



# Rollover, Ejection, Motor Vehicle Trauma

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# Objectives

- Understand why this is important epidemiology and review the intersection and history of EMS and motor vehicle safety.
- Define and review the physics related to motor vehicle injuries and its translation to physical injuries.

## The EMS White Paper stated:

- in 1965 there were 52,000,000 accidental injuries
- of these accidental injuries there were 107,000 killed, 10,000,000+ disabled and 400,000 permanently impaired
- the estimated costs were \$18 billion (this is \$117 billion in 2008 dollars)

# Occupant Ejections During Car Accidents

**81%** of occupants who were totally ejected from the vehicle were killed

## Causes of Occupant Ejection Injuries





# Newton's 1st Law of Motion

An object at rest  
stays at rest.

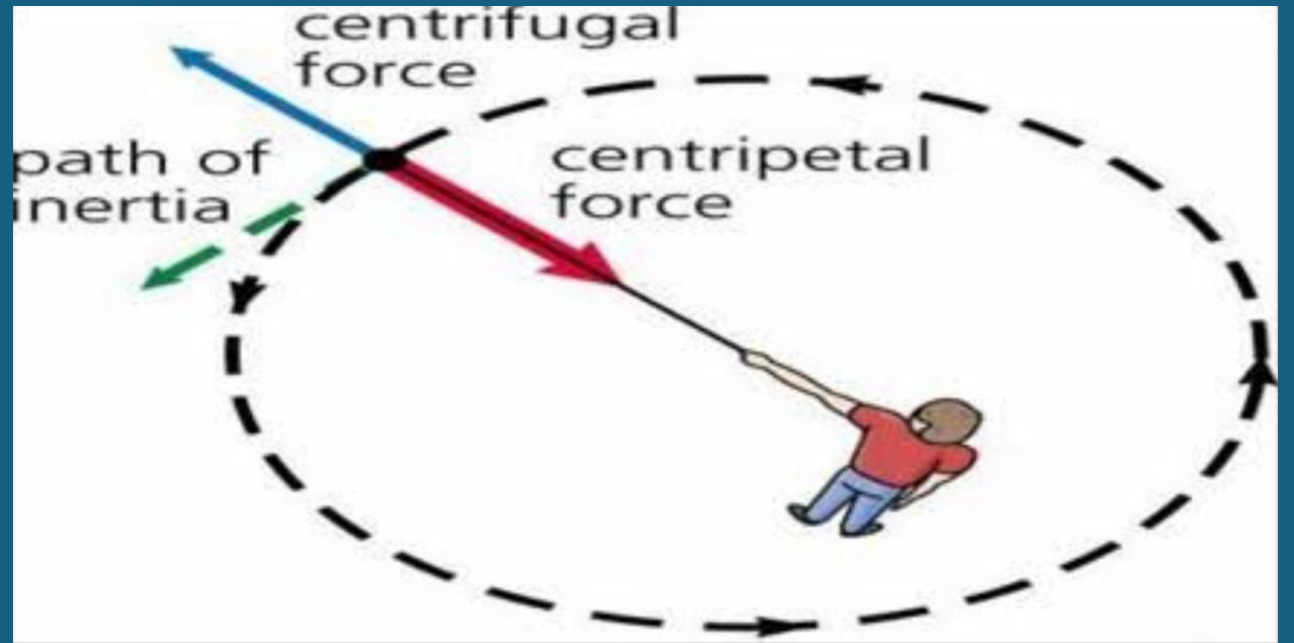


An object in motion stays in  
motion at the same speed  
and same direction—



unless acted upon by  
an outside force.





## 3 COLLISIONS IN A SINGLE CAR CRASH



1. Metal on metal  
Car colliding with

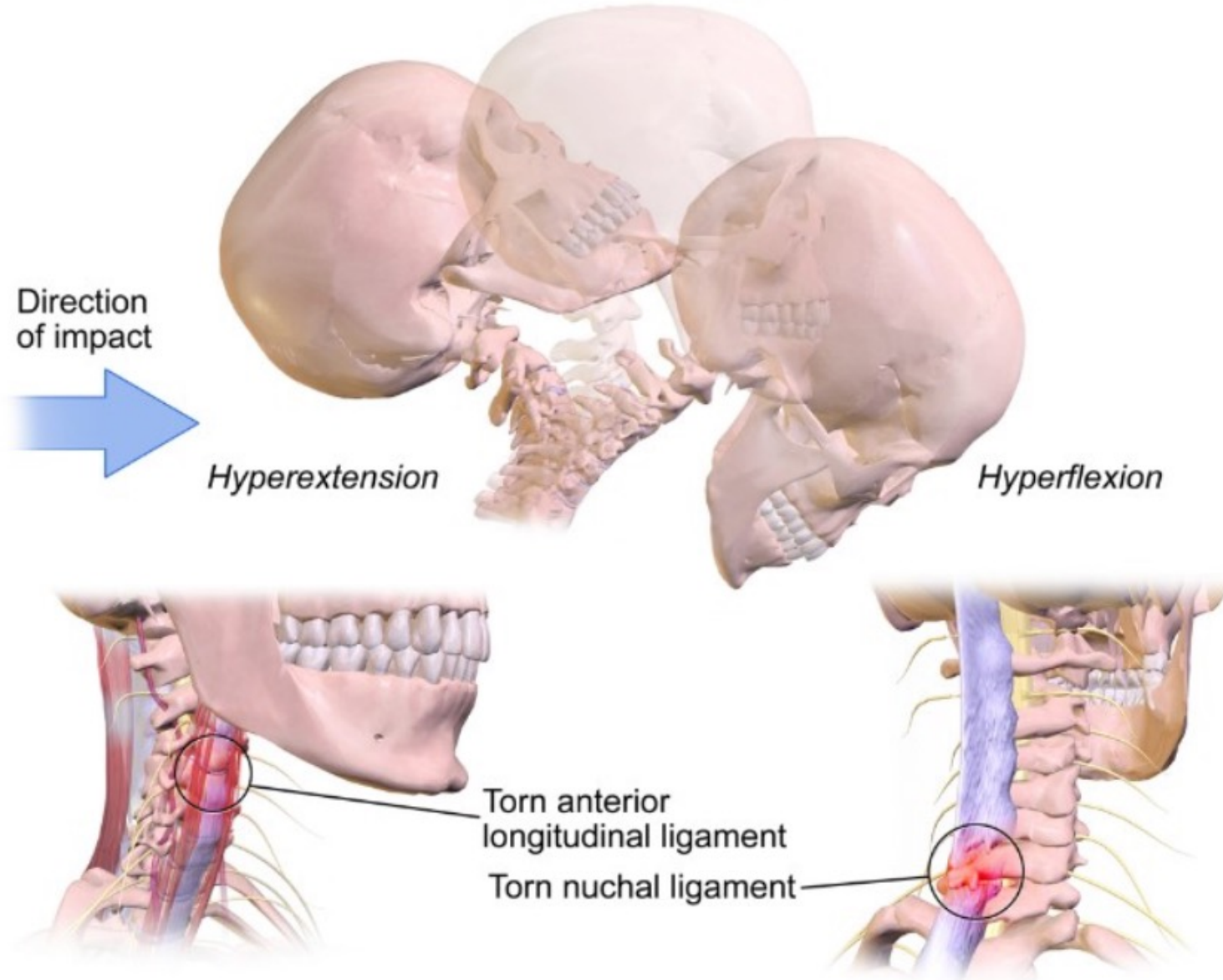
2. Body on metal  
Occupant colliding with  
inside of the car

3. Body on body  
Organs colliding with  
inside of the cavities



# Whiplash

*Soft Tissue Damage*



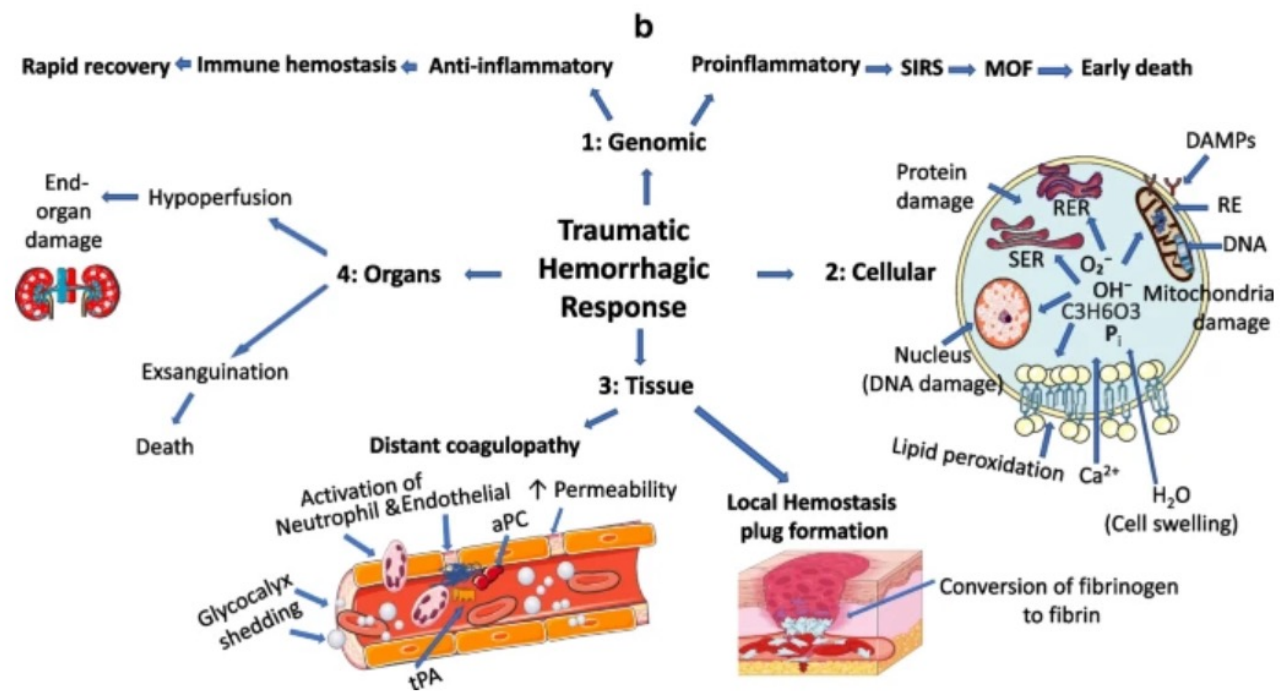
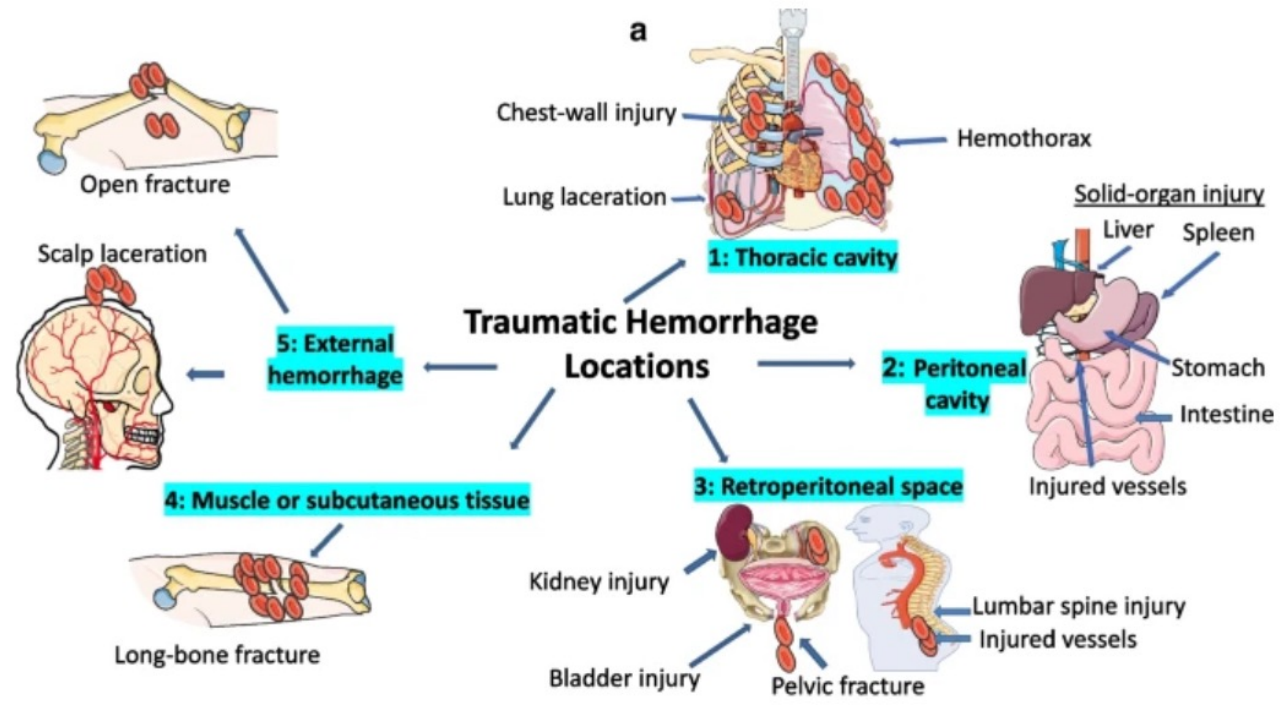


# Trauma BLS Saves lives – X,A,B,C



# Airway







# Rigid vs Soft C-Collar?

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EMA Emergency Medicine  
Australasia



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**SOFTLY: Comparison of outcomes of rigid *versus* soft collar during emergency department investigation for potential cervical spine injury in low-risk blunt trauma patients – A pilot study**

Robert Baker MBBS, Sharon Klim BN, Jasmine Poonian MBChB, Peter Ritchie MBBS, MPH, FACEM, Stephanie Ng MBBS, Anne-Maree Kelly MD, FACEM

First published: 13 March 2023 | <https://doi.org/10.1111/1742-6723.14195>





# Breathing

- Prevent hypoxia
- Monitor with Capnography



# The Impact of Combined Prehospital Hypotension and Hypoxia on Mortality in Major Traumatic Brain Injury

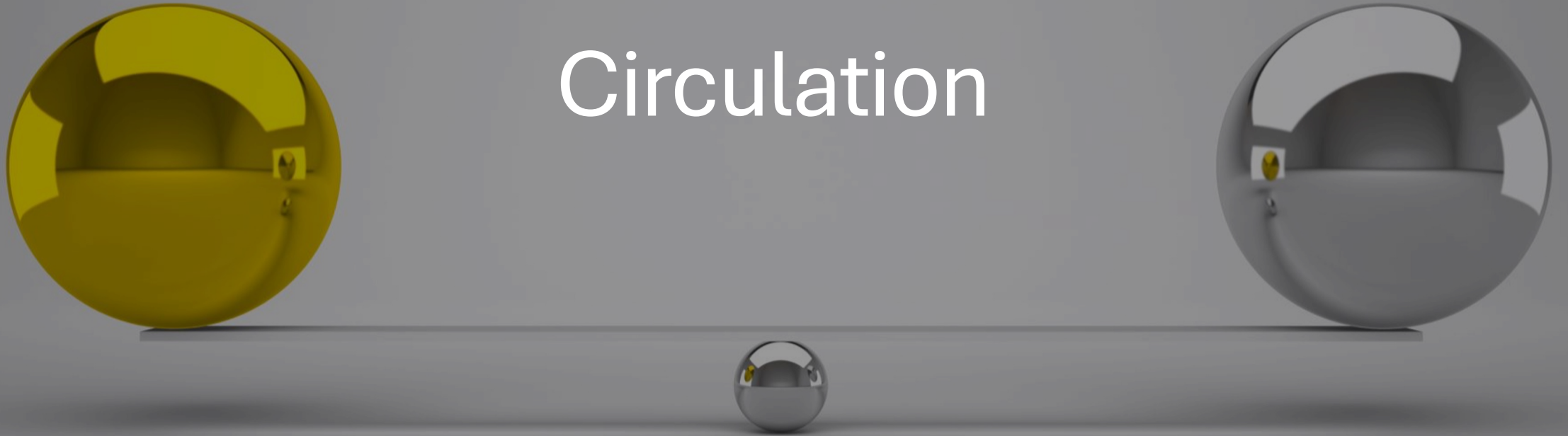
[Daniel W. Spaite](#), MD,<sup>1,2</sup> [Chengcheng Hu](#), PhD,<sup>1,3</sup> [Bentley J. Bobrow](#), MD,<sup>1,2,4</sup> [Vatsal Chikani](#), MPH,<sup>1,4</sup> [Bruce Barnhart](#), RN, CEP,<sup>1</sup> [Joshua B. Gaither](#), MD,<sup>1,2</sup> [Kurt R. Denninghoff](#), MD,<sup>1,2</sup> [P. David Adelson](#), MD,<sup>5</sup> [Samuel M. Keim](#), MD, MS,<sup>1,2</sup> [Chad Viscusi](#), MD,<sup>1,2</sup> [Terry Mullins](#), MBA,<sup>4</sup> and [Duane Sherrill](#), PhD<sup>3</sup>

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## RESULTS

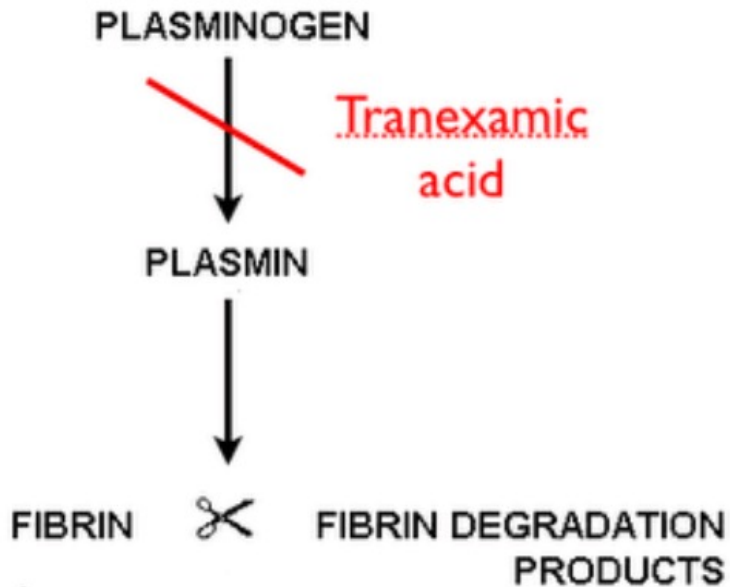
Among the 13,151 cases that met inclusion criteria [Median age: 45; Male: 68.6%], 11,545 (87.8%) had neither hypotension nor hypoxia, 604 (4.6%) had hypotension only, 790 (6.0%) had hypoxia only, and 212 (1.6%) had both hypotension and hypoxia. Mortality for the four study cohorts was 5.6%, 20.7%, 28.1%, and 43.9%, respectively. The crude and adjusted odds ratios (cOR/aOR) for death within the cohorts, utilizing the patients with neither hypotension nor hypoxia as the reference, were 4.4/2.5, 6.6/3.0, and 13.2/6.1, respectively. Evaluation for an interaction between hypotension and hypoxia revealed that the effects are additive on the log odds of death.

# Circulation



Preserving perfusion it turns out matters, but there is a balance

# TXA Evidence is still mixed but is an adjunct for non compressible hemorrhage



- Trial included 896 patients with combat injuries, of which 293 (32.7%) received TXA within 1hr of injury

Outcome	TXA	No TXA	P Value	NNT/NNH
Overall 24hr Mortality	9.6%	12.4%	0.20	---
Overall 48hr Mortality	11.3%	18.9%	0.004	13
Overall 30d Mortality	17.4%	23.9%	0.03	15
Massive Transfusion 24hr Mortality	9.6%	14.8%	0.17	---
Massive Transfusion 48hr Mortality	10.4%	23.5%	0.003	8
Massive Transfusion 30d Mortality	14.4%	28.1%	0.004	7
Overall PE	2.7%	0.3%	0.001	42
Overall DVT	2.4%	0.2%	0.001	46

- TXA Independently Associated with Survival: OR 7.228; 95% CI 3.016 – 17.322
- NO FATALITIES from VTE






# Blood is very important

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Original Article

## Synergism of red blood cells and tranexamic acid in the inhibition of fibrinolysis

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