

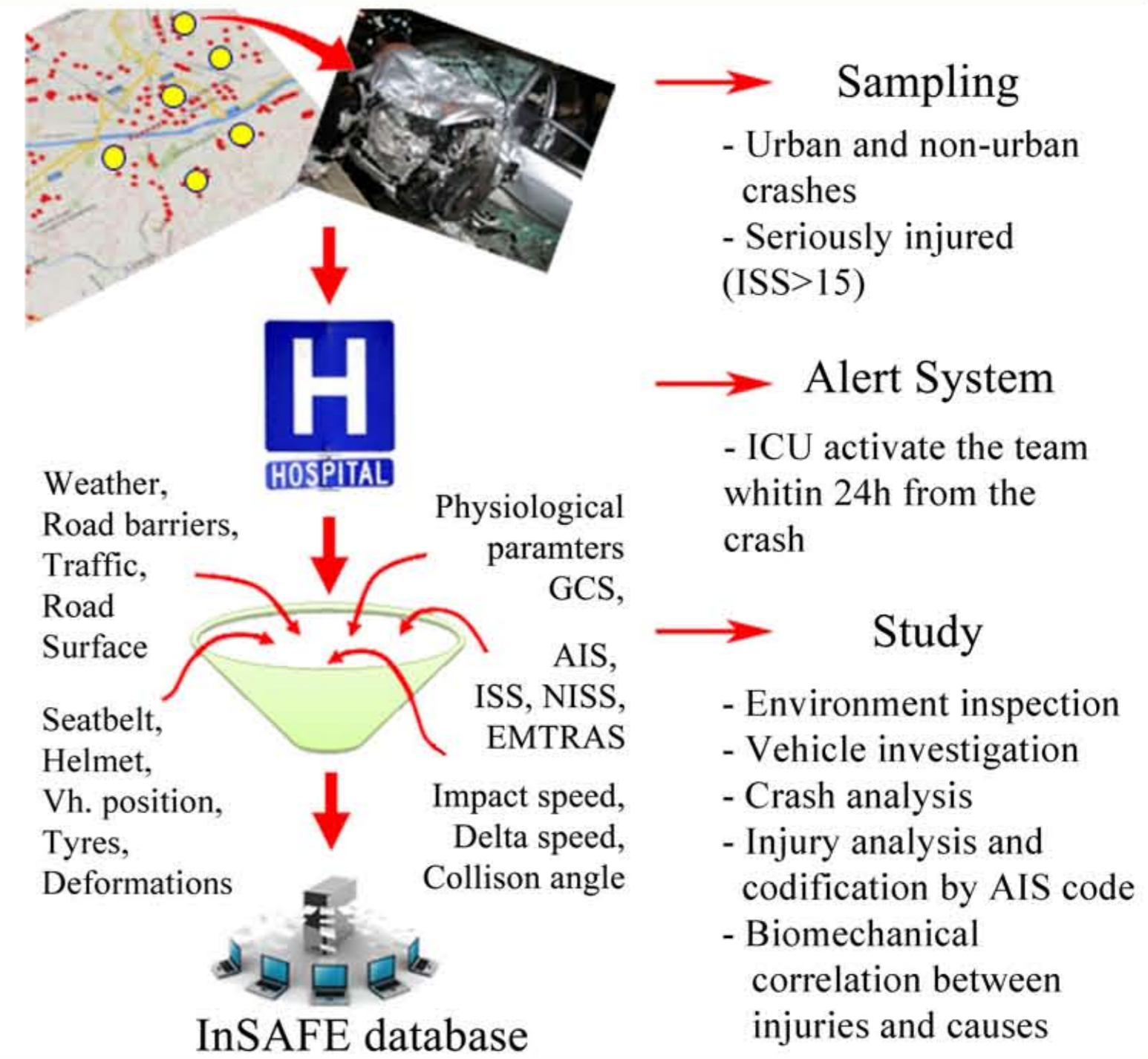
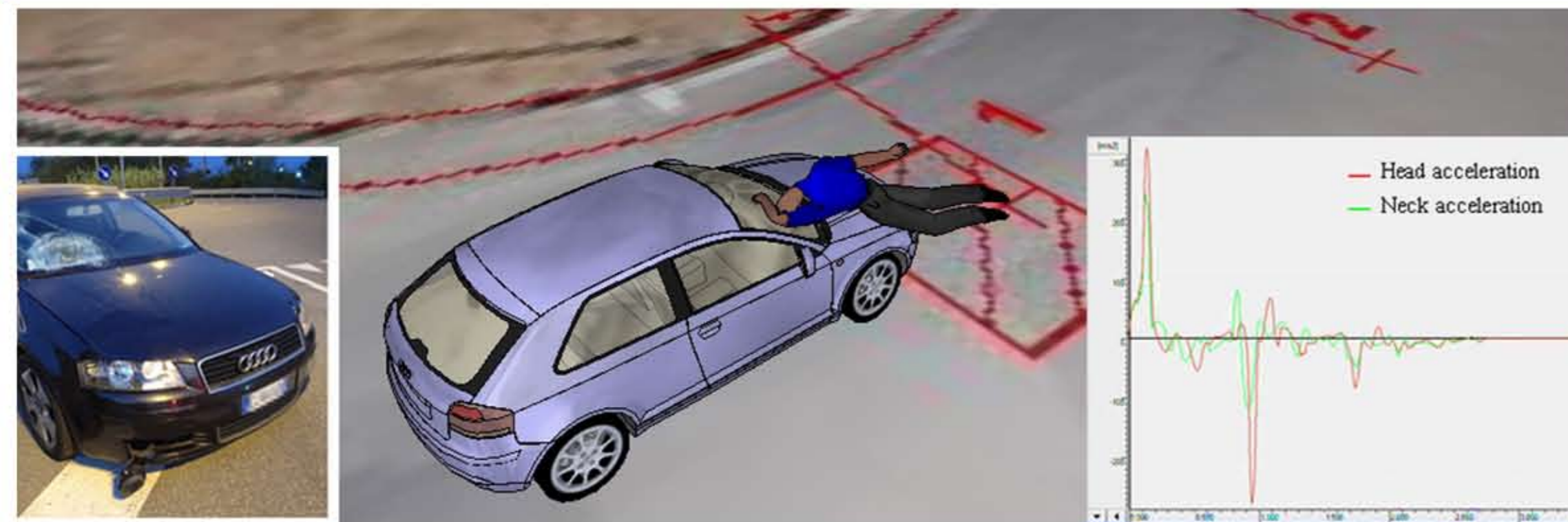
## INTRODUCTION

Road accidents are the eighth leading cause of death in the world, and the leading cause of death for young people aged (15-29). Over a third of the traffic deaths are among pedestrians and cyclists (Vulnerable Road Users - VRU) [1]. In Italy the road accidents are the first leading cause of death in the age group of 15-45 year old [2]. Comparing the 2013 Italian national road accident data with the previous year, there was a decrease of 3.5% for injuries and 9.8% for fatally injured persons in road accidents. Nevertheless, the urban roads count the 75% (136,438) [3].

In-depth road accident studies assess the crash consequences and are useful to develop or to evaluate of new safety devices.

The research presented here provides an overview on the injury typologies, severities and the principal causes of the injuries occurring in urban crashes.

## METHODS



Since 2009 a permanent team (physicians and engineers) performs in-depth road accident research on traumas admitted to ICU [4].

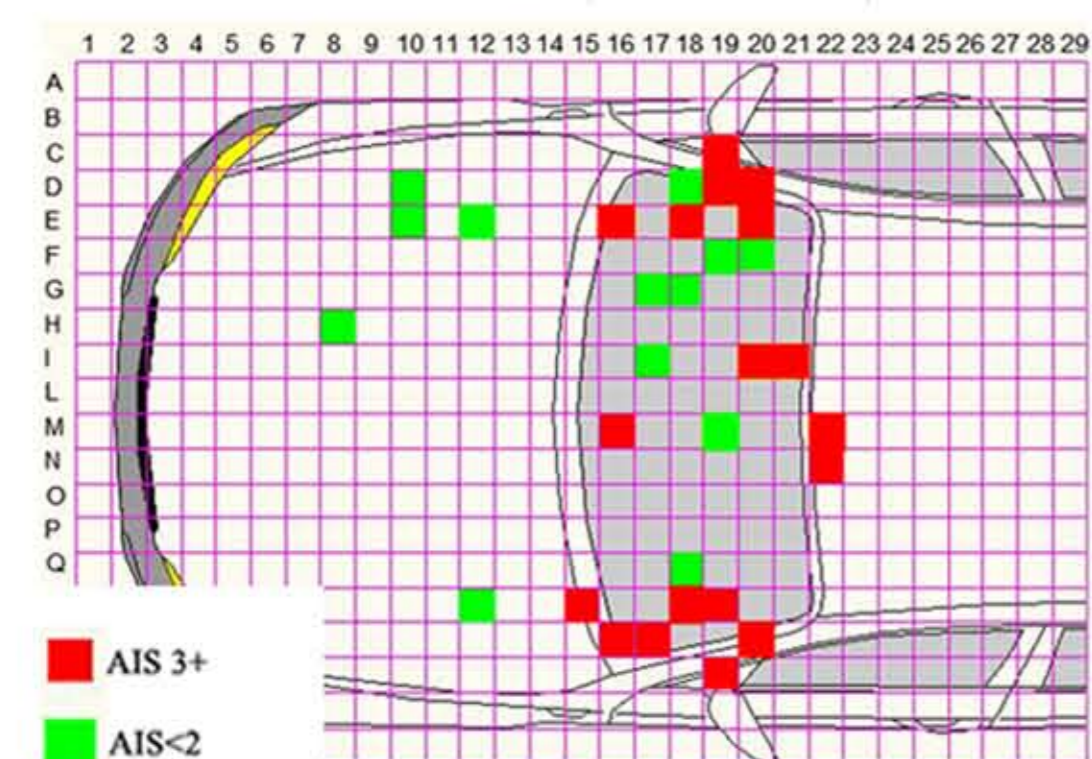
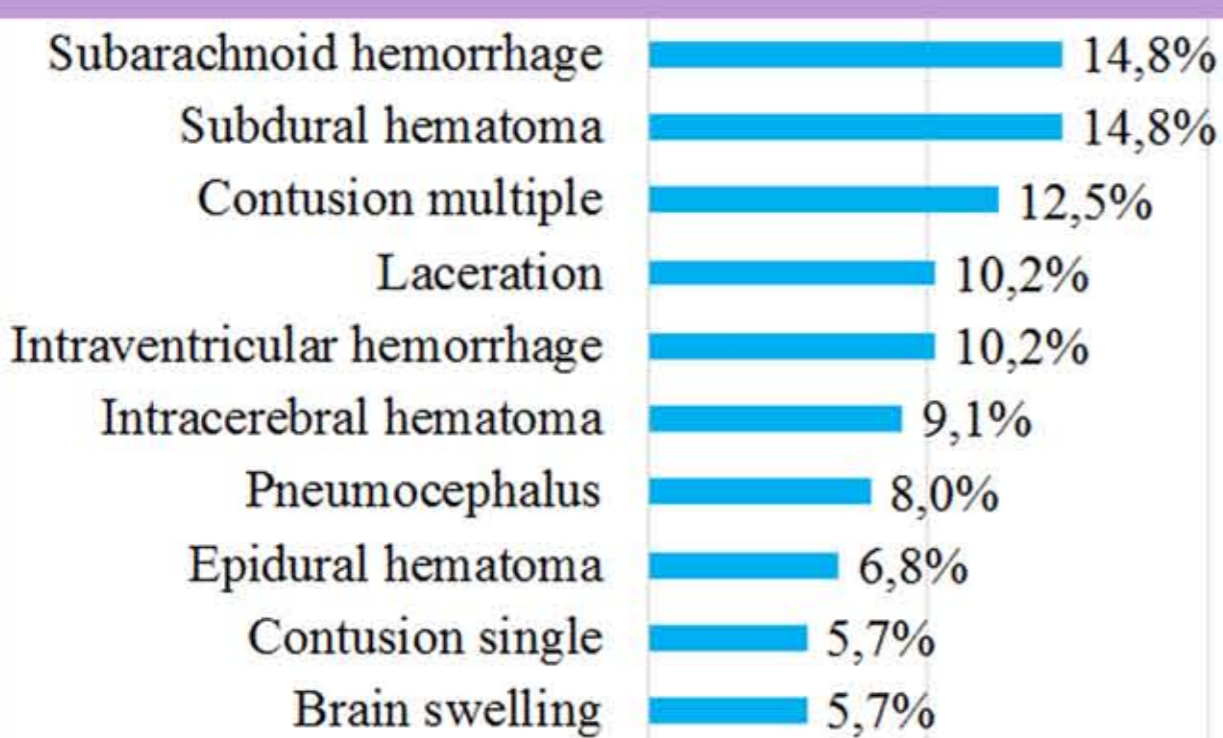
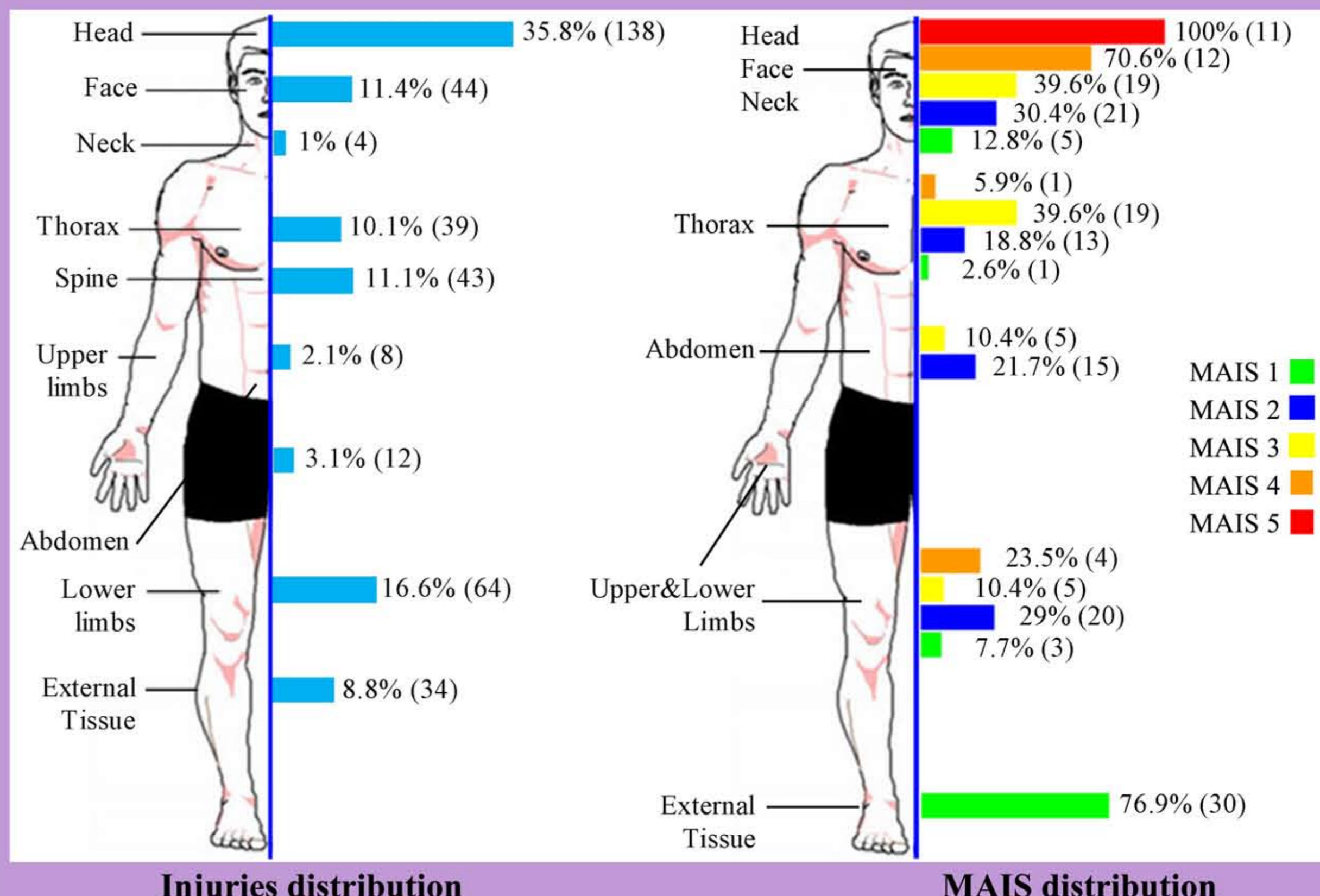
Clinical and crash data were cross-matched during the correlation process. Injuries suffered by each person were codified using the AIS code and related to specific impact objects.

The study analysed 52 serious VRU crashes occurred in urban area.

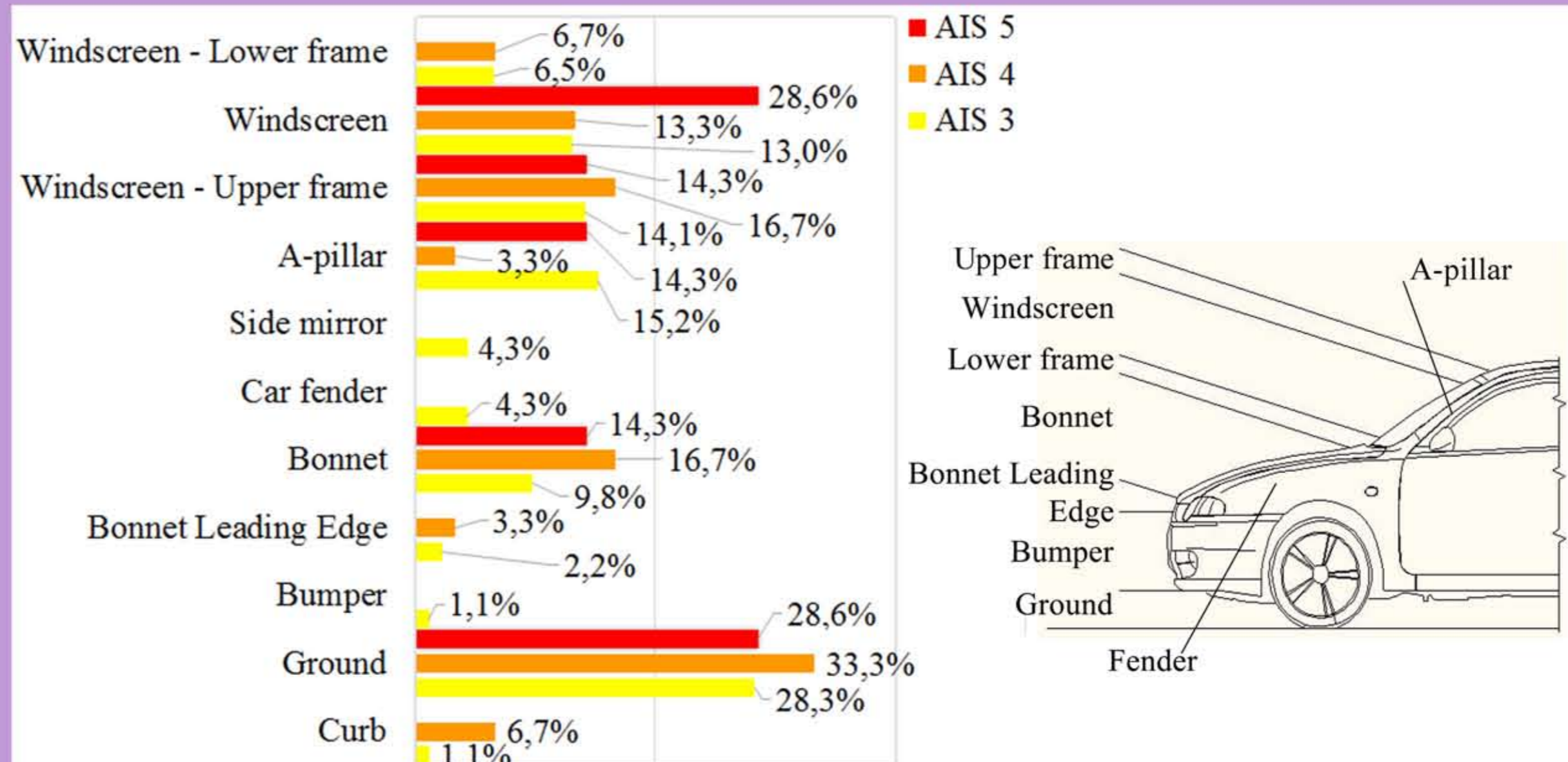
## RESULTS

	People [n°]	Impact speed [km/h] (SD)
Car-to-Pedestrian	26	41,1 (13,9)
Bus-to-pedestrian	3	40,3 (11,0)
PTW-to-Pedestrian	7	40,6 (4,3)
Bycicle-to-Pedestrian	1	43,0 (-)
Car-to-Cyclist	10	40,7 (15,9)
PTW-to-Cyclist	3	49,0 (5,4)
Single Cyclist	2	11,5 (3,5)

- ⇒ Cars are the most common vehicles involved in serious urban VRU crashes
- ⇒ Pedestrian are the most vulnerable (50%)
- ⇒ VRU's impact speed > 40 km/h
- ⇒ The average ISS is 21.5 (SD 10.9)
- ⇒ Head is the most severely injured region with 42% of MAIS 3+
- ⇒ Head and Face are the most frequently injured part with 182 injuries collected



Head Injuries & Impact Points Location



Injuries causes per MAIS3+

## CONCLUSIONS

1. The study is useful to point out in-depth data regarding injuries and their causes
2. Head is the most frequently and severely injured region
3. The most serious head injuries are caused by impacts with the rigid parts of the car
4. Need to use both passive (e.g. Airbag) and active (e.g. Autonomous Emergency Braking systems) safety devices able to make vehicle and ground impacts less harmful
5. Need to reduce vehicle impact speed to make smaller the injury severity

## REFERENCES

- [1] World Health Organization, Global Status Report on Road Safety, 2013
- [2] ISTAT, Leading causes of death in Italy, ISTAT, 2012
- [3] ACI-ISTAT, Road accidents in Italy in 2013, ISTAT, 2014
- [4] Piantini et al, Advanced accident research system based on a medical and engineering data in the metropolitan area of Florence, BMC Emergency Medicine, 13:3, 2013