consequences of AIS 1 neck injuries, in rear impacts. *International IRCOBI Conference on the Biomechanics of Impact*. Goteborg, Sweden, 1998:235-48.

3) Body mass index in females only

- Freeman MD, Croft AC, Rossignol AM, et al. Chronic neck pain and whiplash: A case-control study of the relationship between acute whiplash injuries and chronic neck pain. *Pain Res Manag* 2006;11:79-83.
- 4) Immediate/early onset of symptoms (i.e., within 12 hours) and/or more severe initial symptoms
- Jakobsson L, Norin H, Bunketorp O. Whiplash-associated disorders in frontal impacts: influencing factors and consequences. *Traffic Injury Prev* 2003;4:153-61.
 - Parmar HV, Raymakers R. Neck injuries from rear impact road traffic accidents: prognosis in persons seeking compensation. *Injury* 1993;24:75-8.
 - Radanov BP, di Stefano G, Schnidrig A, et al. Role of psychosocial stress in recovery from common whiplash [see comment]. *Lancet* 1991;338:712-5.
 - Radanov BP, Di Stefano G, Schnidrig A, et al. Psychosocial stress, cognitive performance and disability after common whiplash. *J Psychosom Res* 1993;37:1-10.
 - Radanov BP, Di Stefano G, Schnidrig A, et al. Cognitive functioning after common whiplash. A controlled follow-up study. *Arch Neurol* 1993;50:87-91.
 - Radanov BP, Sturzenegger M, De Stefano G, et al. Relationship between early somatic, radiological, cognitive and psychosocial findings and outcome during a one-year follow-up in 117 patients suffering from common whiplash. *Br J Rheumatol* 1994;33:442-8.
 - Satoh S, Naito S, Konishi T, et al. An examination of reasons for prolonged treatment in Japanese patients with whiplash injuries. *J Musculoskel Pain* 1997;5:71-84.
- 5) Initial back pain
- Radanov BP, Di Stefano G, Schnidrig A, et al. Psychosocial stress, cognitive performance and disability after common whiplash. *J Psychosom Res* 1993;37:1-10.
- 6) Initial decreased cervical spine ROM (females only)
- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. *Proceedings of the International IRCOBI Conference. Graz, Austria, 2004:245-56.*
 - Carlsson G, Bunketorp O, Jakobsson L, et al. Medical and car impact-related risk factors for the prognosis of WAD. . 47th Annual Proceedings, Association for the Advancement of Automotive Medicine, 2003:598-600.
- 7) Initial upper back pain
- Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.
- 8) Initial upper extremity numbness or weakness or pain
- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. *Proceedings of the International IRCOBI Conference. Graz, Austria, 2004:245-56.*
 - Carlsson G, Bunketorp O, Jakobsson L, et al. Medical and car impact-related risk factors for the prognosis of WAD. . 47th Annual Proceedings, Association for the Advancement of Automotive Medicine, 2003:598-600.
 - Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.
 - Jakobsson L, Norin H, Bunketorp O. Whiplash-associated disorders in frontal impacts: influencing factors and consequences. *Traffic Injury Prev* 2003;4:153-61.

9) Greater subjective cognitive impairment.

- Radanov BP, Di Stefano G, Schnidrig A, et al. Cognitive functioning after common whiplash. A controlled follow-up study. *Arch Neurol* 1993;50:87-91.
- Radanov BP, Sturzenegger M, De Stefano G, et al. Relationship between early somatic, radiological, cognitive and psychosocial findings and outcome during a one-year follow-up in 117 patients suffering from common whiplash. *Br J Rheumatol* 1994;33:442-8.

10) Greater number of initial symptoms

- Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.
- Radanov BP, Sturzenegger M, De Stefano G, et al. Relationship between early somatic, radiological, cognitive and psychosocial findings and outcome during a one-year follow-up in 117 patients suffering from common whiplash. *Br J Rheumatol* 1994;33:442-8.
- Scholten-Peeters GG, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303-22.

11) Greater severity or frequency of initial symptoms

- Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.

12) High initial pain intensity

- Scholten-Peeters GG, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303-22.

13) Use of seat belt shoulder harness. For neck (not back) pain; non-use had a protective effect.

- Borchgrevink GE, Lereim I, Royneland L, et al. National health insurance consumption and chronic symptoms following mild neck sprain injuries in car collisions. *Scand J Soc Med* 1996;24:264-71.
- Freeman MD, Croft AC, Rossignol AM, et al. Chronic neck pain and whiplash: A case-control study of the relationship between acute whiplash injuries and chronic neck pain. *Pain Res Manag* 2006;11:79-83.

14) Initial physical findings of limited range of motion

- Scholten-Peeters GG, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303-22.
- Svensson M, Aldman B, Bostrom O. Transient pressure gradients in the pig spinal canal during experimental whiplash motion causing membrane dysfunction in spinal ganglion nerve cells [German]. *Orthopade* 1998;27:820-6.

15) Neck pain on palpation

- Suissa S, Harder S, Veilleux M. The relation between initial symptoms and signs and the prognosis of whiplash. *Eur Spine J* 2001;10:44-9.

16) Muscle pain

- Suissa S, Harder S, Veilleux M. The relation between initial symptoms and signs and the prognosis of whiplash. *Eur Spine J* 2001;10:44-9.
- 17) Disturbed vision
- Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.
- 18) Initial sleep disturbance or fatigue
- Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.
- 19) Initial neurological symptoms; radiating pain into upper extremities
- Hartling L, Pickett W, Brison RJ. Derivation of a clinical decision rule for whiplash associated disorders among individuals involved in rear-end collisions. *Accid Anal Prev* 2002;34:531-9.
 - Suissa S, Harder S, Veilleux M. The relation between initial symptoms and signs and the prognosis of whiplash. *Eur Spine J* 2001;10:44-9.
- 20) Past history of neck pain ³⁸ or headache ⁴².
- Parmar HV, Raymakers R. Neck injuries from rear impact road traffic accidents: prognosis in persons seeking compensation. *Injury* 1993;24:75-8.
 - Radanov BP, Sturzenegger M, De Stefano G, et al. Relationship between early somatic, radiological, cognitive and psychosocial findings and outcome during a one-year follow-up in 117 patients suffering from common whiplash. *Br J Rheumatol* 1994;33:442-8.
- 21) Headache
- Suissa S, Harder S, Veilleux M. The relation between initial symptoms and signs and the prognosis of whiplash. *Eur Spine J* 2001;10:44-9.
- 22) Initial degenerative changes seen on radiographs
- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. *Proceedings of the International IRCOBI Conference. Graz, Austria, 2004:245-56.*
 - Carlsson G, Bunketorp O, Jakobsson L, et al. Medical and car impact-related risk factors for the prognosis of WAD. . 47th Annual Proceedings, Association for the Advancement of Automotive Medicine, 2003:598-600.
 - Parmar HV, Raymakers R. Neck injuries from rear impact road traffic accidents: prognosis in persons seeking compensation. *Injury* 1993;24:75-8.
 - Watkinson A, Gargan MF, Bannister GC. Prognostic factors in soft tissue injuries of the cervical spine. *Injury* 1991;22:307-9.
- 23) Foraminal stenosis (cervical)
- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. *Proceedings of the International IRCOBI Conference. Graz, Austria, 2004:245-56.*
- 24) Loss or reversal of cervical lordosis

- Ettlin TM, Kischka U, Reichmann S, et al. Cerebral symptoms after whiplash injury of the neck: a prospective clinical and neuropsychological study of whiplash injury. *J Neurol Neurosurg Psychiatry* 1992;55:943-8.

25) Increasing age (i.e., middle age and beyond)

- Brison RJ, Hartling L, Pickett W. A prospective study of acceleration-extension injuries following rear-end motor vehicle collisions. *Journal of Musculoskeletal Pain* 2000;8:97-113.
- Freeman MD, Croft AC, Rossignol AM, et al. Chronic neck pain and whiplash: A case-control study of the relationship between acute whiplash injuries and chronic neck pain. *Pain Res Manag* 2006;11:79-83.
- Krafft M. When do AIS 1 neck injuries result in long-term consequences? Vehicle and human factors. *Traffic Injury Prevention* 2002;3:89-97.
- Parmar HV, Raymakers R. Neck injuries from rear impact road traffic accidents: prognosis in persons seeking compensation. *Injury* 1993;24:75-8.
- Radanov BP, Di Stefano G, Schnidrig A, et al. Psychosocial stress, cognitive performance and disability after common whiplash. *J Psychosom Res* 1993;37:1-10.
- Radanov BP, Di Stefano G, Schnidrig A, et al. Cognitive functioning after common whiplash. A controlled follow-up study. *Arch Neurol* 1993;50:87-91.
- Scholten-Peeters GG, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303-22.

26) Front seat position; driver seat vs. passenger seat for females.

- Scholten-Peeters GG, Verhagen AP, Bekkering GE, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;104:303-22.
- Krafft M, Kullgren A, Lie A, et al. The risk of whiplash injury in the rear seat compared To the front seat in rear impacts. . *International IRCOBI Conference on the Biomechanics of Impact*. Munich, Germany, 2002:203-10.

27) Rear seat position.

- Krafft M, Kullgren A, Lie A, et al. The risk of whiplash injury in the rear seat compared to the front seat in rear impacts. *Traffic Injury Prev* 2003;4:136-40.

28) Occupants of vehicles manufactured in the late 1980s to early 1990s (OR=2.7 vs those in early 1980s vehicles) . This is relevant for rear impact crashes only. Other data suggest this relationship holds for all 1990s vehicles.

- Krafft M. A comparison of short- and long-term consequences of AIS 1 neck injuries, in rear impacts. *International IRCOBI Conference on the Biomechanics of Impact*. Goteborg, Sweden, 1998:235-48.
- Krafft M. When do AIS 1 neck injuries result in long-term consequences? Vehicle and human factors. *Traffic Injury Prevention* 2002;3:89-97.

29) Initial generalized sensory hyperalgesia

- Sterling M, Jull G, Vicenzino B, et al. Sensory hypersensitivity occurs soon after whiplash injury and is associated with poor recovery. *Pain* 2003;104:509-17.

30) Head rotation at impact; both frontal and rear

- Carlsson G, Bunketorp O, Jakobsson L, et al. Medical and car impact-related risk factors for the prognosis of WAD. . 47th Annual Proceedings, Association for the Advancement of Automotive Medicine, 2003:598-600.
- Bunketorp O, Jakobsson L, Norin H. Comparison of frontal and rear-end impacts for car occupants with whiplash-associated disorders: symptoms and clinical findings. Proceedings of the International IRCOBI Conference. Graz, Austria, 2004:245-56.

31) Non-awareness of impending impact

- Ryan GA, Taylor GW, Moore VM, et al. Neck strain in car occupants: injury status after 6 months and crash-related factors. Injury 1994;25:533-7.
- Sturzenegger M, DiStefano G, Radanov BP, et al. Presenting symptoms and signs after whiplash injury: the influence of accident mechanisms. Neurology 1994;44:688-93.

Dr. Jason Mazzarella, DC, DAAPM, DCAPM, DAAETS, DqEEG (c), DWTT (D), FIAMA, MVC-FRA, CATSM, CBIS, CMVT, CPM, CDRSC, CDAAC, BSc Kin, BSc HPA

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