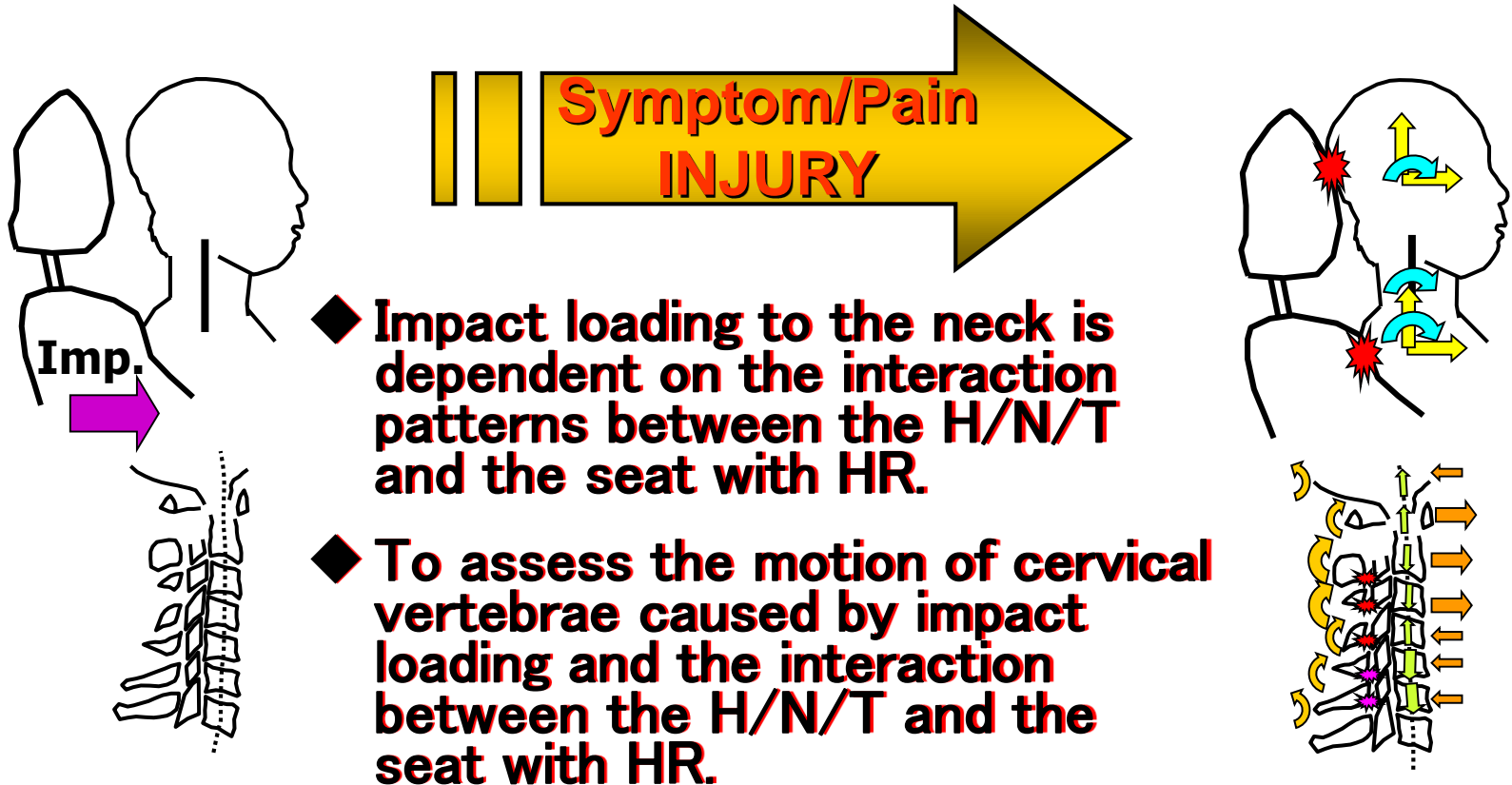


# A Brief Summary of the Process on the Selection/Determination of Neck Injury Parameters and Injury Criteria

# A) Necessary Method for Neck Injury Evaluation



◆ Correlation between neck force/moment and IV-NIC (R) based on Accident Reconstruction Simulation and Human Volunteer Test

	Overall	IV-NIC	Simulation		Volunteer	
		Flexion	Strain	Shear Strain	Strain	Shear Strain
		Mean				
NIC	○	△	△	△	○	○
UNFX-HeadRear	○	× (*)	× (*)	× (*)	○	○
UNMY-Fle./Ext.	○	△	○	○	×	△
LNFX-HeadRear	○	△	○	○	○	○
LNMY-Fle./Ext.	○	△	○	○	×	△

Overall : Judgment from result of volunteer test and simulation

Symbol (Column of yellow and pink):

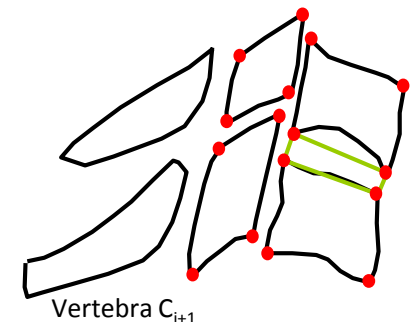
○: Positive correlation and correlation coefficient of 0.5 or more

△: Positive correlation and less than correlation coefficient of 0.5

×: Low (~0.2) correlation

(\*): Due to the different sizes of occupants

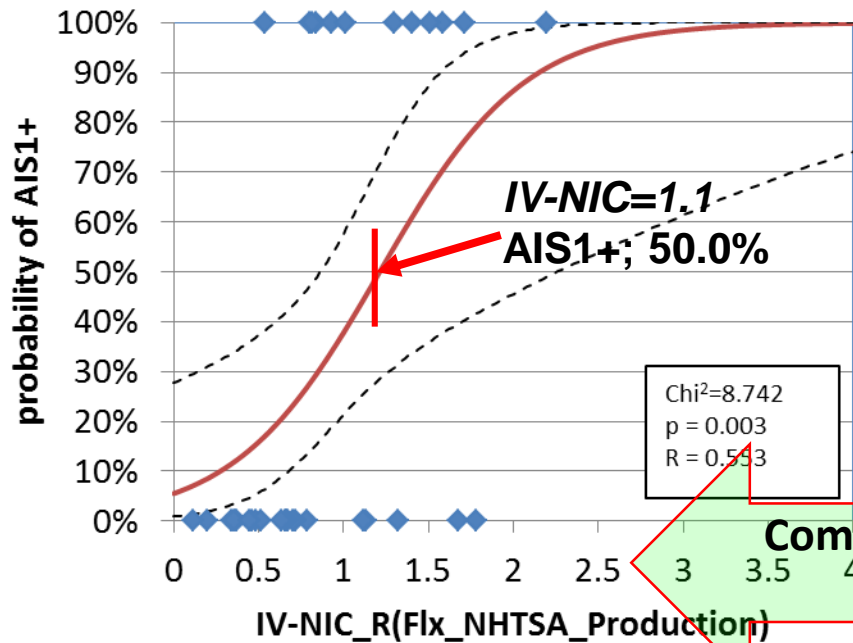
Vertebra  $C_i$



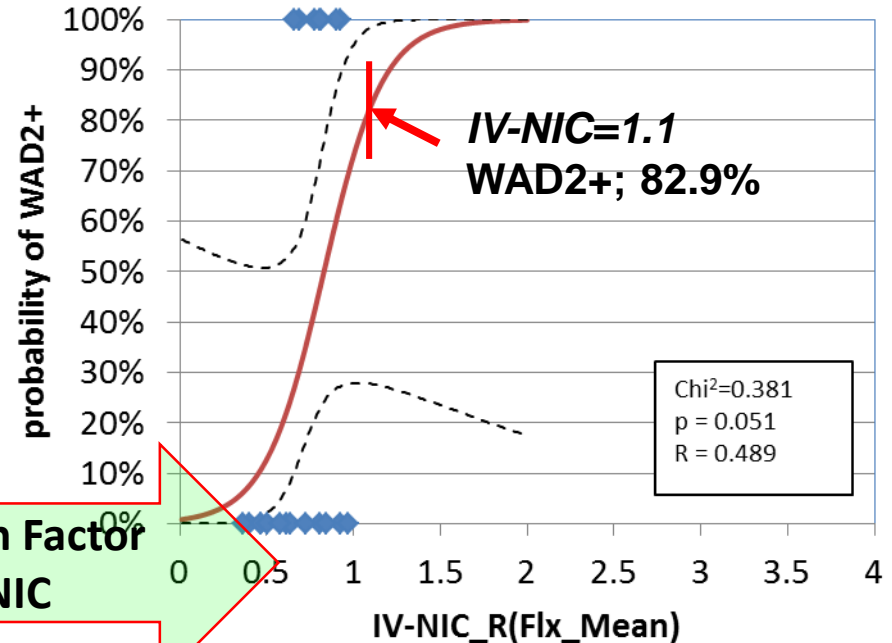
Max. Principal Strain and Max. Shear Strain

# ◆ Setting Methods of Neck Injury Criteria

- Fig. 1 shows that IV-NIC value corresponding to the AIS1+ 50% on the risk curve obtained by the PMHS Tests (Production seat)
- The IV-NIC value 1.1 corresponds to the AIS1+50% on the risk curve obtained by the PMHS tests shown in Fig.1. This IV-NIC value 1.1 also corresponds to 82.9% of WAD2+ risk curve wrt the IV-NIC.
- The IC of NFM, NIC, and NDCr will be created by WAD2+82.9% based on the risk curve of WAD2+ wrt IV-NIC (see Table on the next E) page).



**Fig. 1 Injury Risk Curve (AIS1+; PMHS: Production Seat)**



**Fig. 2 Injury Risk Curve (WAD2+; CAE: Accident Reconstruction)**

# Conclusion

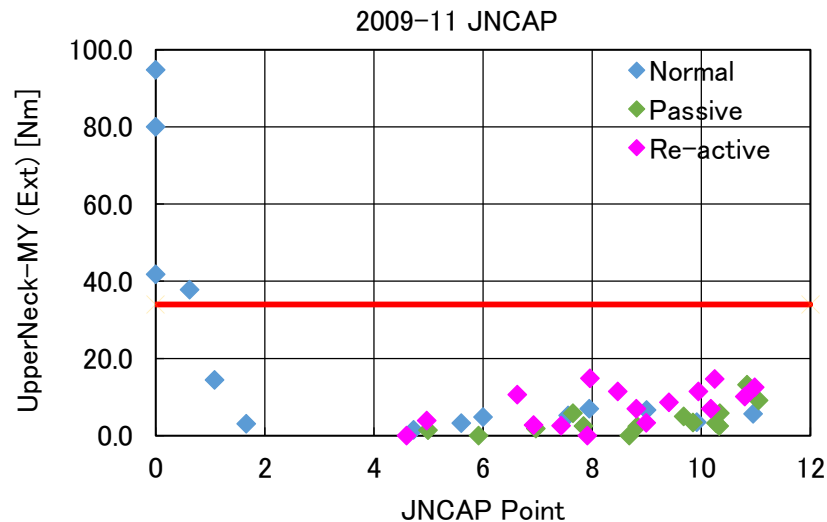
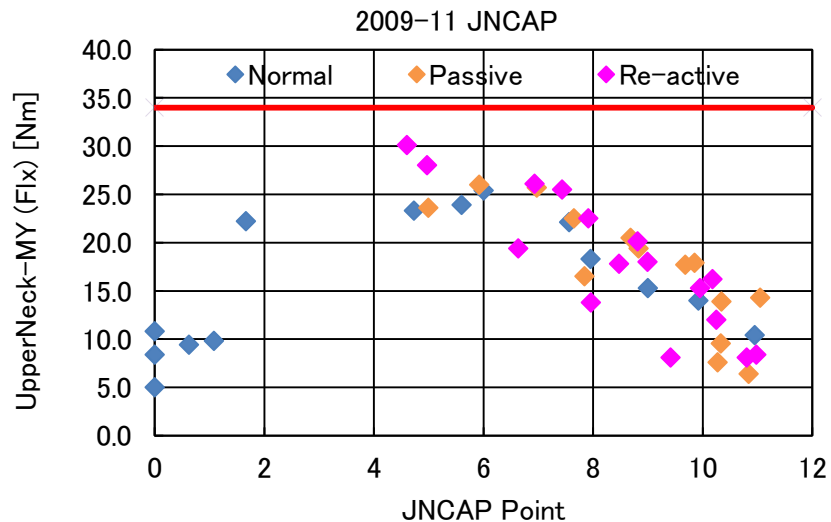
## Japan Proposal

## Injury Evaluation Parameters and Injury Criteria for GTR7

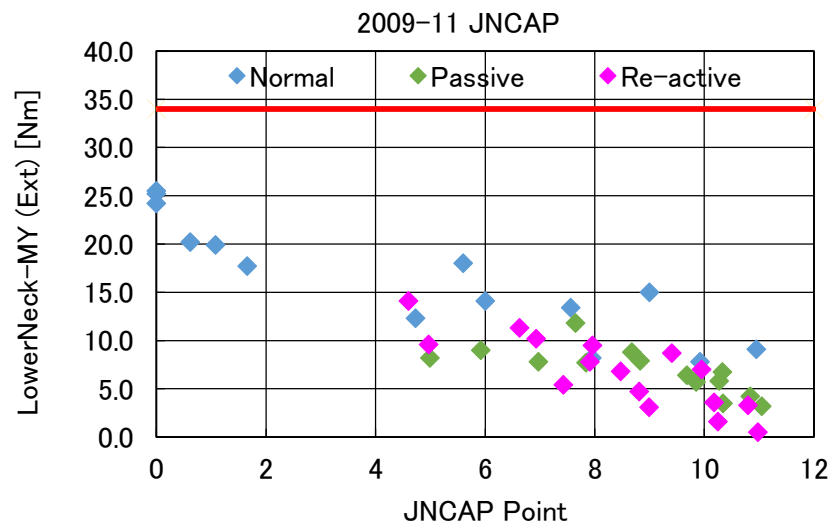
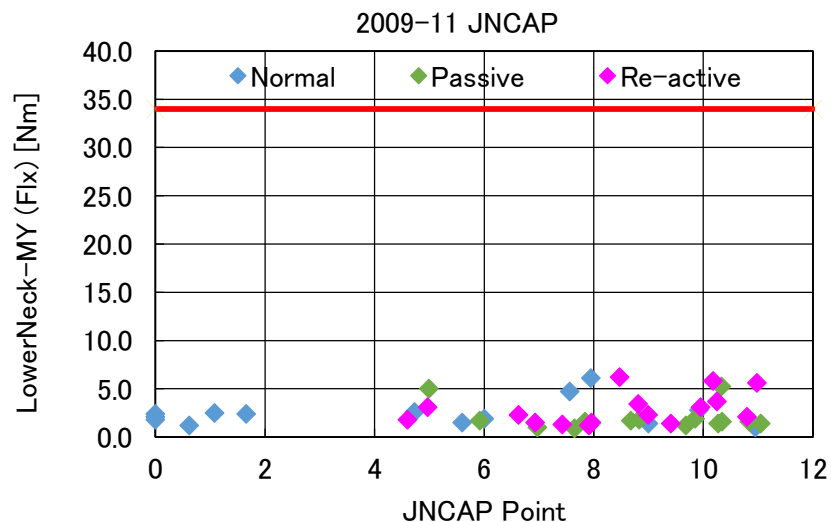
<b>Injury Criteria</b>		<b>AIS1+: 50% Value &lt;Equivalence&gt; WAD2+: 82.9% Value</b>
		<b>IV-NIC=1.1</b>
<b>NIC Max</b>		<b>23</b>
<b>Upper Neck</b>	<b>FX (Backward)</b>	<b>640</b>
	<b>MY(Flx/Ext)</b>	<b>34</b>
<b>Lower Neck</b>	<b>FX (Backward)</b>	<b>640</b>
	<b>MY(Flx/Ext)</b>	<b>34</b>

Units: Force (N)  
Moment (Nm)

# 17.6 km/h: JCAP (2009-2011データ)

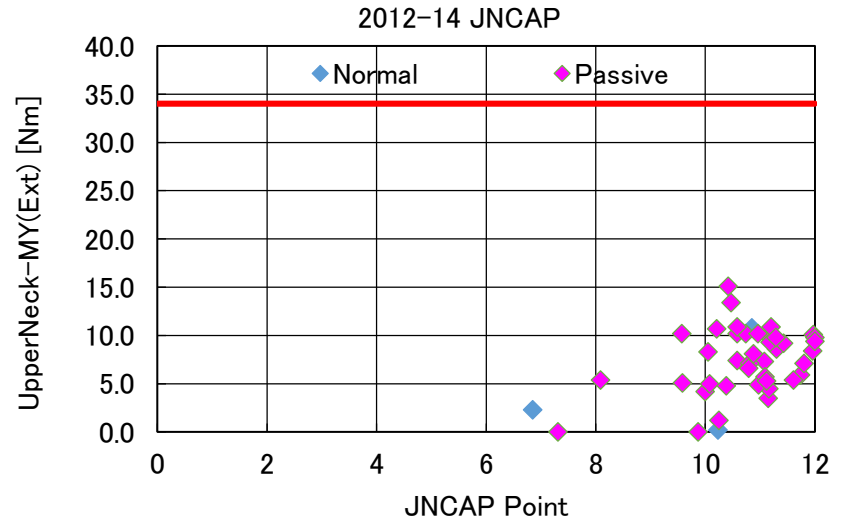
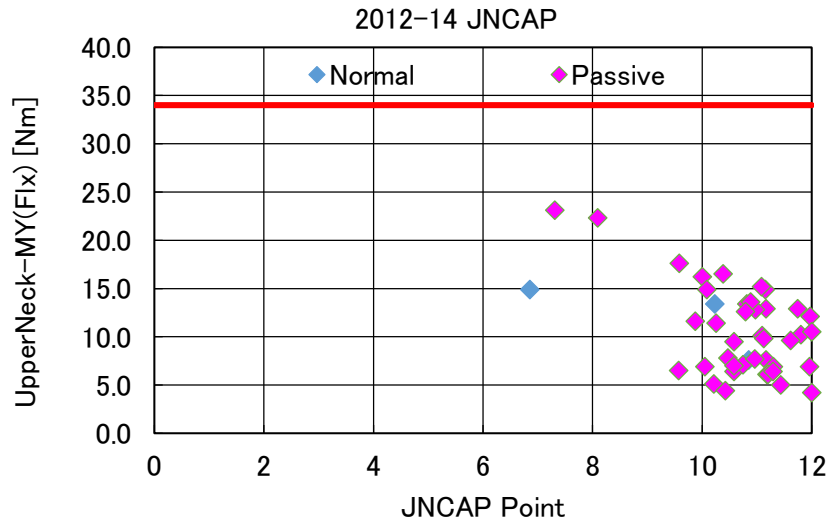


## Upper Neck MY (Flx./Ext.)

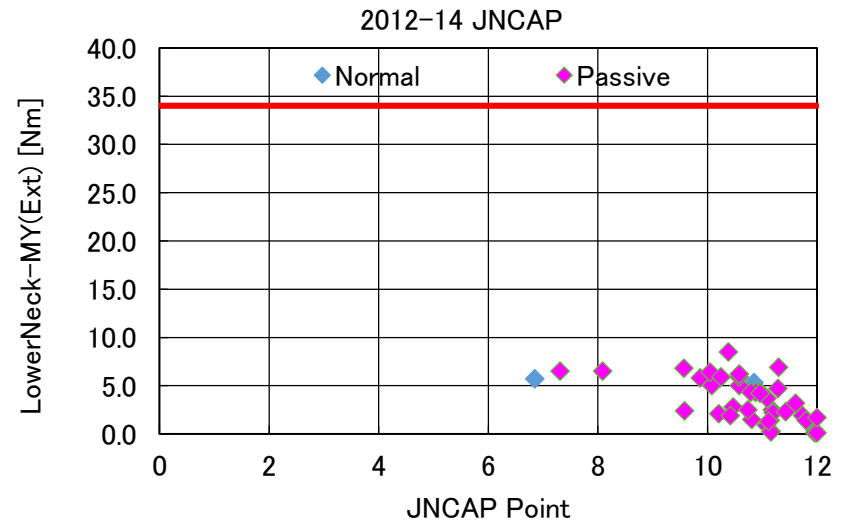
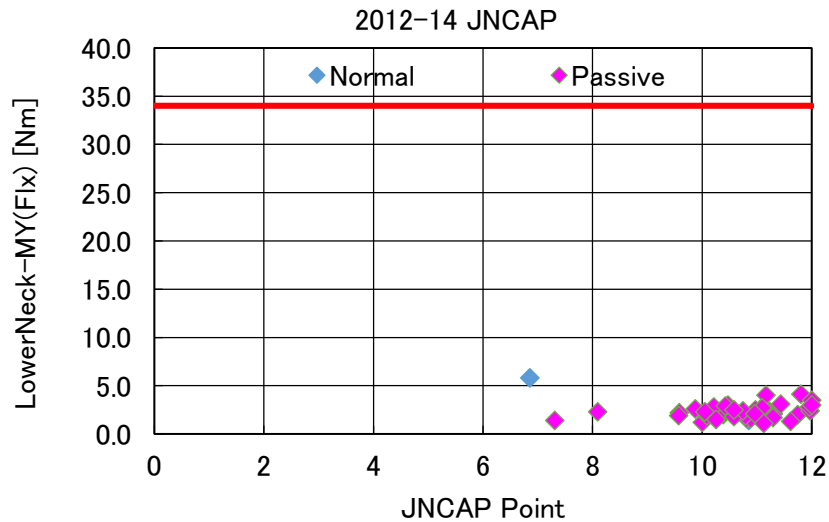


## Lower Neck MY (Flx./Ext.)

# 20.0 km/h: JCAP (2012データ)



## Upper Neck MY (Flx./Ext.)



## Lower Neck MY (Flx./Ext.)