Just a Dish on a Tablecloth

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Objectives

- Discuss the laws of energy
- Use kinematics to predict injury patterns
- Review the kinematics of specific traumatic events
- Discuss the effects of energy distribution

Trauma Overview

Kinetic Energy

$$KE = \frac{\text{mass x velocity}^2}{2}$$

or

$$KE = \tfrac{1}{2}\,(\text{mass x velocity}^2)$$

Velocity vs. Mass

Importance of Kinematics	
Newton's First Law – A body at rest will stay at rest – A body in motion will stay in motion	
3 Collisions – Vehicle – Occupant – Organs	
Law of Conservation of Energy – Energy cannot be created – Energy cannot be destroyed	
Force – Force = Mass x Acceleration – Force = Mass x Deceleration	
Blunt Trauma – Compression – Shear strain – Tensile strain – Torsion	

Compression Injuries	
Shear Injuries	
Tension Injuries	
Lap Restraints	
Shoulder Restraints – Abdominal injuries – Chest injuries – Clavicular fractures – Spine injuries	
Airbags – Front Airbags – Side Airbags	

Types of Impact
 	
– Frontal
  o Up and over
  o Down and Under
– Rear
– Lateral
– Rotational
– Rollover	

Motorcycle Collisions – Frontal impacts – Ejection – Angular impacts – Sliding	

Pedestrian Accidents – Primary – Secondary – Tertiary – Quaternary	
Falls – Height – Surface determines – Impact – Landing Feet First – Landing Head First	
Blast Injuries – Primary – Secondary – Tertiary – Quaternary – Quinary	
Summary – Time is critical in trauma patients – Understanding energy transfer can assist in the prediction of injuries – Kinematics can greatly assist in the assessment of the trauma patient	