# CENTRO DI TRAUMATOLOGIA DELLO SPORT
# CHIRURGIA ARTROSCOPICA

## UNITA' OPERATIVA DI RIABILITAZIONE SPORTIVA

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www.traumasport.net

# Prevention and treatment of training injuries in Italian Alpine Skiers


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*CENTRO DI TRAUMATOLOGIA DELLO SPORT E CHIRURGIA ARTROSCOPICA*

*FEDERAZIONE ITALIANA SPORT INVERNALI COMMISSIONE MEDICA*

*INTERNATIONAL SKI FEDERATION*



IRCCS – ISTITUTO ORTOPEDICO R. GALEAZZI - MILANO

# Alpine ski

high risk of trauma..

# injuries

## Indirect traumas

## Direct traumas


**during training or races**

# ..during TRAINING

- ✓ **Possible and common lesions in all sports**
- ✓ **During training (gym or skiing)**

**New equipments have modified the training methods: high working loads**

# ..during RACE

- ✓ high speed falls
- ✓ direct trauma against gate or security systems (barriers, air fence..)



# Race

**DOWNHILL & SG: 130-140 Km/h**

- ✓ **Falls**
- ✓ **Wrong landing after jump**

# Race

## SL & GS

✓ **during curve: the shape of new carving ski does NOT allowed to recover the right balancing position → spring effect ("effetto molla")**

# *Not all falls are so severe as they seem...*

**Vitalini - Kitzbuhel**

# &
# *viceversa…*

**Compagnoni – Albertville ’92**

# Italian Alpine Ski team

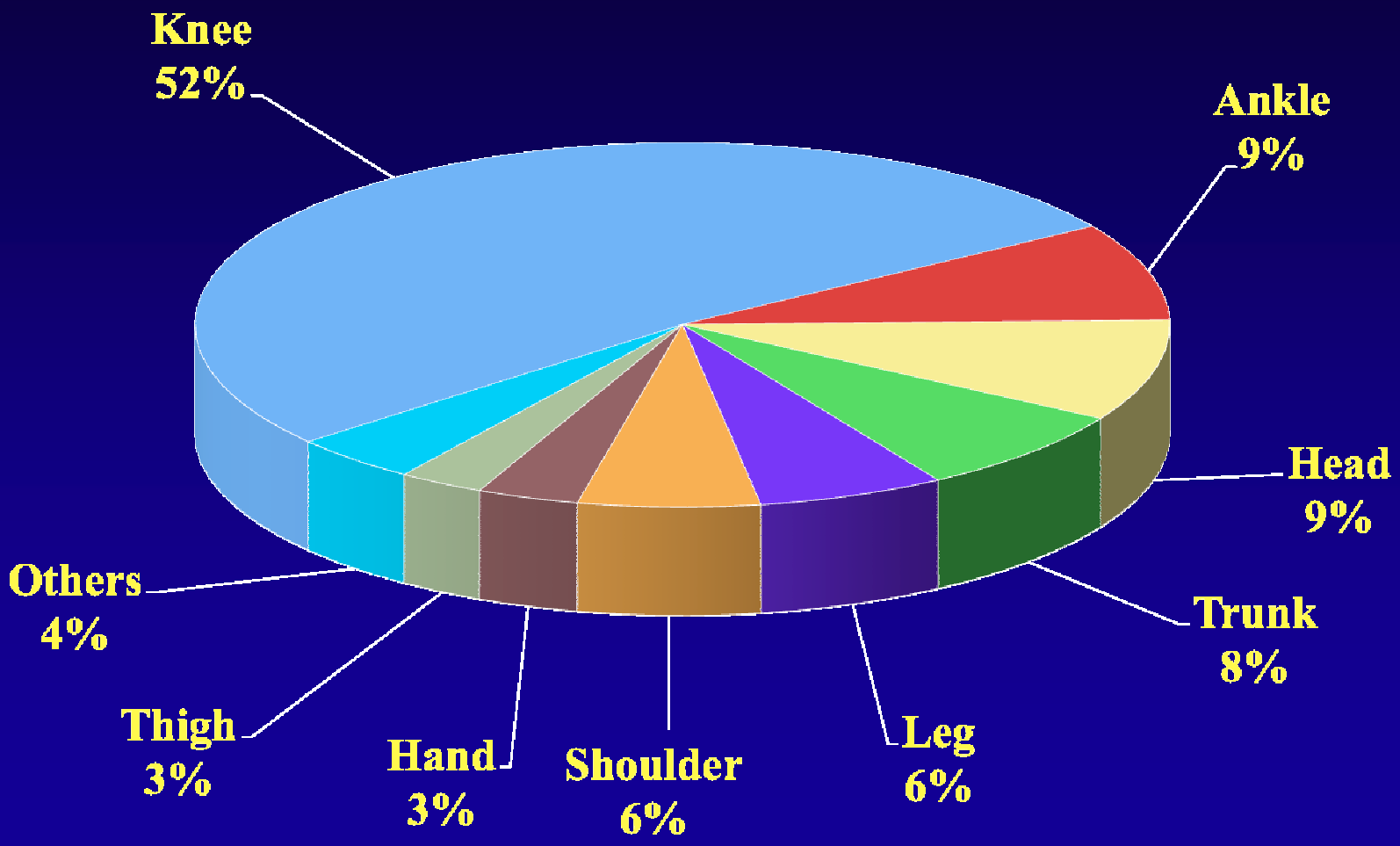
**1985 - 2009** ⇒ **≅600 ATHLETES**

**≅ 850 Injuries**

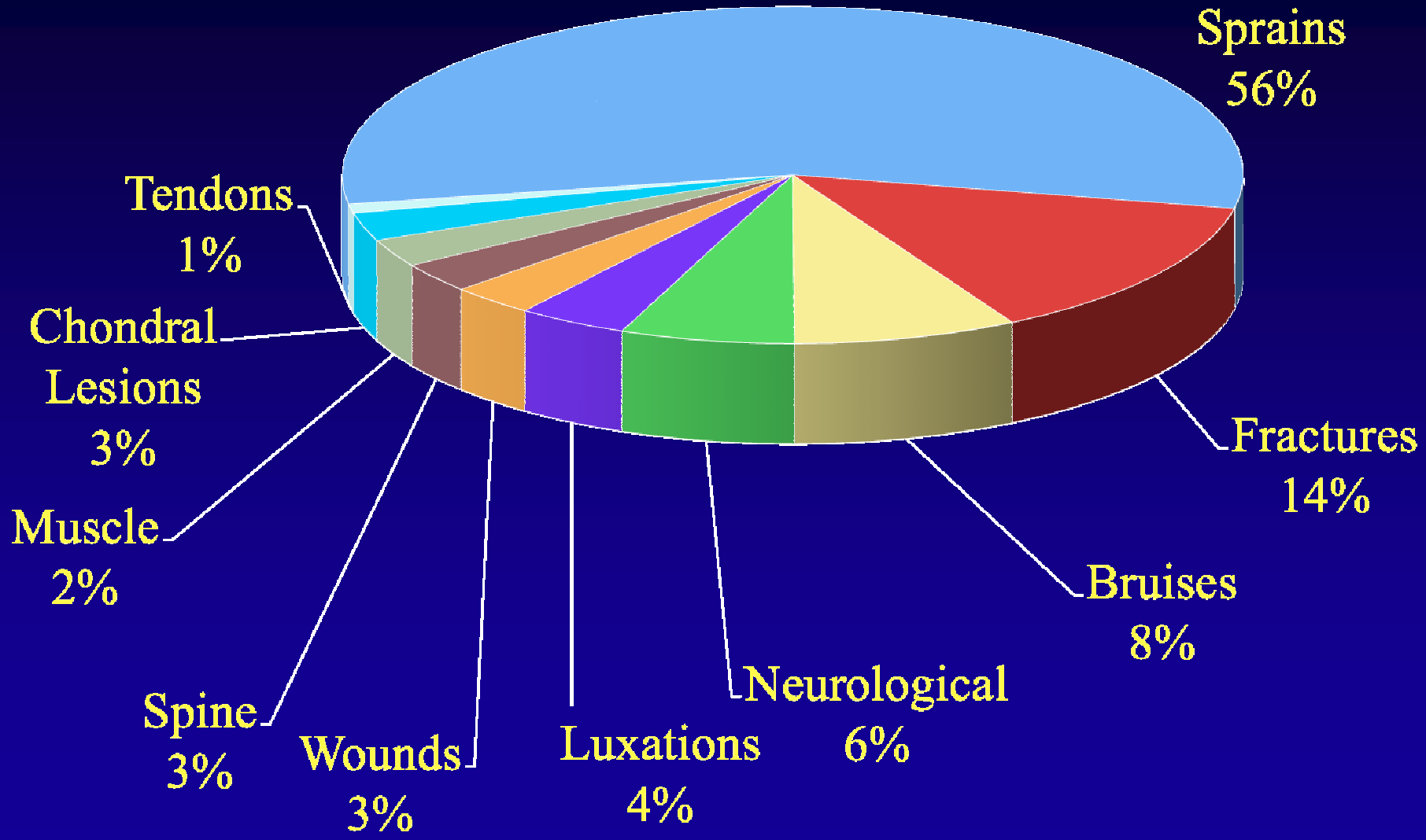
**≅ 450 knee lesions**

Archive of Italian Medical Commitee

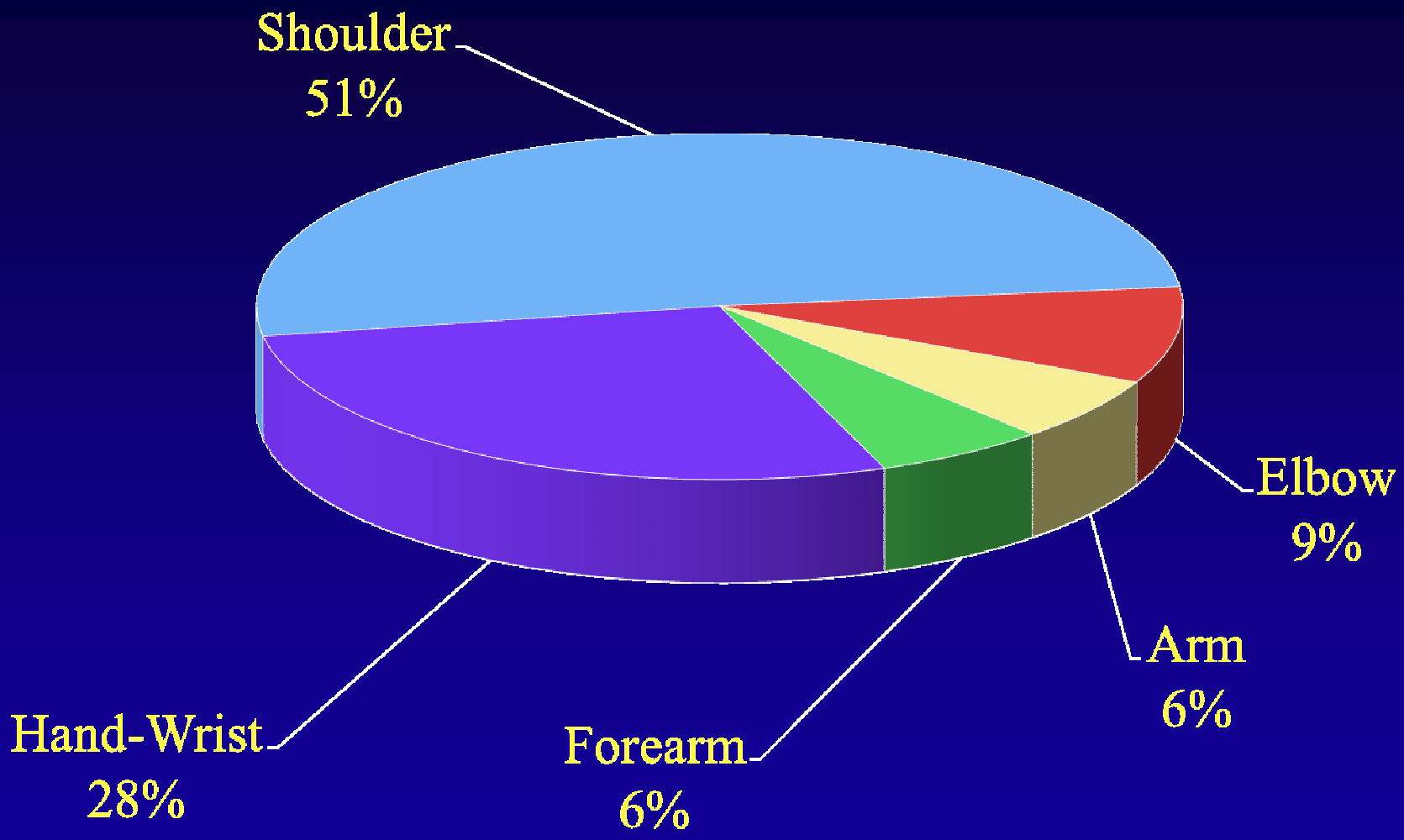
# Lesions: localization



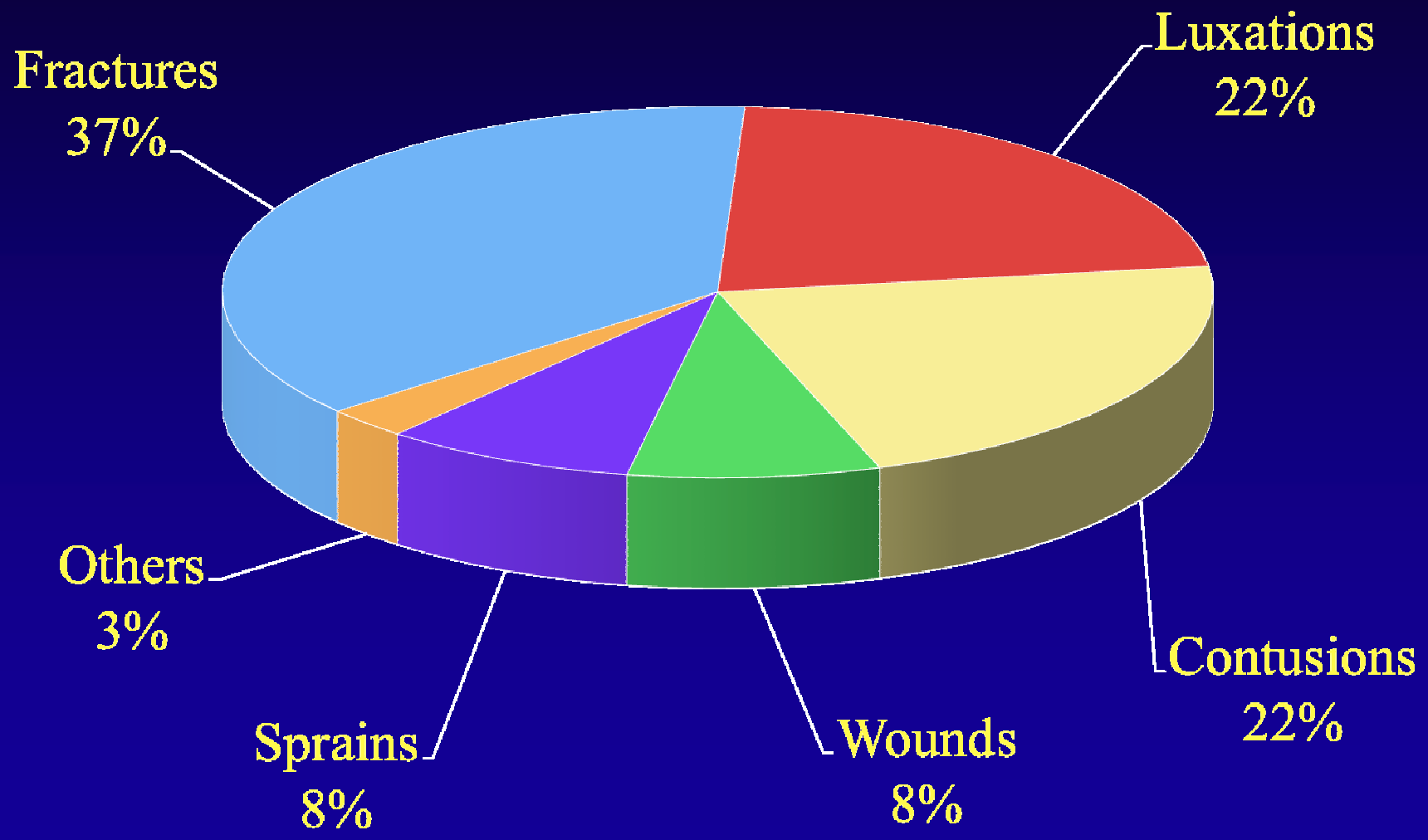
# Injury Types



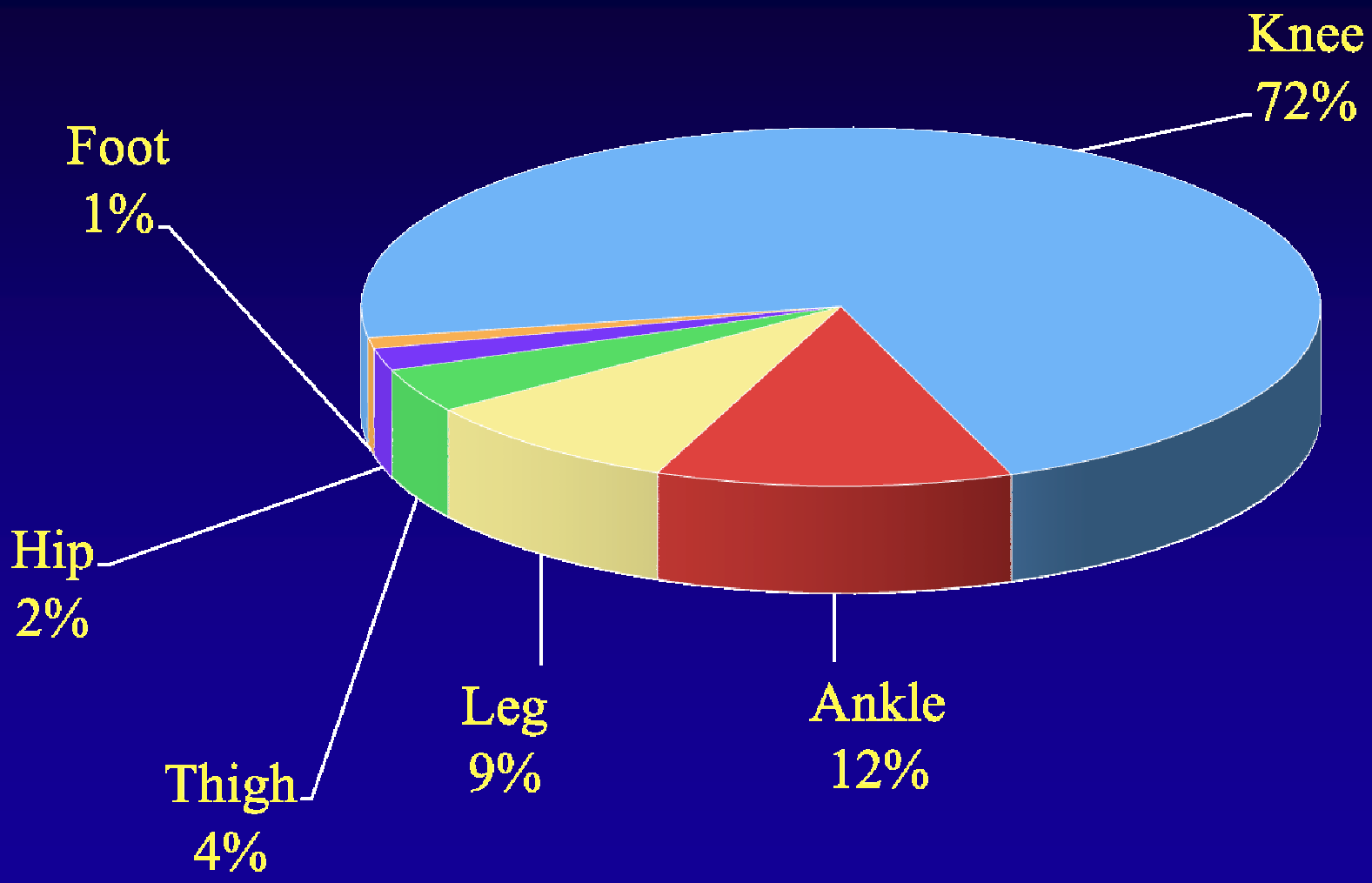
# Upper limb



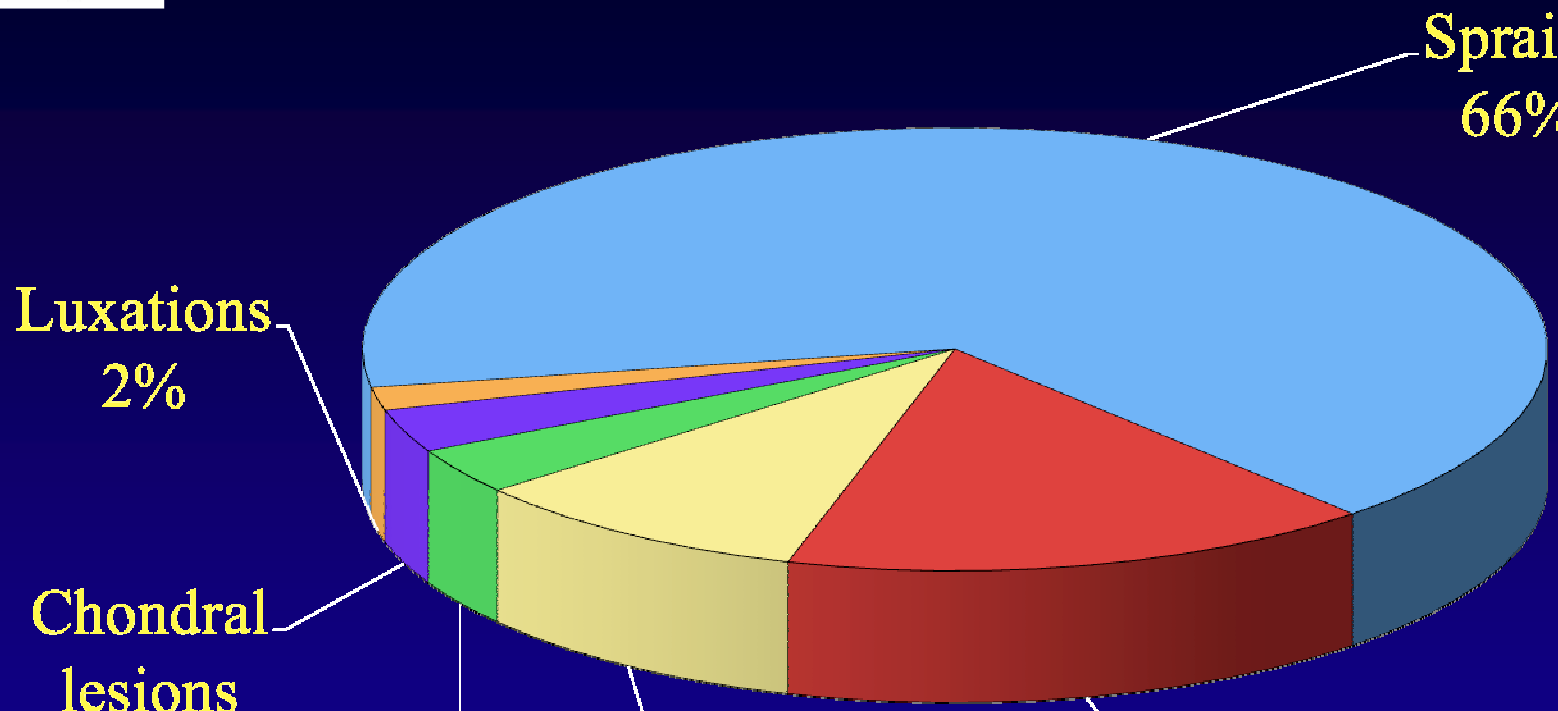
# Injury Type: Upper limb



# Lower limb



# Knee lesions



# Epidemiology

**The international literature has shown that ACL tear rates vary also by sport:**

**Alpine skiing:**
**Incidence (new lesions/year)**
**40-65 tears/100.000 exposures**

**A meta-analysis of the incidence of ACL tears as a function of gender, sport and a knee injury-reduction regimen – Chadwick C. et al. – Arthroscopy Vol 23, No 12, 2007 pp 1320-1325**

# Epidemiology

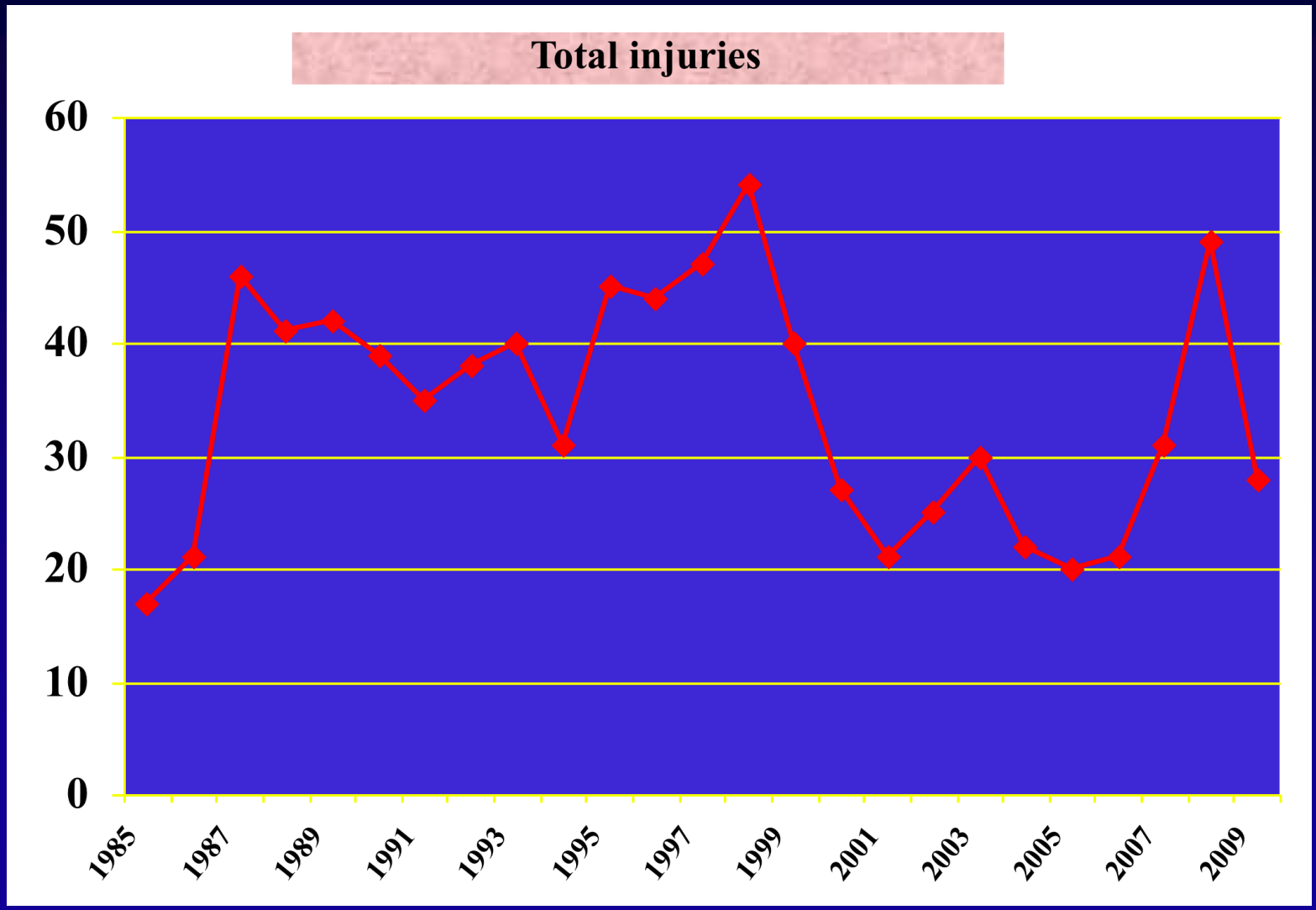
- training/races: 1500 hours/season
- 150 athletes

**Incidence (ACL injuries/1000 player-hours of match/training)**

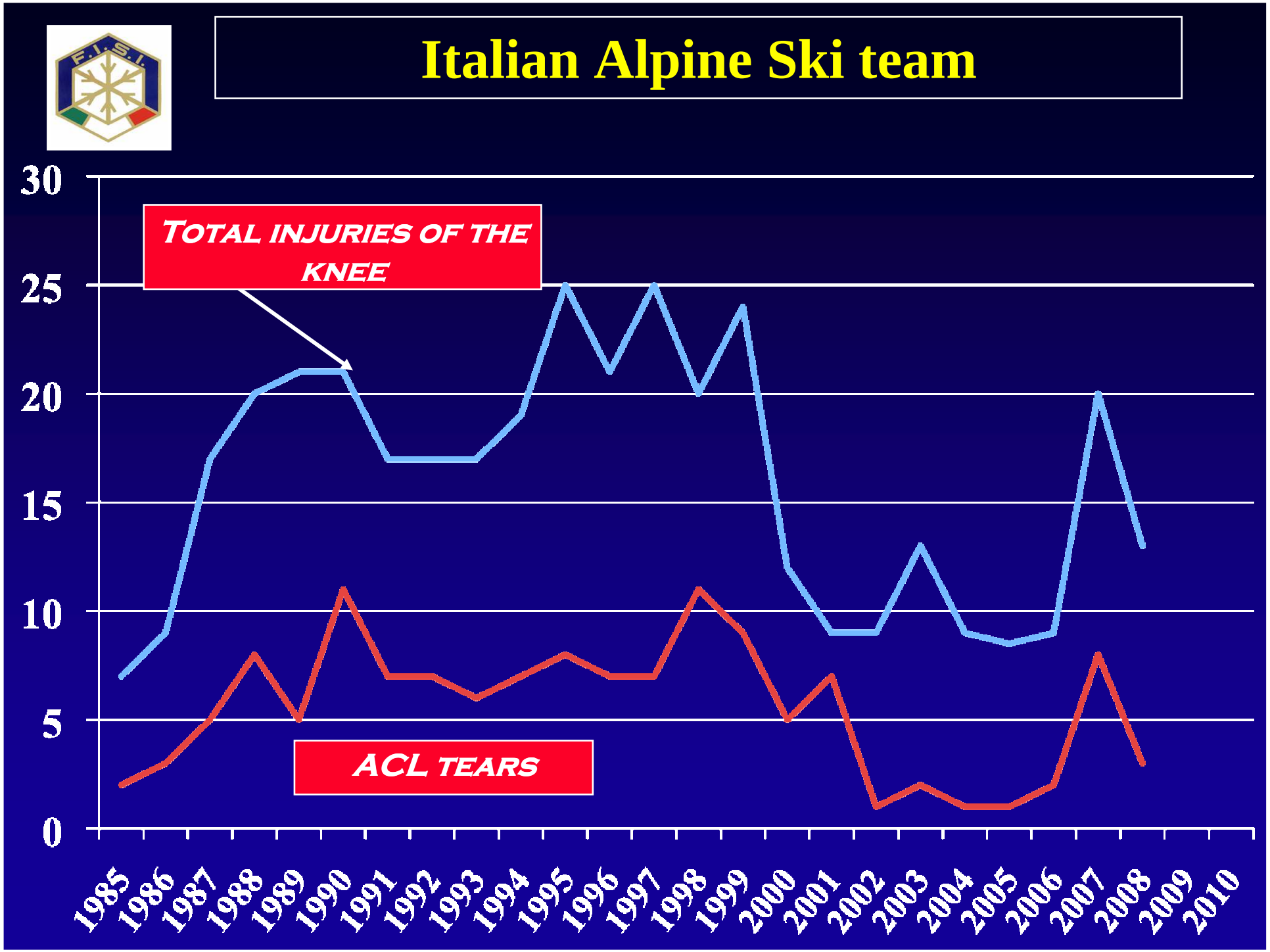
**0,023**

**(5.54 year/150 athletes - 3,5/1000h)**

# Italian Alpine Ski team



# Italian Alpine Ski team



# Mechanisms of injury

- **Specific** → **Skiing disciplines: SL & GS**

  **Sprains (knee/shoulder)**

- **Generic** → **Skiing disciplines: SG & DH**

  **Skeletal Traumas / Traumatic brain injury**

# Specific Mechanisms of injury

# Mechanisms of injury *(Knee)*

- **Valgus stress (rare)**
- **Varus stress (rare)**
- **Valgus external rotation**
  - **Falling back recovery**
  - **Steep landing**
  - **Flat landing**

# The evolution of ski & boots

**‘60**

**‘90**


**2000**

# The evolution of ski & boots

**‘60**

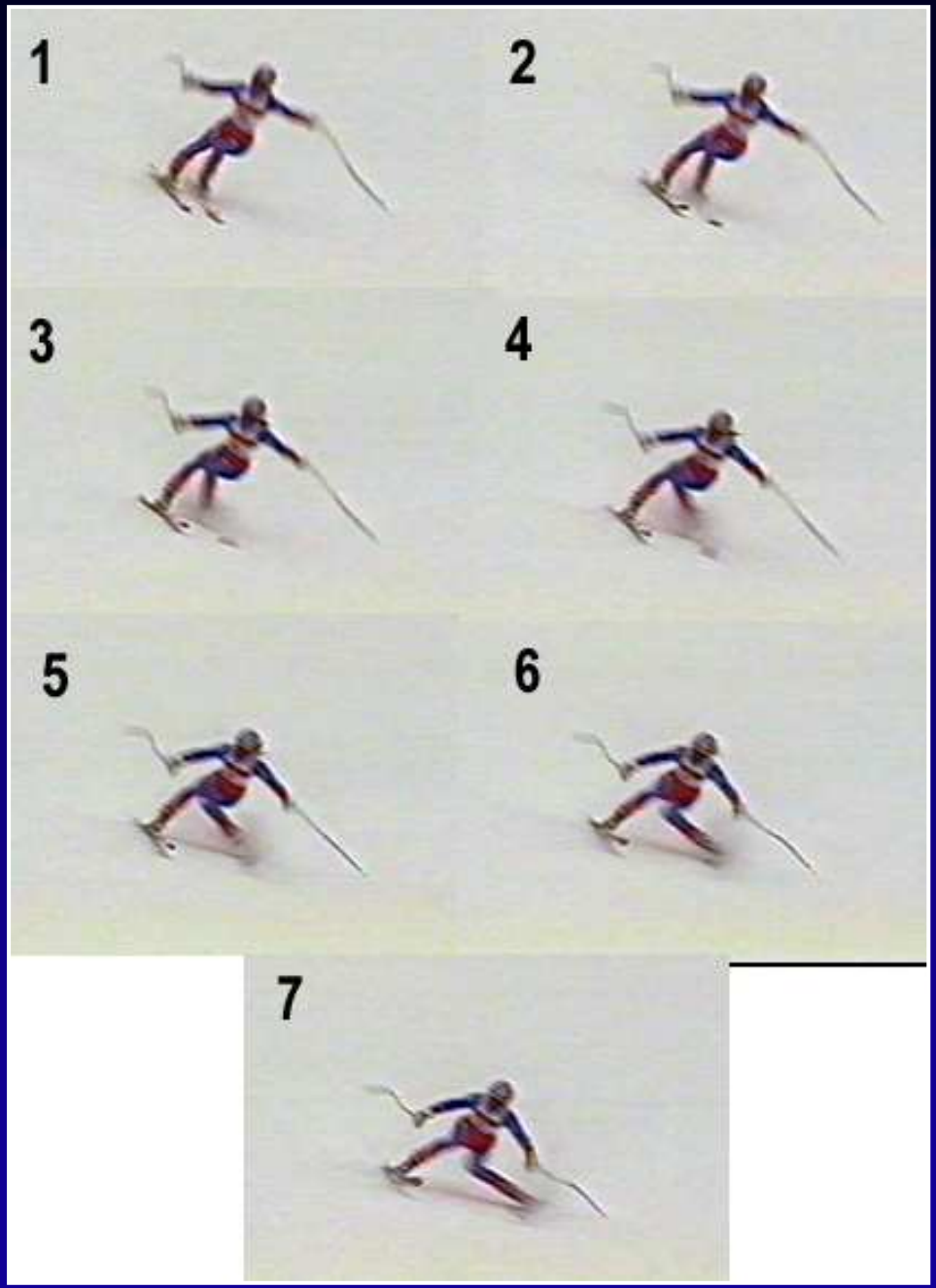
**‘90**


**2000**


# Increase in boot height and new ski shape have changed the anatomical site mainly exposed to injuries



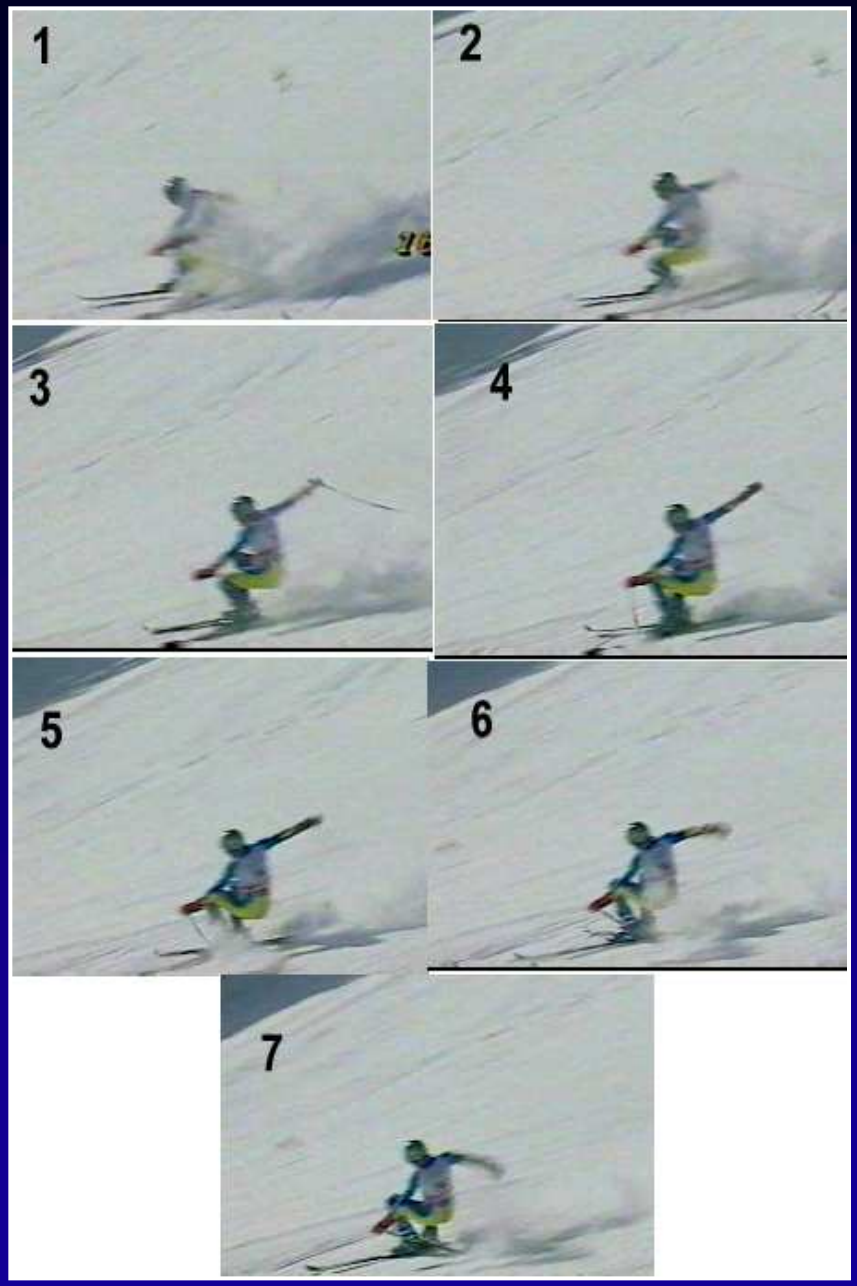
*"Valgus External rotation"*



Masnada F. (Veysonnaz 1996)

ACL Right & Left

*"Falling Back Recovery"*




**Rieder (Soelden 2007)**

**ACL Left**

*“Steep Landing”*

Rzehak P. (Kitzbuhel 1992)

ACL Left

# Mechanisms of injury *(Shoulder)*

- **Trauma caused by wrong use of poles**
- **Falls with externally rotated, abducted & extended upper limb**


Von Grunigen M. (St. Anton 1994)

Luxation right shoulder


Luxation
1:25.1

# Generic Mechanisms of injury

Albrecht – Kitzbuhel 2009

Costazza – Beever Creek 2008

# Prevention


SKI SAFETY...
AN INDUSTRY BLOSSOMS
HELMET
ROLL BAR
DRAG CHUTE
AIR BAG
TREE FEELER

# Risk situations

**Complete lost of control**


**Impossible active prevention**

**Lost of weight balancing**

**Possible active prevention**

# The 2 levels of prevention…

## A) Passive

- Equipment

Ski, Bindings, Boots
Helmet and body protections

- Tracks

tracks preparation
security barriers
chart race course

## B) Active

- Recognize & correct the risk situations
- Adequate technical gesture
- Athletic training

# PASSIVE PREVENTION

## *1- Equipment*

Ski - Boots - Bindings



**Quality & adjustment of equipment**

**International rules (F.I.S.)**

- **Size of ski**
- **Shape of ski**
- **Height of boots**

Helmets - Body protections


# PASSIVE PREVENTION

## *2- Tracks*

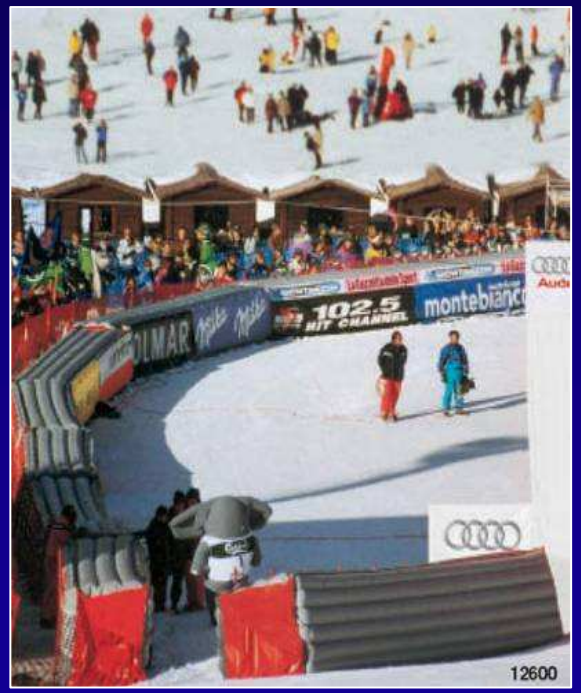
Preparation of track

**Type A barrier**

**Type B barrier**

**Type C barrier**

# “Air fence”

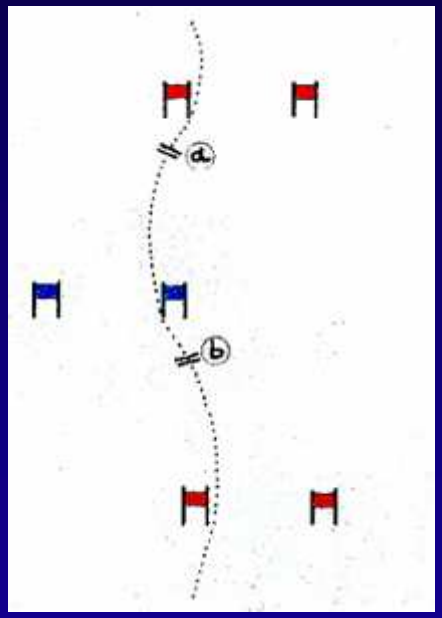
# Efficient barrier

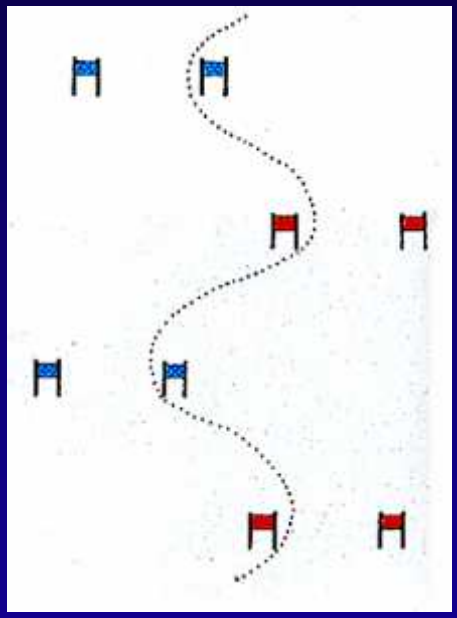
# NOT efficient barrier

# PASSIVE PREVENTION

## *2- Tracks*

Race Track Charting



**International rules (F.I.S.)**

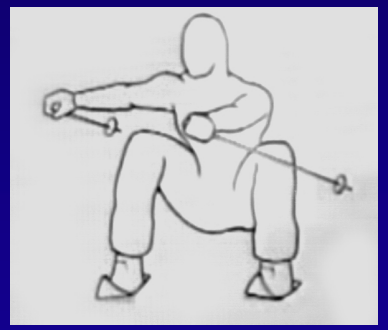
- **number of gates**
- **angle degree and distance between the gates**

# Potential Risk Situation

Lost of weight balancing

**Fall**

**Not Fall**



**Knee iperflexion**

**STRESS for ACL!!!**

# ACTIVE PREVENTION

## 2- Adequate technical gesture

Pay attention to the weight balancing
Avoid knee iperflexion

# ACTIVE PREVENTION

## *3- adequate training*

**Objectives: increase in force, agility & proprioceptivity**

# ACTIVE PREVENTION

*3- adequate training*

## ECCENTRIC FORCE: YO YO SQUAT

# THANK YOU