

Submitted by the expert from Japan

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(59th GRSP May 9-13, 2016,
Agenda item 22(a))

Pedestrian Safety Research in Japan

**59th GRSP
9th-13th May 2016
MLIT / NTSEL**



Ministry of Land, Infrastructure, Transport and Tourism



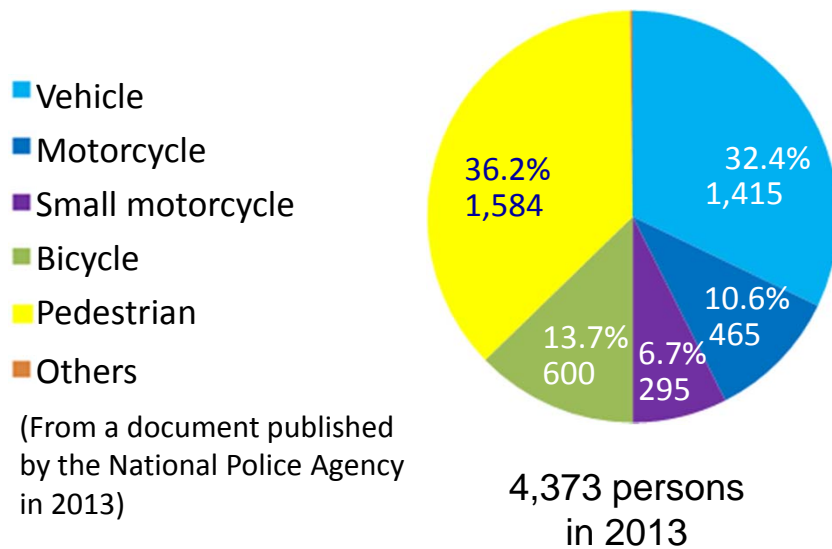
National Traffic Safety and Environment Laboratory

Macro Traffic Accident Study

Traffic accident fatalities by mode

Accident data

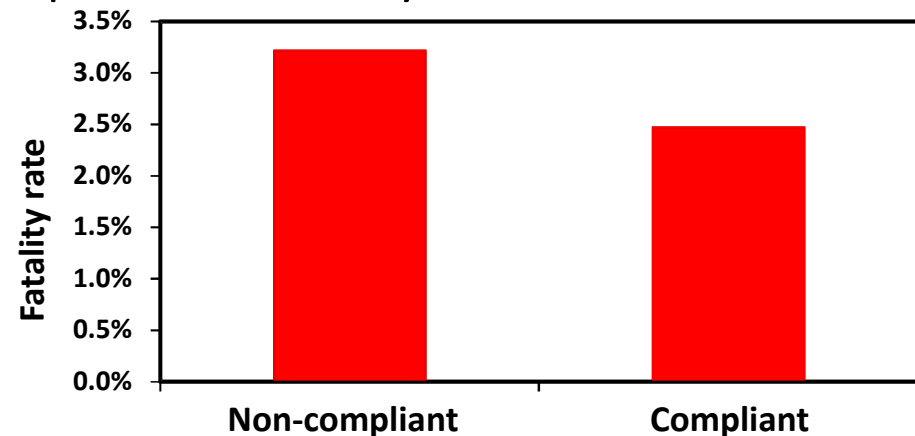
- Macro accident data for 2013
- Fatal accidents



Effects of the pedestrian safety standard

Accident data

- Macro accident data from 2012 to 2013
- Fatal pedestrian accidents
- M1 category vehicles
- Compliant/non-compliant with the pedestrian safety standard

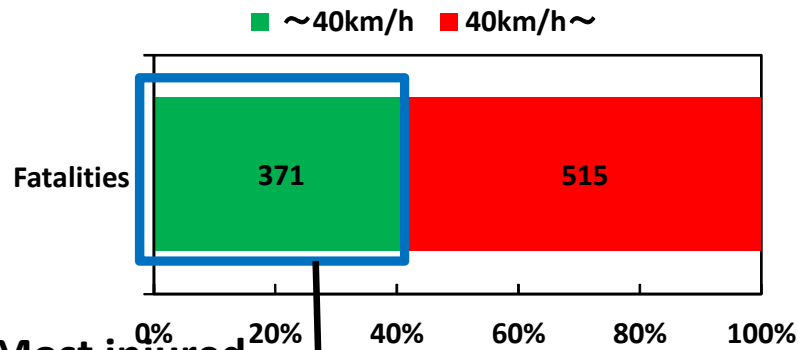


*From a document of the 3rd vehicle safety meeting for FY2014 conducted by MLIT

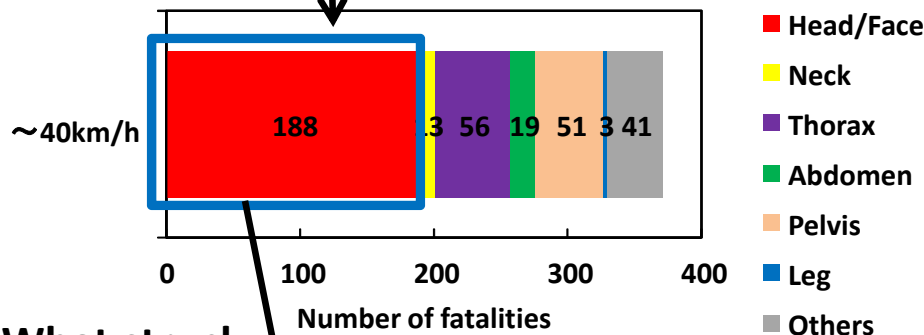
- Pedestrians accounted for the largest proportion of traffic accident fatalities.
- Pedestrian safety standard is effective in reducing the fatalities by traffic accidents .

Macro Traffic Accident Study

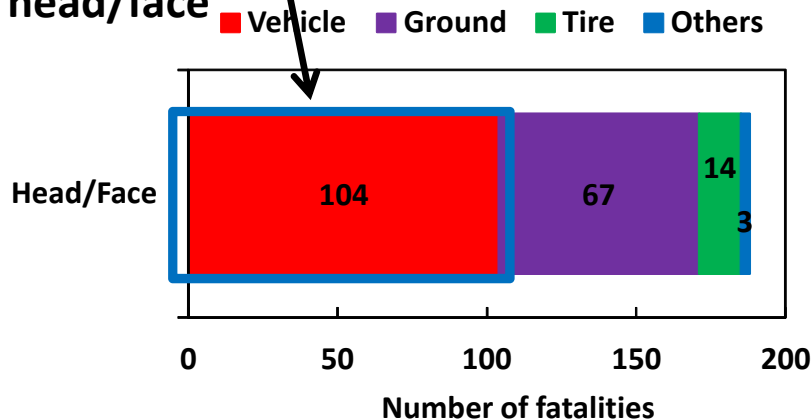
Travel speed of the vehicle



Most injured body region



What struck head/face

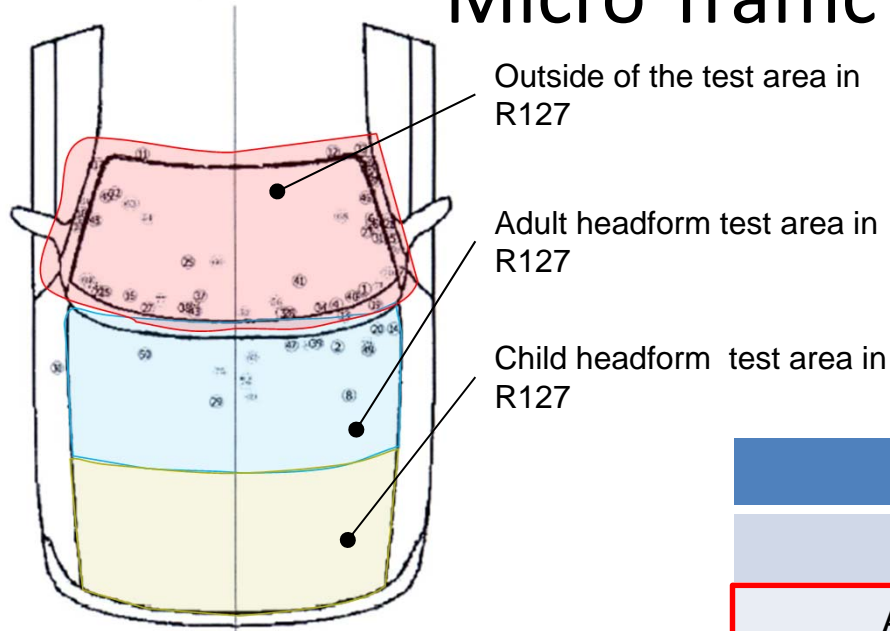


Accident data

- Macro accident data for 2008-2012
- Pedestrian fatal accidents
- Passenger cars (mini vehicles, sedans, mini vans) compliant with the pedestrian safety standard
- 42% of pedestrian fatal accidents occurred at 40 km/h or below.
- Of the fatal accidents that occurred at under 40km/h , 51% accounted for the cases that the head/face were the most injured body regions.
- In 55% of the above said fatal accidents, the head/face were hit by vehicle externals.

There is a potential to reduce pedestrian fatalities by further improving vehicles' pedestrian safety.

Micro Traffic Accident Study



O: Striking area of the vehicle in accidents with AIS2+ head injury in the micro accident survey

*From a report on results of detailed traffic accident research and analysis through medicine-engineering collaboration for vehicle safety in 2013 conducted by MLIT

Accident data

- Micro accident data from 1993 to 2012
- Pedestrian accidents with AIS2+ head injury
- Passenger cars and trucks with bonnet
- Accidents excluding children aged 10 or younger /below 140 cm in height

Striking area	No. of cases	Proportion
Hood	15	21 %
A-pillar periphery	23	32 %
Lower wind shield glass frame periphery	24	34 %
Upper wind shield glass frame periphery	2	6 %
Wind shield glass	6	9 %
Fender	1	1 %
Total	71	100 %

Lower wind shield glass frame and A-pillar peripheries are the major areas that struck head in pedestrian accidents with AIS 2+ head injury.

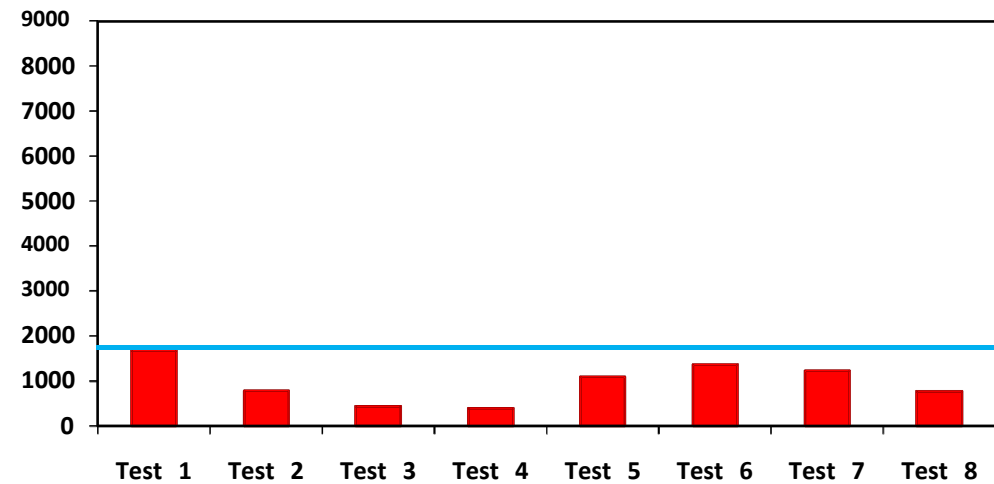
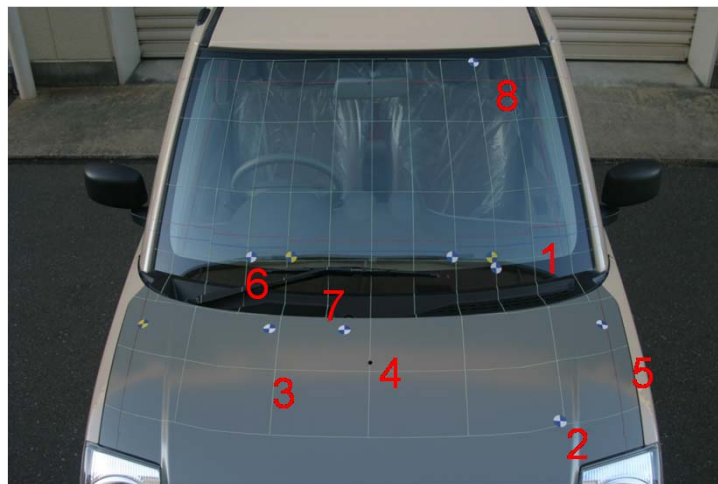
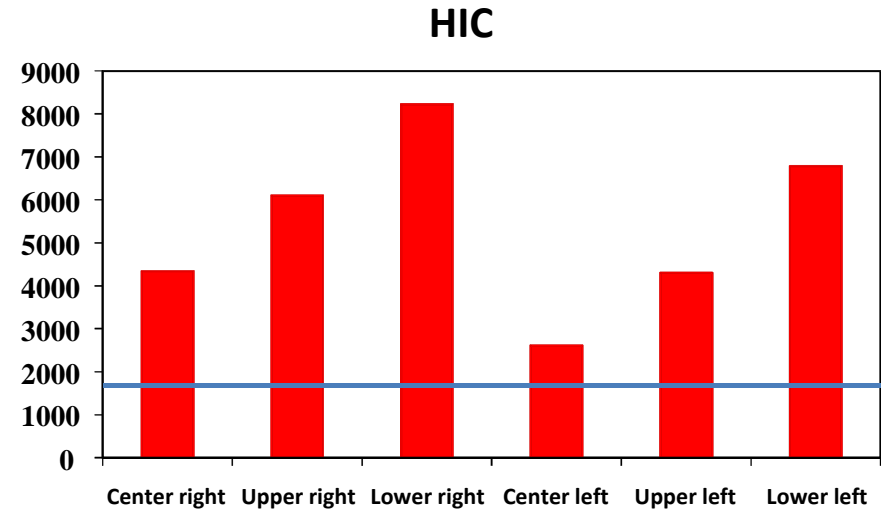
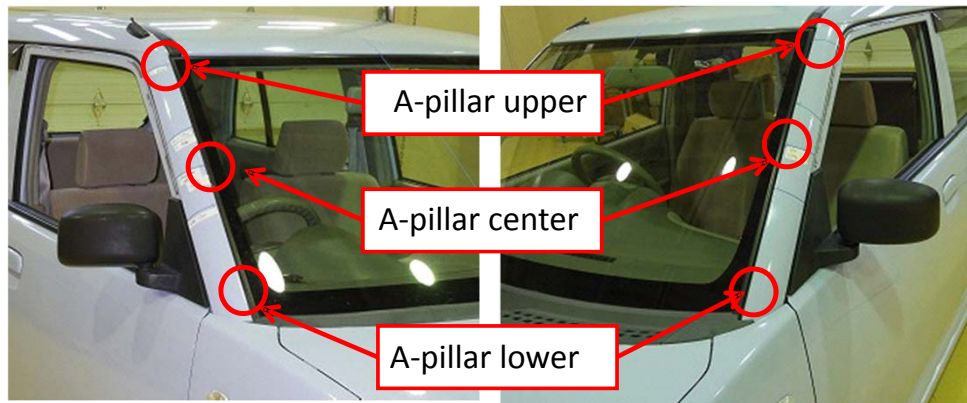
-> Many were outside of the test areas in pedestrian safety standard.

Pedestrian Head Protection Tests

- We conducted the pedestrian head protection tests in which the impactor was hit at the center of the A-pillar (worst-case condition).
- We conducted the tests according to the R127 specifications except for the test area.
- The tested vehicle was compliant with the pedestrian safety standard.
- Several tests were conducted with the same vehicle (results from the second, third, and all subsequent trials might have been affected by the preceding tests).



Test Results



- HIC was above the threshold in all A-pillar tests
- In J-NCAP test result of the same vehicle, HIC was below the threshold in all test areas.

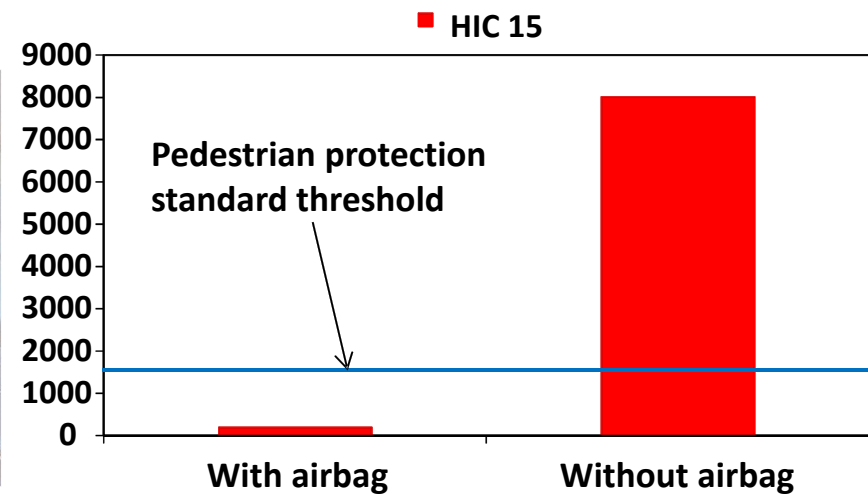
Pedestrian Head Protection Tests

- We conducted the pedestrian head protection tests in which the impactor was hit at the center of the A-pillar (worst-case condition).
- We conducted the tests according to the R127 specifications except for the test area.
- The vehicle was equipped with a pedestrian airbag.
- Tests were conducted with/without the airbag.
- The pedestrian airbag was forcibly deployed at the timing when its performance was sufficient.



Effects of Pedestrian Airbag

With pedestrian airbag Without pedestrian airbag



- With the pedestrian airbag, HIC was far below the threshold.
- Without the airbag, HIC was far above the threshold.
 - >The pedestrian airbag is effective in protecting the pedestrian's head in a collision, potentially reducing the number of fatal pedestrian accidents.

Summary

- **In recent fatal traffic accidents in Japan, pedestrians account for the largest proportion.**
- **According to the macro accident study from 2012 to 2013 in Japan, fatality rate of pedestrian accidents with vehicles compliant with the pedestrian safety standard was lower than that with non-compliant vehicles.**
- **According to the macro accident study from 2008 to 2012 in Japan , among pedestrian accidents involving passenger cars such as sedans, minivans, and mini vehicles compliant with the pedestrian safety standard, 42% of pedestrian fatal accidents occurred at 40 km/h or below. Of the fatal accidents that occurred at under 40km/h , 51% accounted for the cases that the head/face were the most injured body regions. In 55% of the above said fatal accidents, the head/face were hit by vehicle externals.**

Summary

- **According to the micro accident study from 1993 to 2012 in Japan, in the traffic accidents between an adult pedestrian and a vehicle with bonnet resulting in AIS2+ head injury, 66% were cases in which the pedestrian's head was impacted by the A-pillar or the lower front wind shield glass frame peripheries, which were both outside of the test area in R127.**
- **In the pedestrian head impact test cases using the one vehicle model compliant with the pedestrian safety standard, HIC of the tests impacted at the A-pillar was higher than those at the test area in R127.**
- **In the pedestrian head impact test case using the one vehicle model equipped with a pedestrian airbag, the pedestrian airbag was effective in reducing the head injury when the head was impacted with the A-pillar.**