



Snell Standards and Research for Better Protection

Hong Zhang

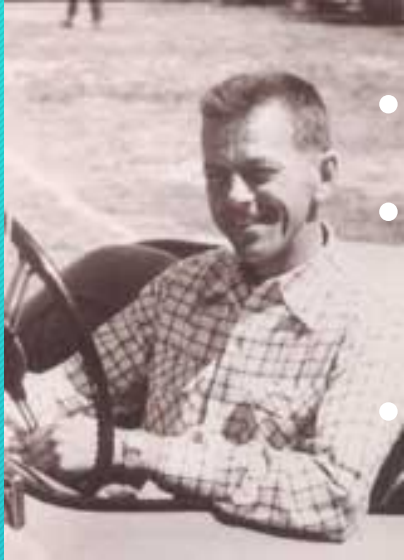
IRETS/MSF

August 26-28, 2019

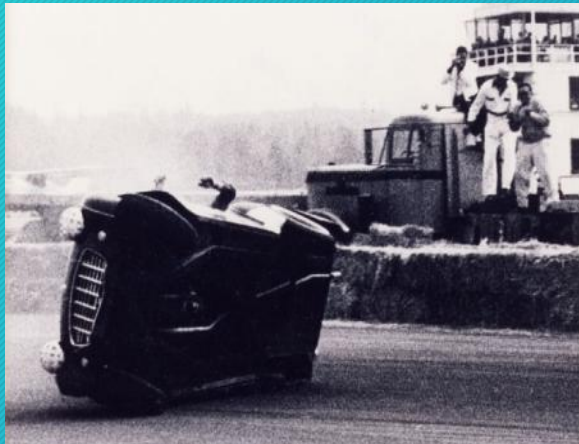
Columbus, OH



Beginnings



- Amateur Racer William "Pete" Snell
- Rollover Crash in Arcata, California,
 - August 6, 1956
- Pete died of head injuries
 - Sustained in a then state-of-the-art helmet



Helmet in 1950s



How to Choose among Today's Motorcycle Helmets?



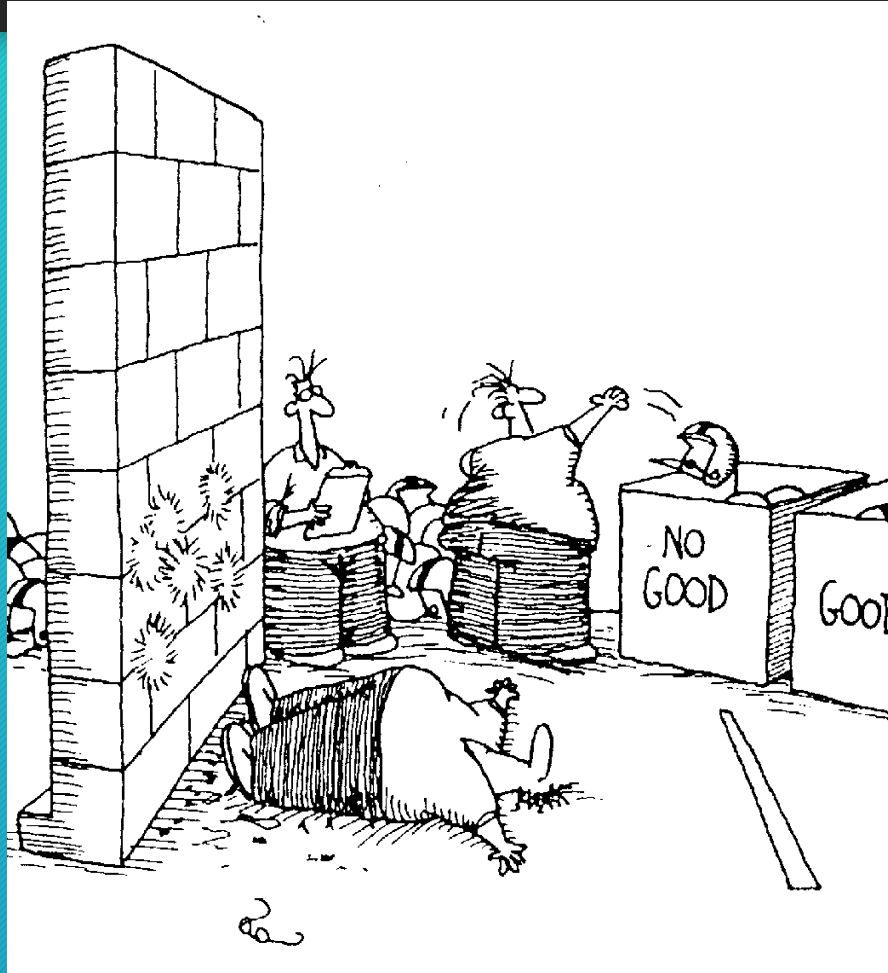
Snell Motorcycle Helmet Standards



Effectiveness of Standards

- Standards = Documents
- Effectiveness of standards depend on
 - * Strict and independent certification
 - * Enforceable compliance
 - * Experience and competence
- Testing and More Testing

Not how Snell tests helmet



Oldest Snell Testing Photo



Old Oscilloscope Early 1960s



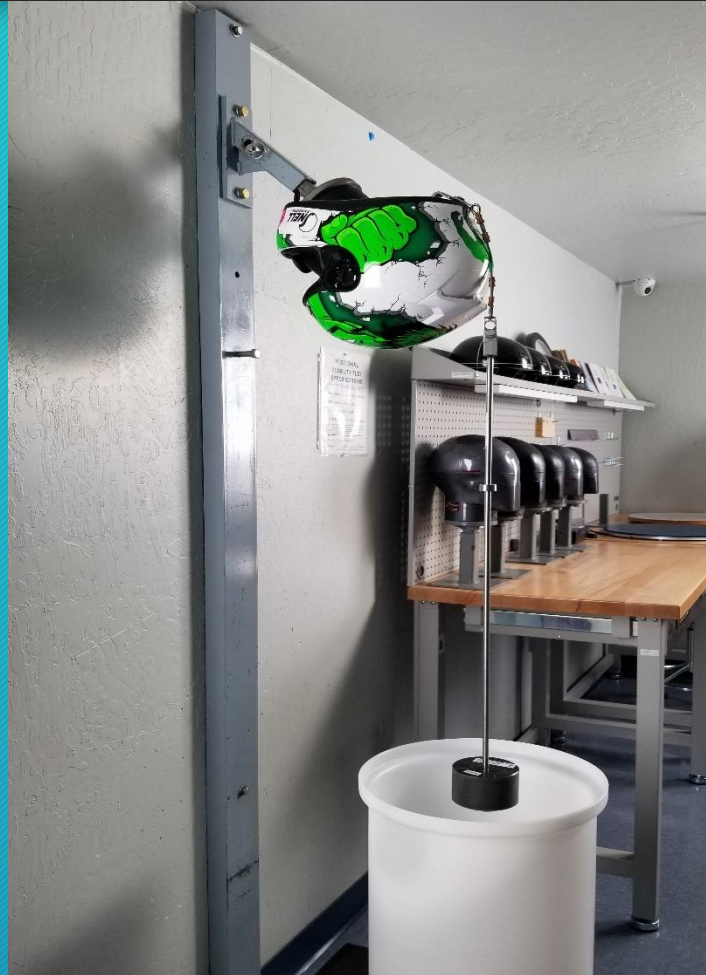
Snell Impact Test



Snell Penetration Test



Roll-off Test



Snell Face Shield Test



Some fail tests.



Some pass tests.

Overall assessment		
HELMET PASSED		
Impact info		
Sample:	1, Hemi, Right	
Drop No:	3	
Impact data observed		
Impact Velocity:	(std)	(%error)
8.496		

Scientifically Valid & Repeatable Test



Experience and Expertise

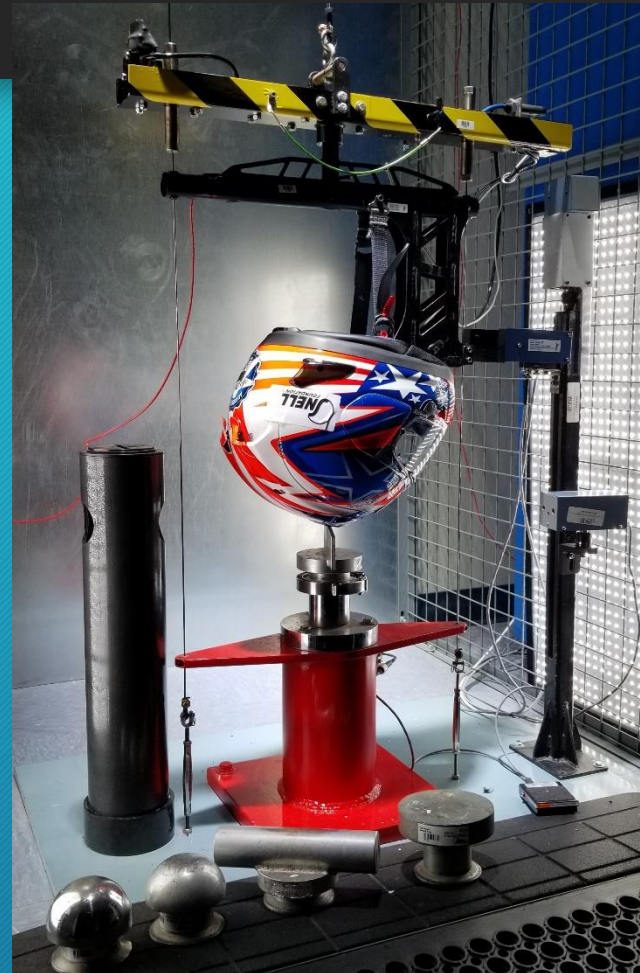


Snell Certification Program

- Tough Standard Requirements
 - To ensure best protection available
- Certification
 - To determine Worthy Helmets
- Random Sample Testing
 - To assure compliance of helmets in markets



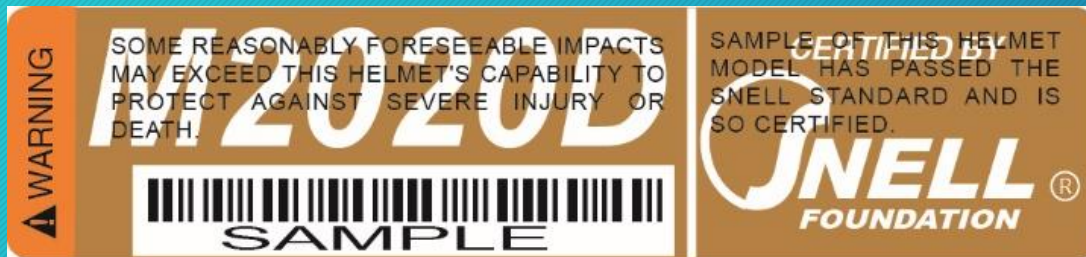
Snell Certification/RST Testing



Snell - Most Stringent Standard



Snell Updates Standards Every 5 Years M2020 Standard Effective Oct. 1, 2019



Newer Helmets and Greater Protection

- The effectiveness of helmet has increased from 29% between 1982-1987 to 37% between 1993-2002. (NHTSA reports)
- Tougher Snell Standards
- DOT Standard Unchanged
- Better Designs and Materials

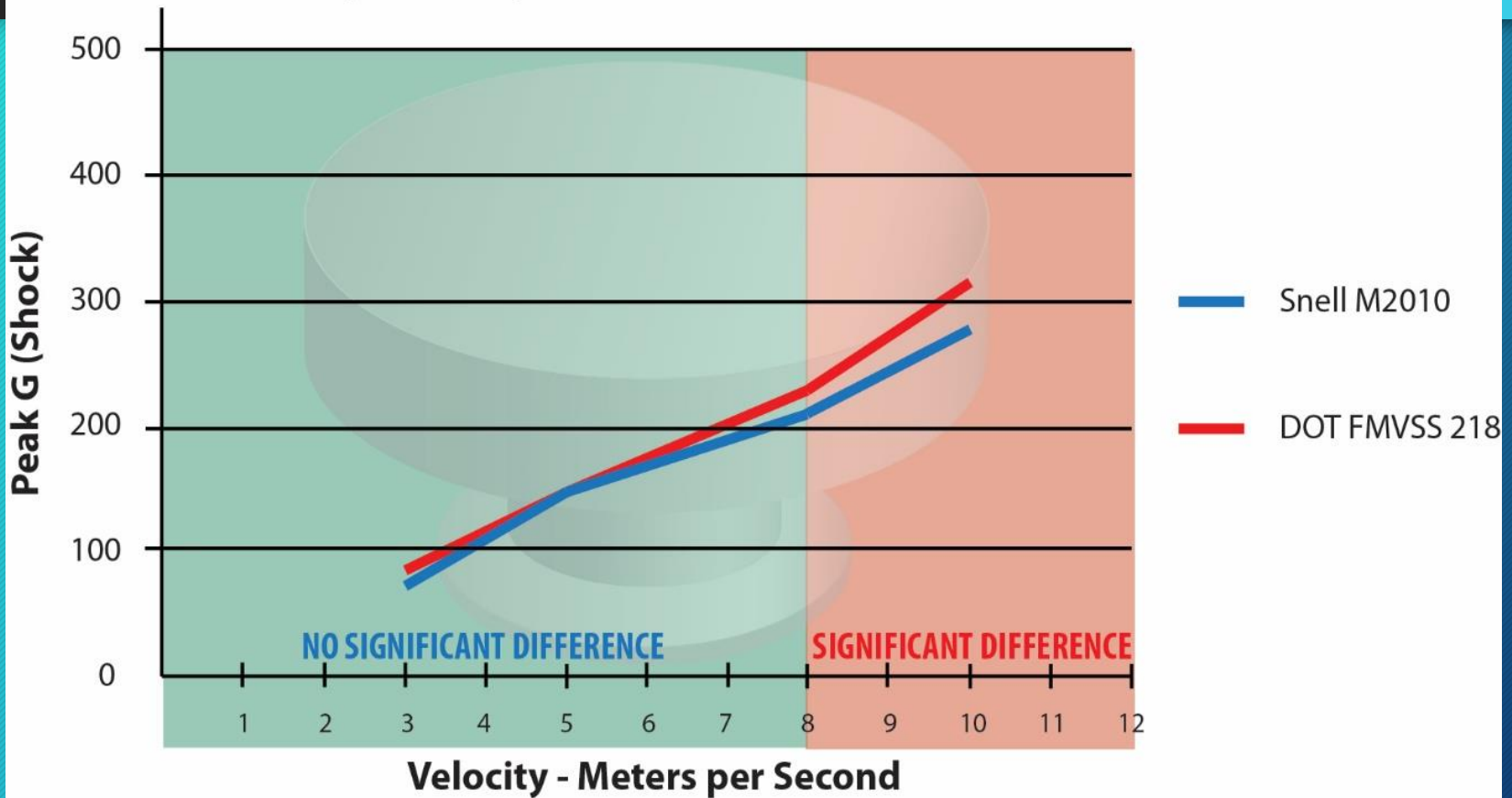


Shell Spreads the Load. Liner Foam = More Braking Time



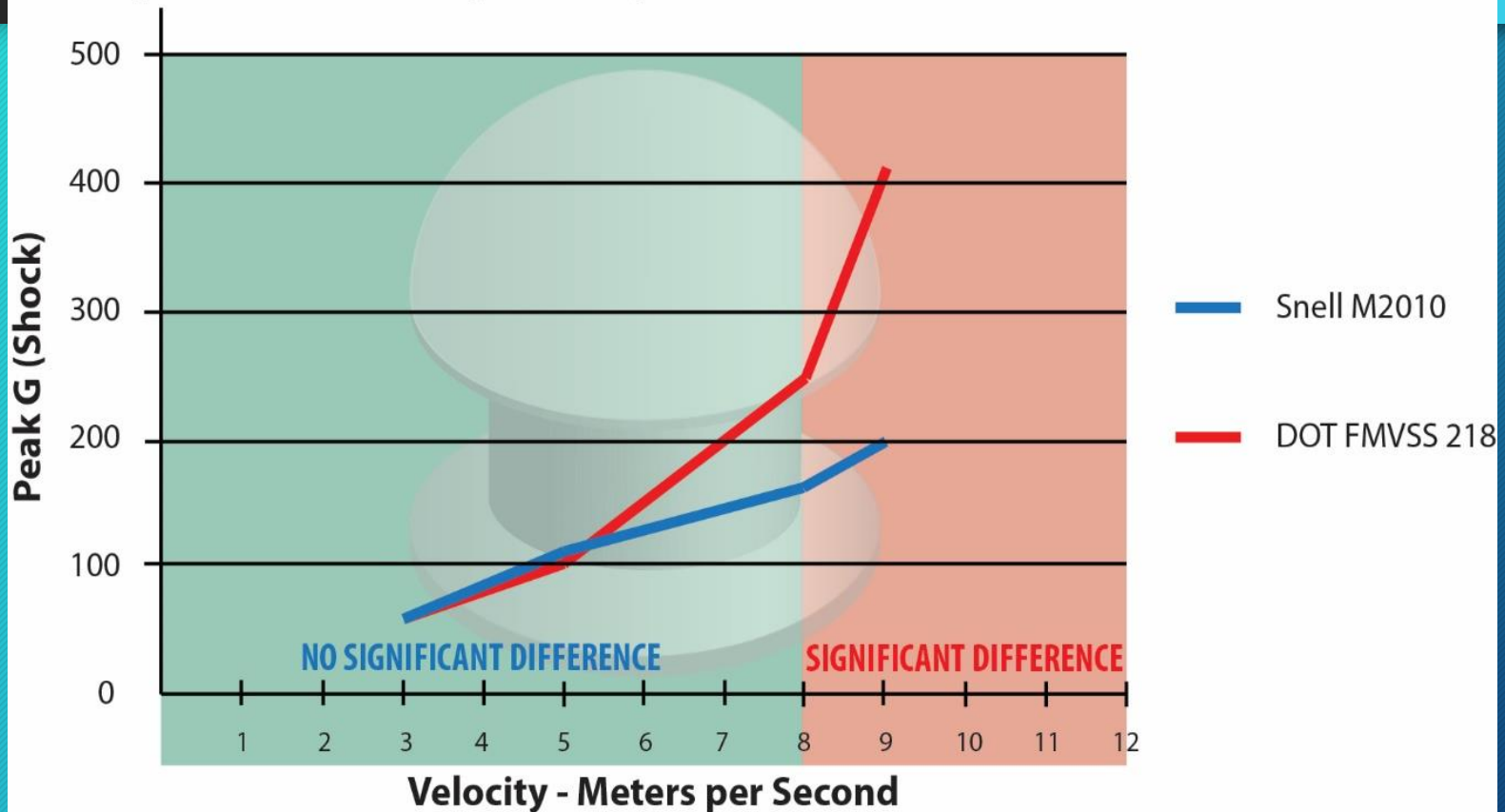
Research Snell vs DOT

Flat Anvil Impact Response - 57-59 cm (ISO J) Sized Helmets



Snell Protects/DOT Bottoms Out

Hemispherical Anvil Impact Response - 57-59 cm (ISO J) Sized Helmets



Fact Check

- Misinformation that Snell helmets are only for racers.
- DOT is NOT all you need.
- Snell helmets are NOT too hard.
 - Snell & DOT protect the same in minor impacts.
 - Snell continues to protect at higher levels long after DOT protection fails.



International Conference of Biomechanics Research (IRCOBI)

- September 2015 in Lyon, France
- Snell Presents Peer Reviewed Research Paper
- Low Energy Impact Comparison Study
- Snell and NOCSAE Sponsor a Seminar on Test Method for Angular Acceleration



Three Helmet Standards (US)

- ECE and DOT (FMVSS 218)
 - Mandatory - minimum impact protection requirement
 - DOT Self-certified /ECE Not as protective
 - Manufacturers arrange “reasonable” testing
 - Claim DOT certification for their own products
- Snell M2015
 - Voluntary - premium impact protection capability
 - Snell certified
 - Snell does pre-market and in-market testing
 - Manufacturers are bound by contract



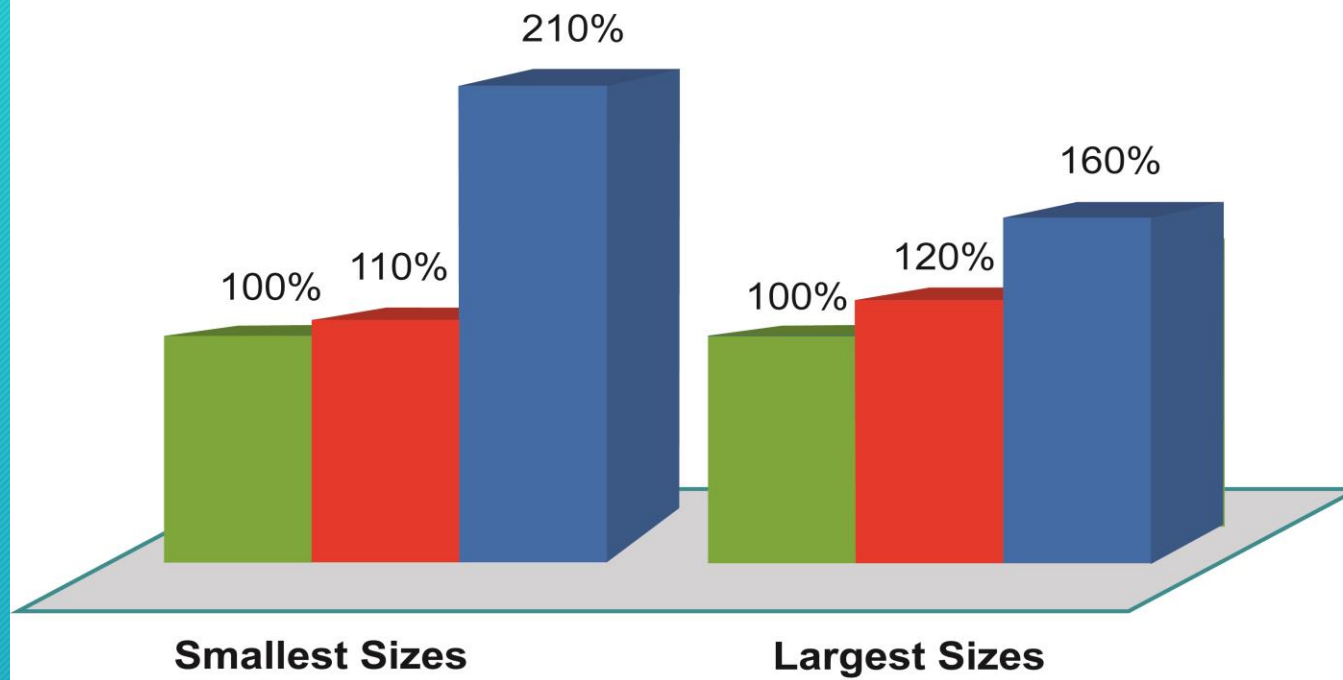
Impact Energy Management

as a percentage of ECE demands

 ECE

 DOT

 SNELL



Snell Means Premium Protection.
DOT and ECE are Minimum Requirement.

Impact Energy Management

Medium Size Helmets

ECE 22.05 (45%)

DOT (51%)

SNELL (100%)



Motorcycle Helmet Effectiveness

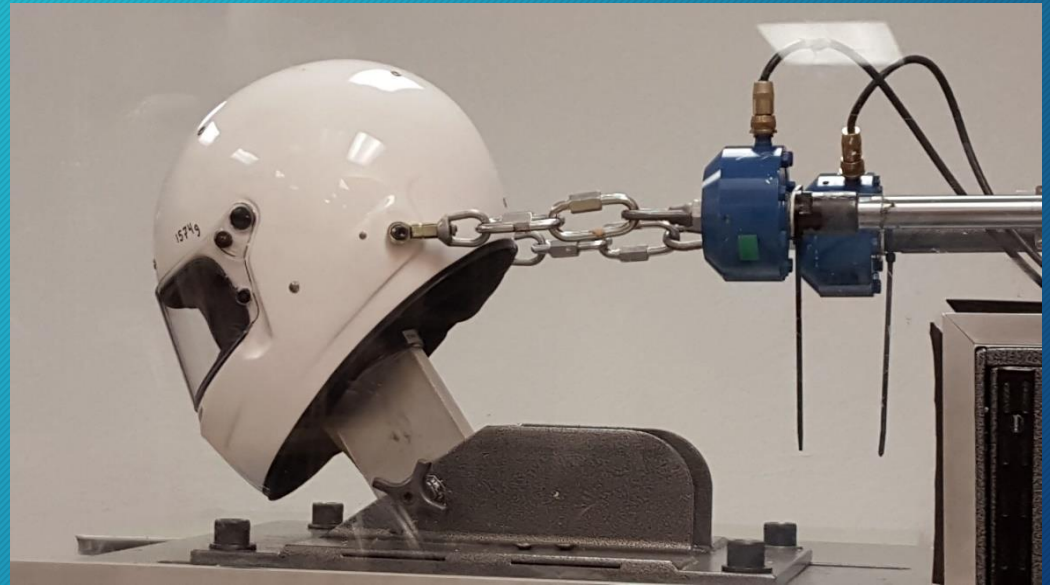
- NHTSA estimates that helmet usage leads to:
- 37% reduction of crash fatality
- 67% prevention of brain injuries



Other Snell Standards



NASCAR & INDY 500



Austin Dillon Walking Away from 2015 Crash NASCAR Daytona Finish



Helmet Fit Research

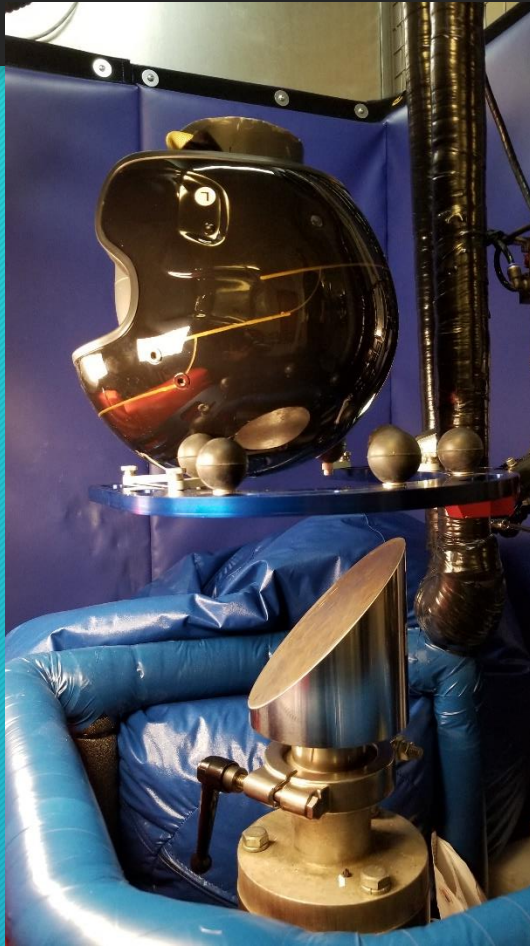
- Well-fitted helmets protect better.
- Dr. Amy McIntosh reported in 2012 that children with help fitting a helmet had concussions reduced by 41%.



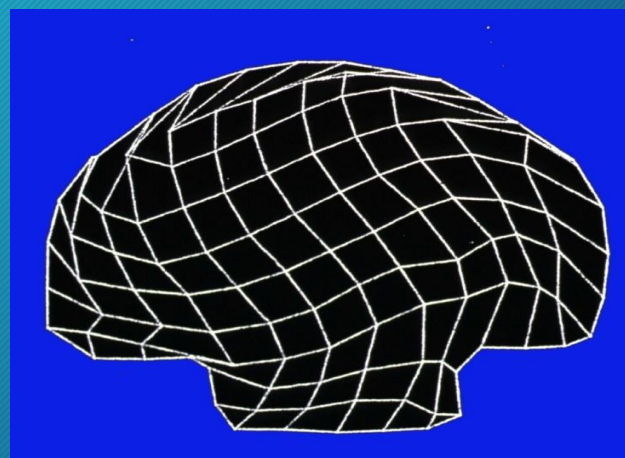
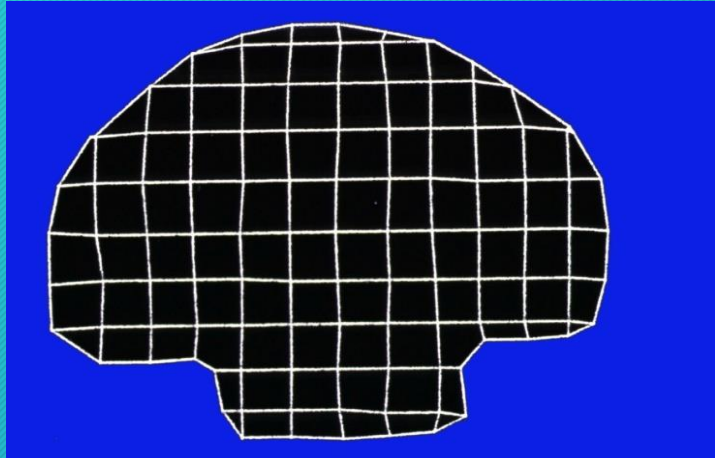
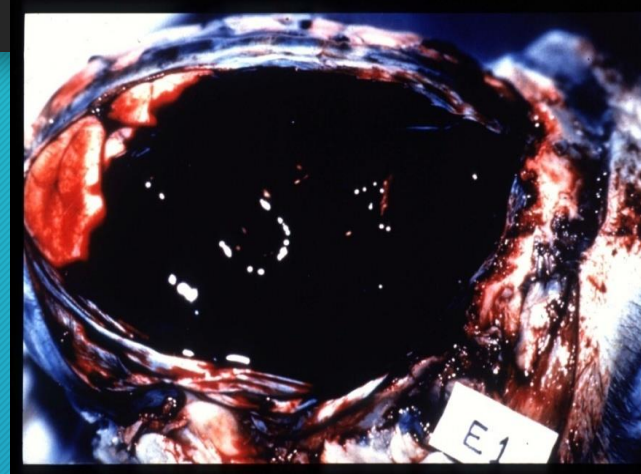
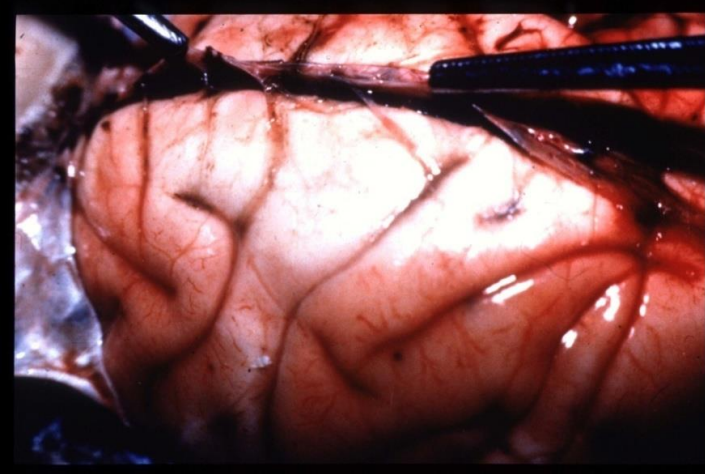
How Helmets Work

- Space
- Time
- Cartoon Videos on YouTube.com

Wireless Head Form for Rotational Impact Test



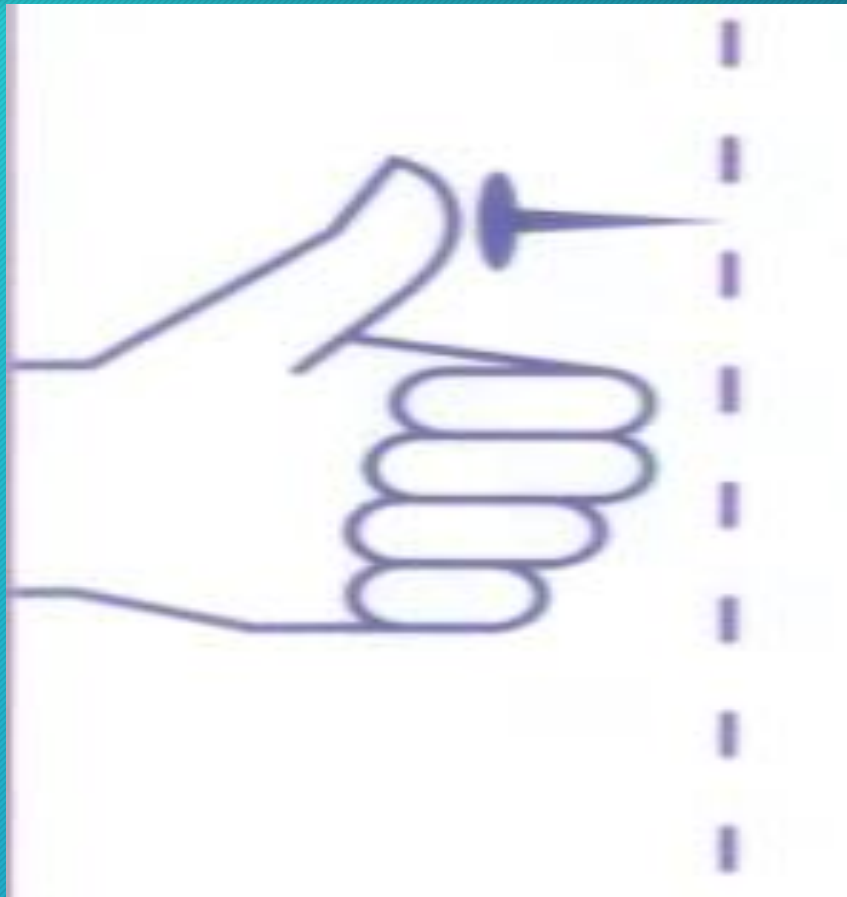
Bridging Vein Rupture



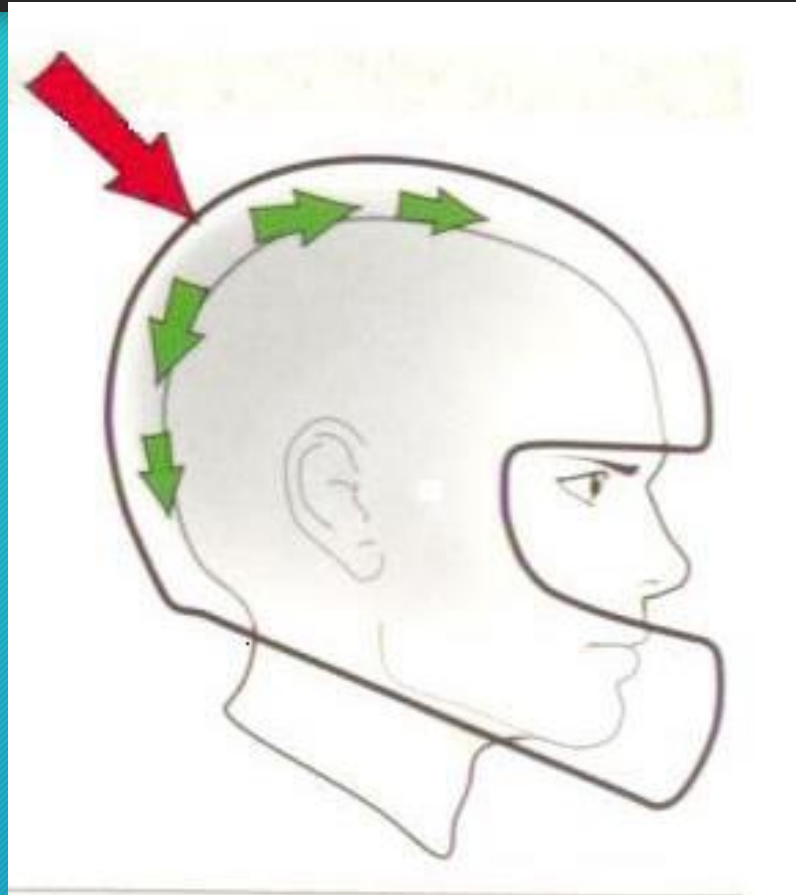
Shell Spreads the Load. Liner Foam = More Braking Time



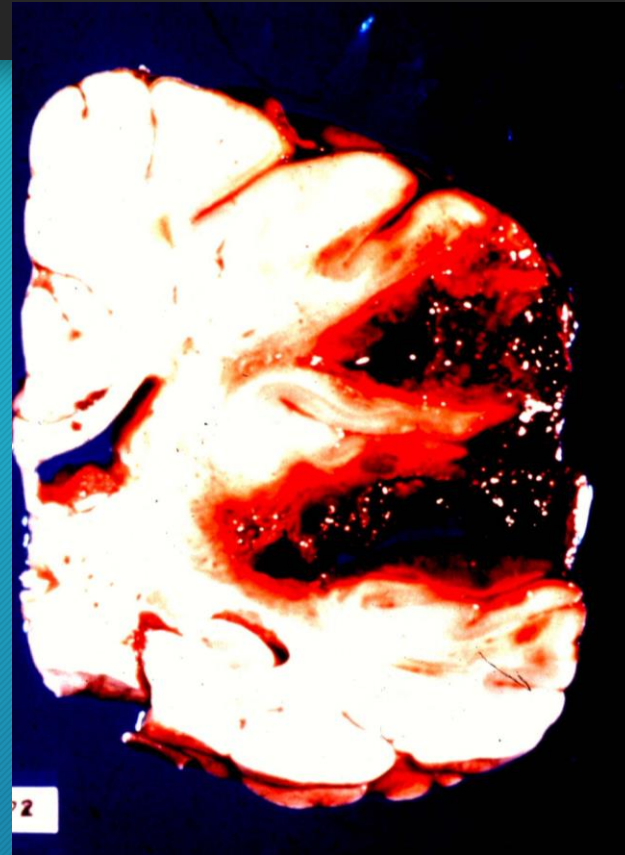
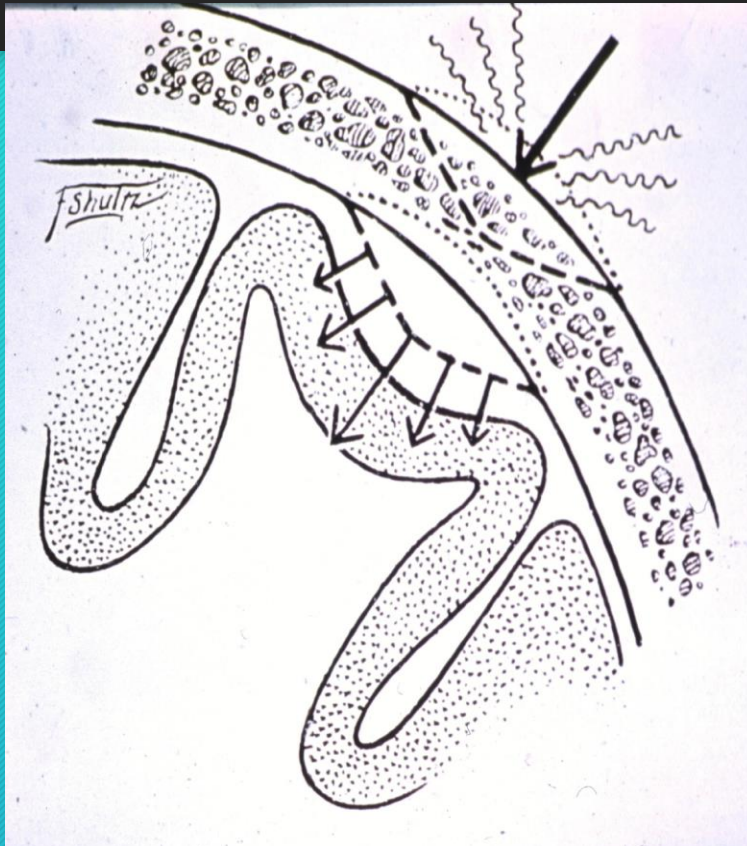
Physics in a Thumb Tack



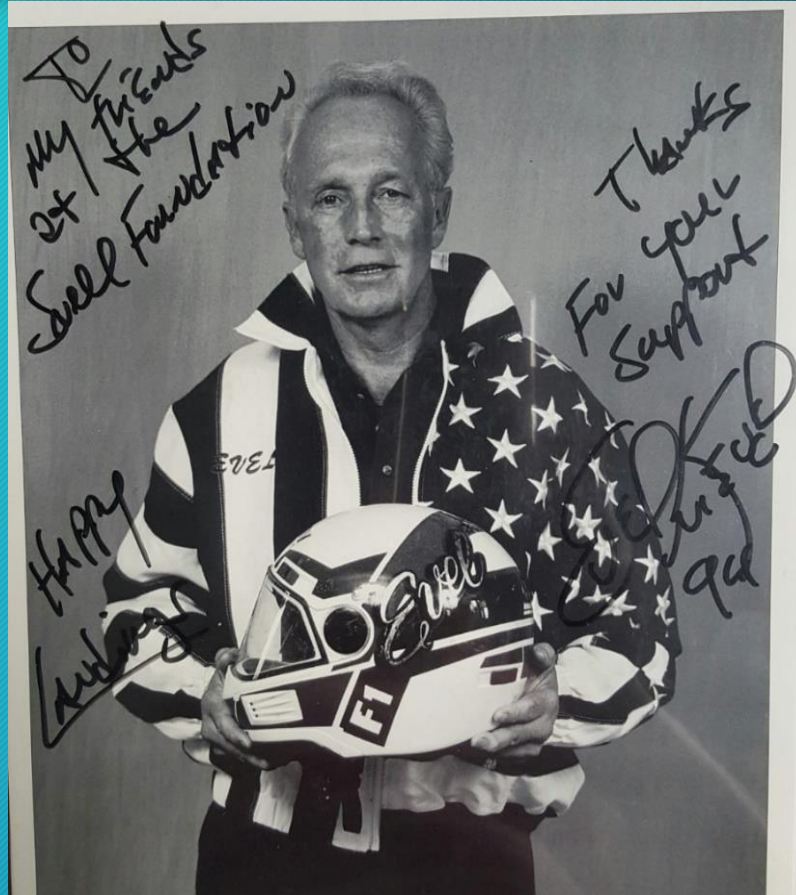
Hard Shell / Spread the Force



Skull Fracture and Hemorrhage



Snell Helmets Save Lives.



Snell Tests For Public Safety

- Snell Web Site Helmet List
- Updates Each Day
- Certified Helmets by Name and Size
- Decertified Helmets Noted



Snell's Mission

- Evidence based Helmet Standards
- Premium Protective Helmets
- Injury Prevention Education



SCCA National Hall of Fame 2015



Helmet Dos and Don'ts

- Replace every 5 years.
- Fasten chin strap.
- Clean with only soap and water.
- Do not cut or alter the helmet liner.
- Do not put helmet near hot muffler or engine.
- Do not place helmet atop mirror or handle bar.



Snell's Mission

- Evidence Based Helmet Standards
- Premium Protective Helmets
- Injury Prevention Education



We Don't Make Helmet.
We Make helmets Safer.



www.smf.org

More Information

- Videos in Snell Youtube Channel
 - How Helmet Works to Protect the Brain
 - Why Helmet Standards Matter
 - Snell Lab Tour
- Snell Facebook/Twitter
- Call Snell Lab and Office: 916-331-5073



Last Words

- Riders have no direct indicators of helmet protective capability
- Riders can look for indirect indicators (e.g.: a serialized Snell sticker)
- There are reasonably foreseeable crashes that will exceed a helmet's protective capabilities.
- In serious crashes riders need all the impact management capability a helmet can offer.
- www.smf.org 916-331-5073 for more info

