

Prevention of head Injuries

36th SITEMSH Congress, 13.03.2018. Arosa (CH)

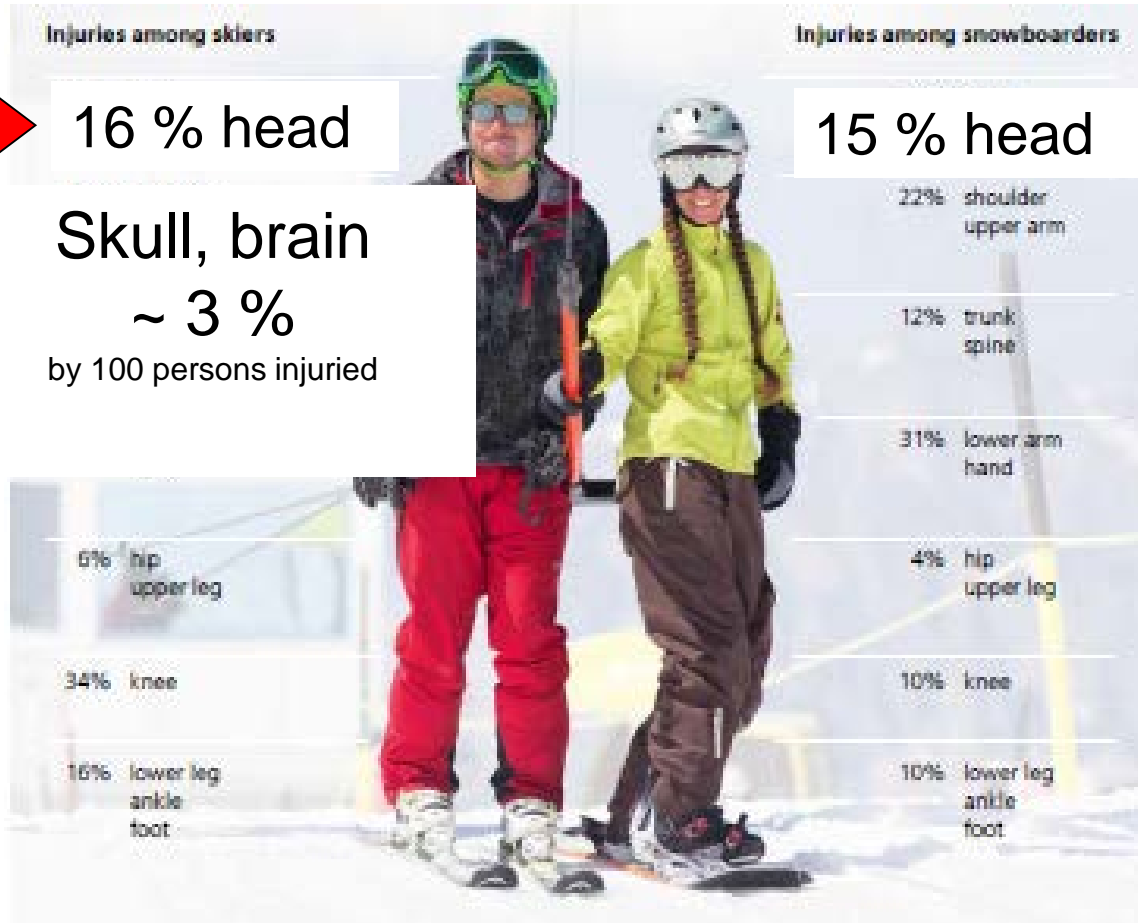
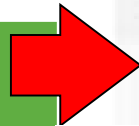
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Injury localization in snow sports, (Ø 2010-2014)

Type of sport	injured persons
Skiing	51,000
Snowboarding	14,000
Total	65,000



Total of sports accidents among the Swiss population:
 410,000 injured persons with medical treatment
 (Ref. www.bfu.ch → STATUS, 2017)

Injury Control Strategy: Haddon-Matrix

Phase	Agent: human	Vector: energy	Environment
Pre-event	Risk behaviour	Speed	Slope design
	Readiness Skiing skills	Equipment	Visibility
Event	Fall experience Constitution	Helmet-wearing PPE	Collision object
Post-event	Compliance Age	First Aide	Rescue service

Individual protective gear in snow sport: Survey of wearer behaviour and reasons for non-wearing

Objectives

- Barriers and facilitators
- Target group

Methods

- In 21 winter-sports resorts
- 1'500 – 2'000 face-to-face long interviews 2003/2007/2008/2010/**2018**
- ~5,000 observations 2003/2005-2016



bfu campaign: 2003 – 2007



 Enjoy sport – protect yourself

Schweizerische Vereinigungstelle für Unfallverhütung, www.bfu.ch
Bureau suisse de prévention des accidents, www.bpa.ch
Ufficio svizzero per la prevenzione degli infortuni, www.upi.ch

ASA | SVV
Schweizerischer Versicherungsverband
Association Suisse d'Assurances
Associazione Svizzera d'Assicurazioni

bfu campaign «1000 Accidents a Day» 2007-2010



1000 Accidents per day
Protect yourself with a helmet

 bfu
ASA | SVV
Die Schweizer
Versicherer

Aim of the campaign «1'000 Accidents a Day»

To promote the **wearing of helmets** by skiers and snowboarders

by influencing **behavior-relevant factors**

- awareness of danger
- perceived vulnerability
- comfort

Focused on **13- to 30-year-old** mainly beginner and intermediate snow sports participants



bfu campaign 2017+

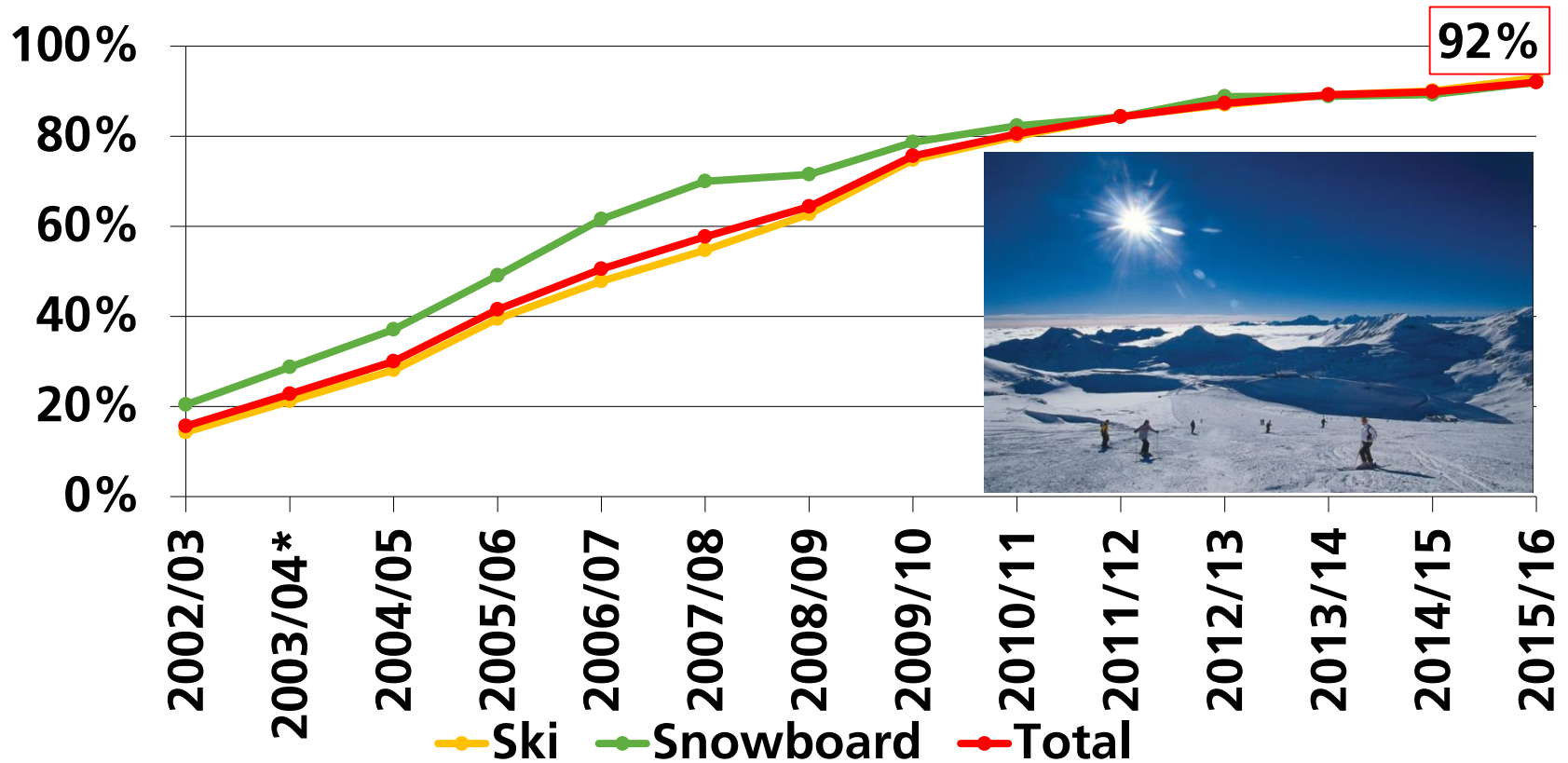


~("Even slower and
You're gonna drive backwards ")

→ Better tips on: sport.bfu.ch

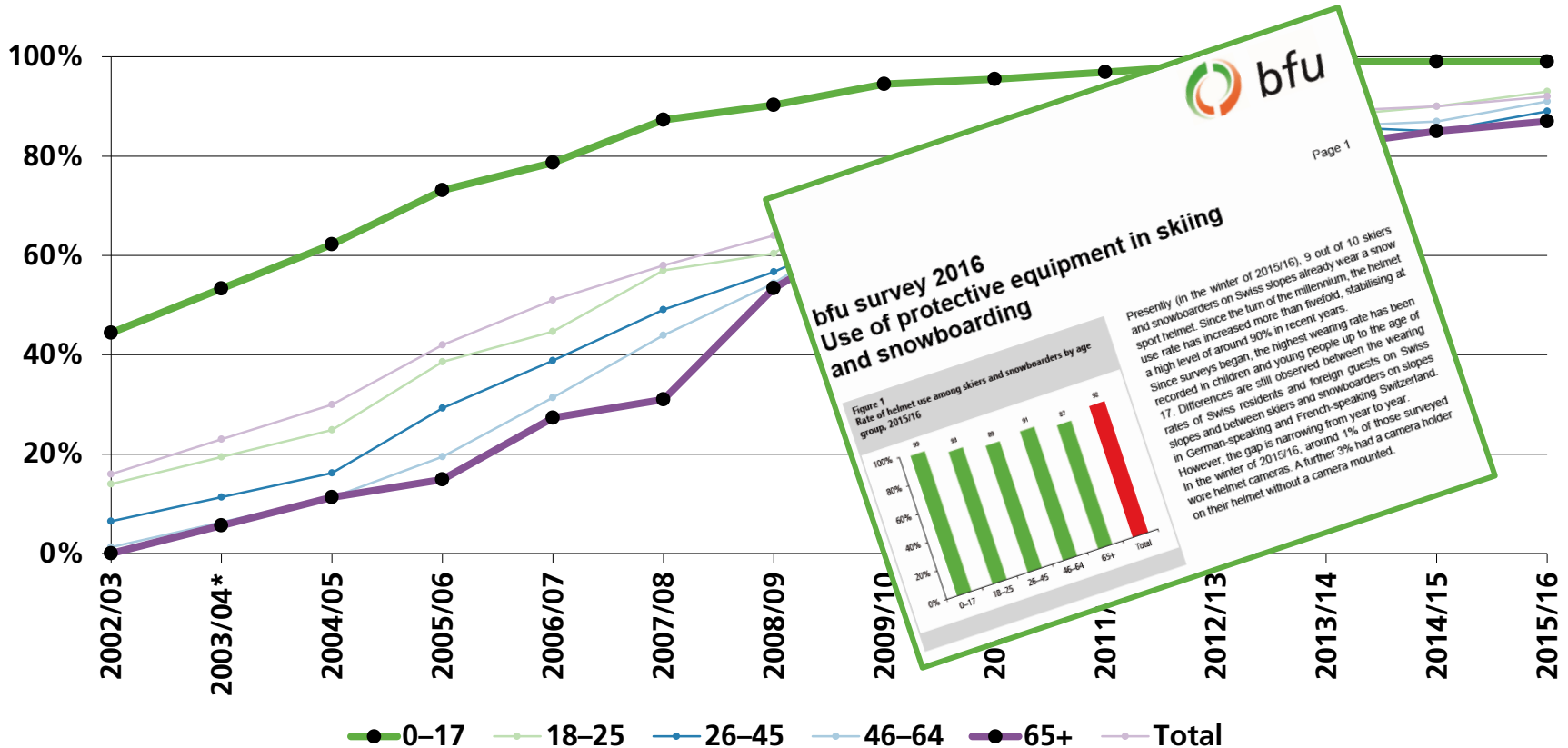
~~("think about what you do in sports"
– "stop sport accidents")

Rate of helmet use in Switzerland



Source: bfu, person recorded (sample) p. a. 5,000-7,500

Rate of helmet use in snowsports, by age



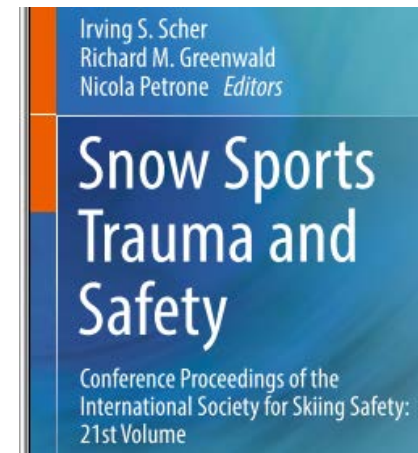
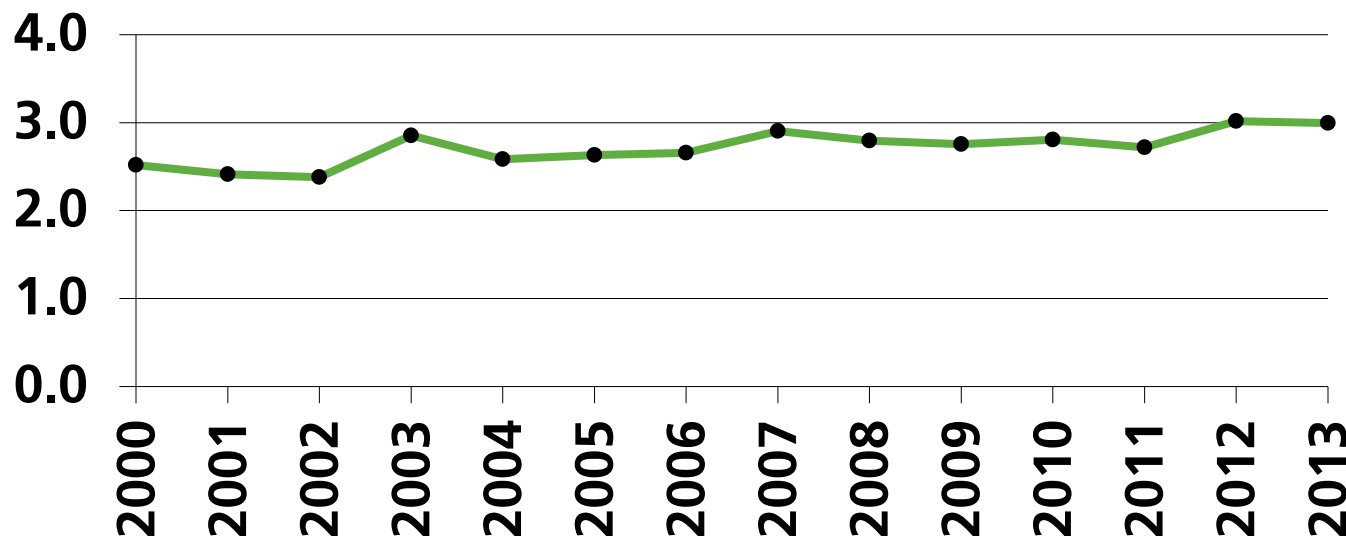
Source: bfu, person recorded (sample) p. a. 5,000-7,500

Injury risk and development

2.9 accidents per 1000 skier-days (SD)

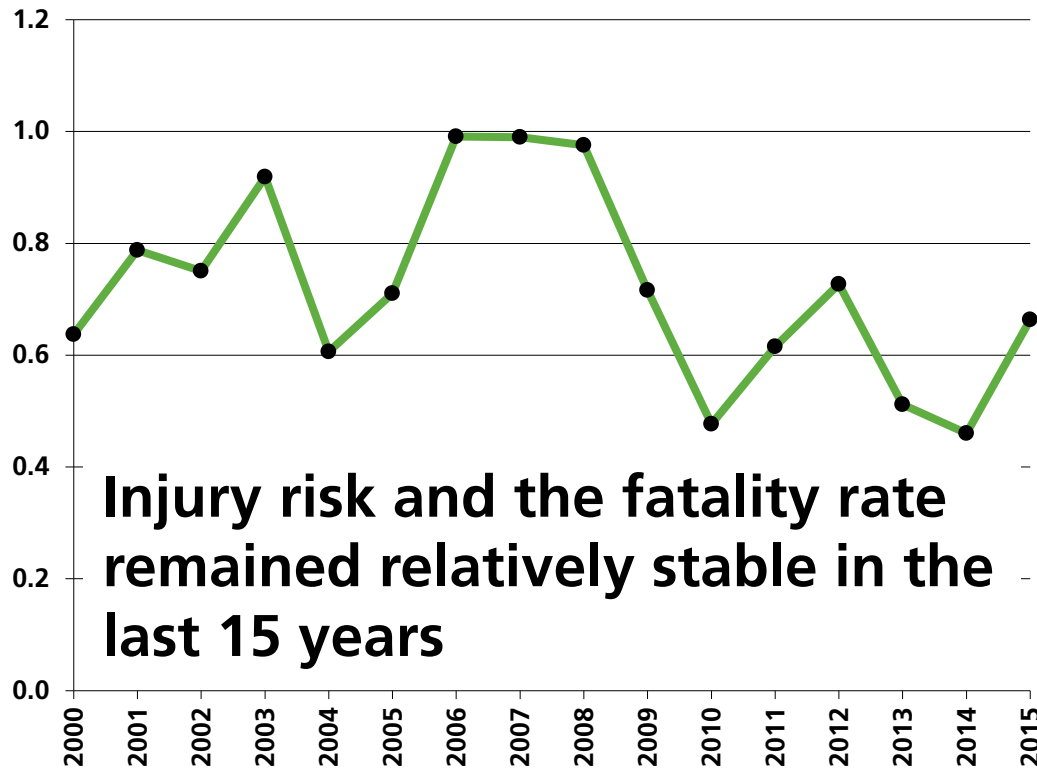
with: 2.8 skiers/1000 SD & 3.1 snowboarders/1000 SD

Ref: Bianchi et al. 2017, 29-39

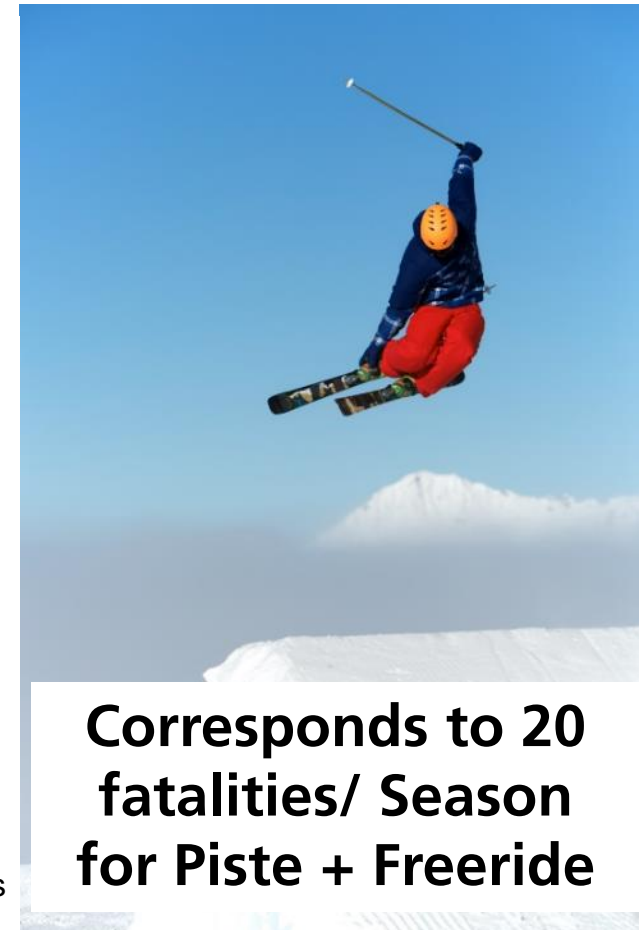


Injury risk remained relatively stable in the last 10-15 years

Fatality rate: 0.6 deaths per 1 million skier days



Injury risk and the fatality rate remained relatively stable in the last 15 years



Ref: Bianchi et al. Snow Sports Trauma and Safety: Conference Proceedings of the International Society for Skiing Safety: 21st Volume, 2017, 29-39

A reduction of severe head injuries

- Increase of the helmet wearing rate → Reduction of the risk of head injuries (Shealy et al. Skiing Trauma & Safety 20th Vol. (2015); Bailly et al. Wilderness & Env. Med. 2018)
- « ...,the hoped for benefit with regard to death has not been shown» (Shealy et al., ISSS 2017 p. 29)

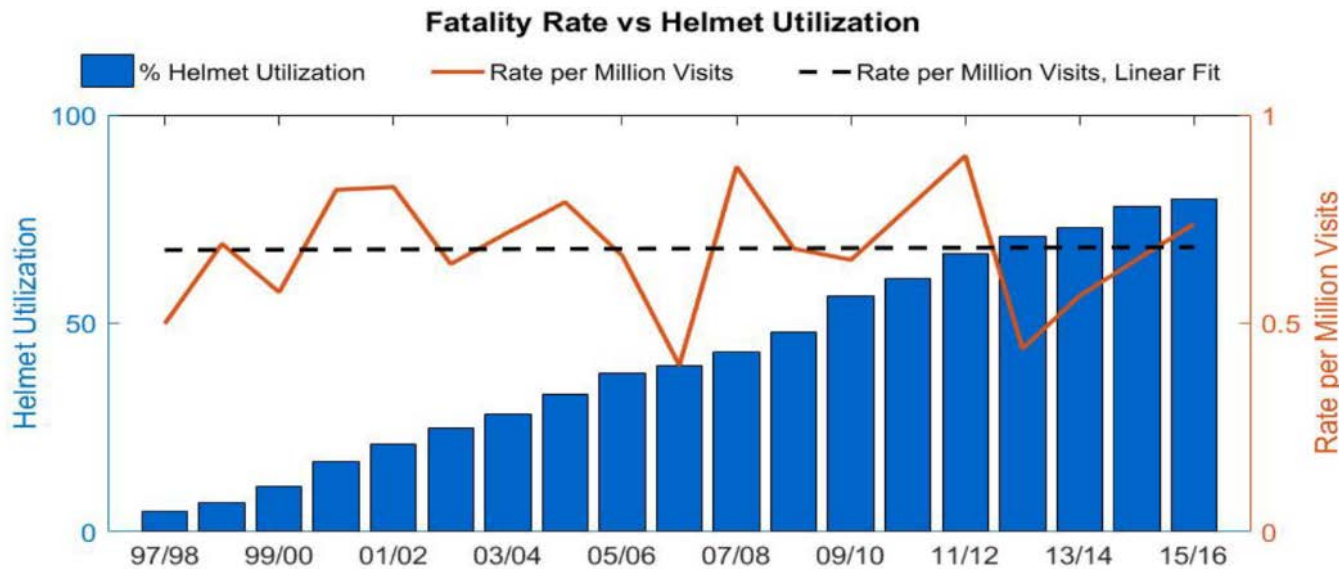


Figure 1. Fatality Rate/Million visits vs Fraction of population using Helmet.

Racing helmet conform to FIS specifications 2013

ASTM 2040 / EN 1077A

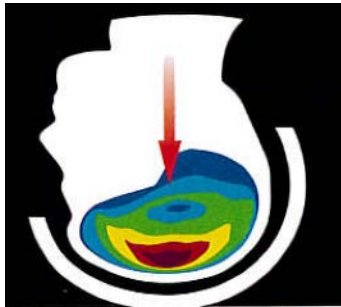
And:

Testing procedure EN 1077A
with 6,8 m/s,
instead of 3.84 m/s resp. 2.71 m/s

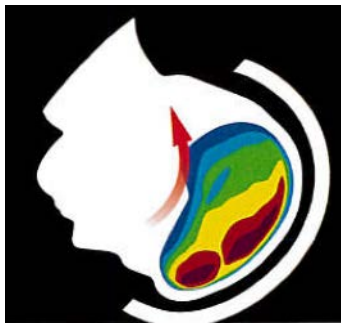


«Helmet with FIS standard offers higher protection mechanism»

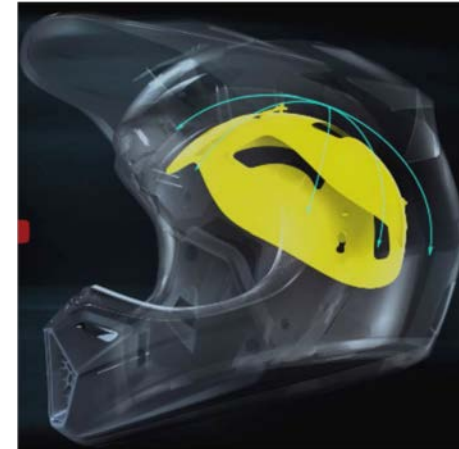
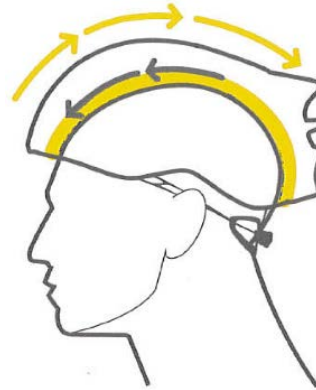
Multi-directional Impact Protection System (MIPS)



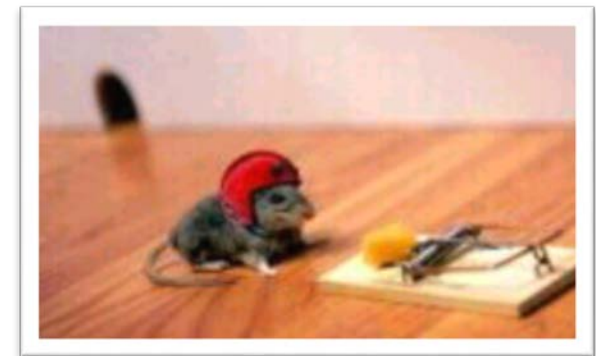
Linearer Aufprall

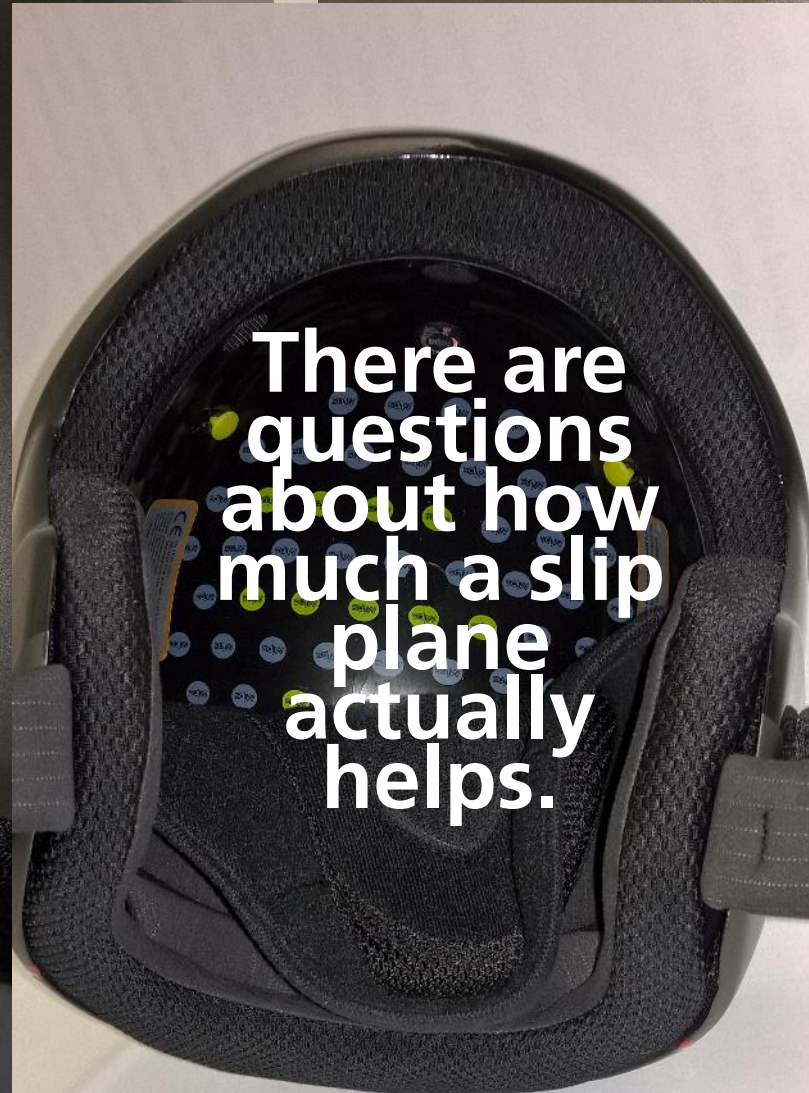


Rotationsaufprall



To reduce the rotational component of an impact





Biomechanical effect of MIPS technology

Patrick Isler
(2018) Dynamic
Test Center,
Vauffelin (CH)

(on behalf of the bfu)

«The results have shown that a slip plane in helmets (MIPS) provides improved protection against rotational loads.»



The bottom line

- The protective effect of snow sports helmets has been proven
- The protective effect can still be improved further

→ slip planes (e.g. MIPS)?

→ SPIN pads (“shearing pads inside”)?

→ airbag technology (e.g. Hövding)?

→ honeycomb?

→ air-filled bladder?

→ Multilayer concept?

→ More rounded design (esp. in Cycling)?

→ Effect of a helmet mounted camera?

Helmets.org (2018): « ...any spur to innovation in what has been long stagnant period for new helmet technology is very welcome»



Swiss Council for Accident Prevention

Swiss Competence and
Coordination Centre for
Accident Prevention
thanks for your interest

www.bfu.ch