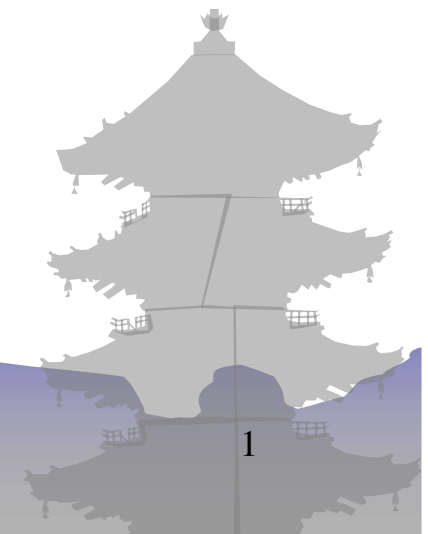


Proposal for Head Restraint gtr Phase 1 Dynamic Option for BioRID II

JASiC/Japan

Nov. 2007



Agreement at #142 WP29 in June 2007

EC, Japan, and US Proposal Regarding Next Steps on Head Restraint GTR, WP29-142-23, was agreed at #142 WP29 in June 2007.

Static

Contracting Parties choice

R-point with Backset $\leq 45\text{mm}$



or

H-point with Backset $\leq 55\text{mm}$



OR*

Dynamic Option

Option1

Head rotation with HY-III ≤ 12 deg

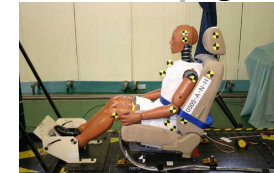
Option2(Contracting Parties choice)

Head rotation with HY-III ≤ 12 deg

or

Some criteria with BioRID II

Waiting for EEVC study



Option3
Dismissed

*: **Manufacture choice**

Proposal for Phase1 Dynamic Option

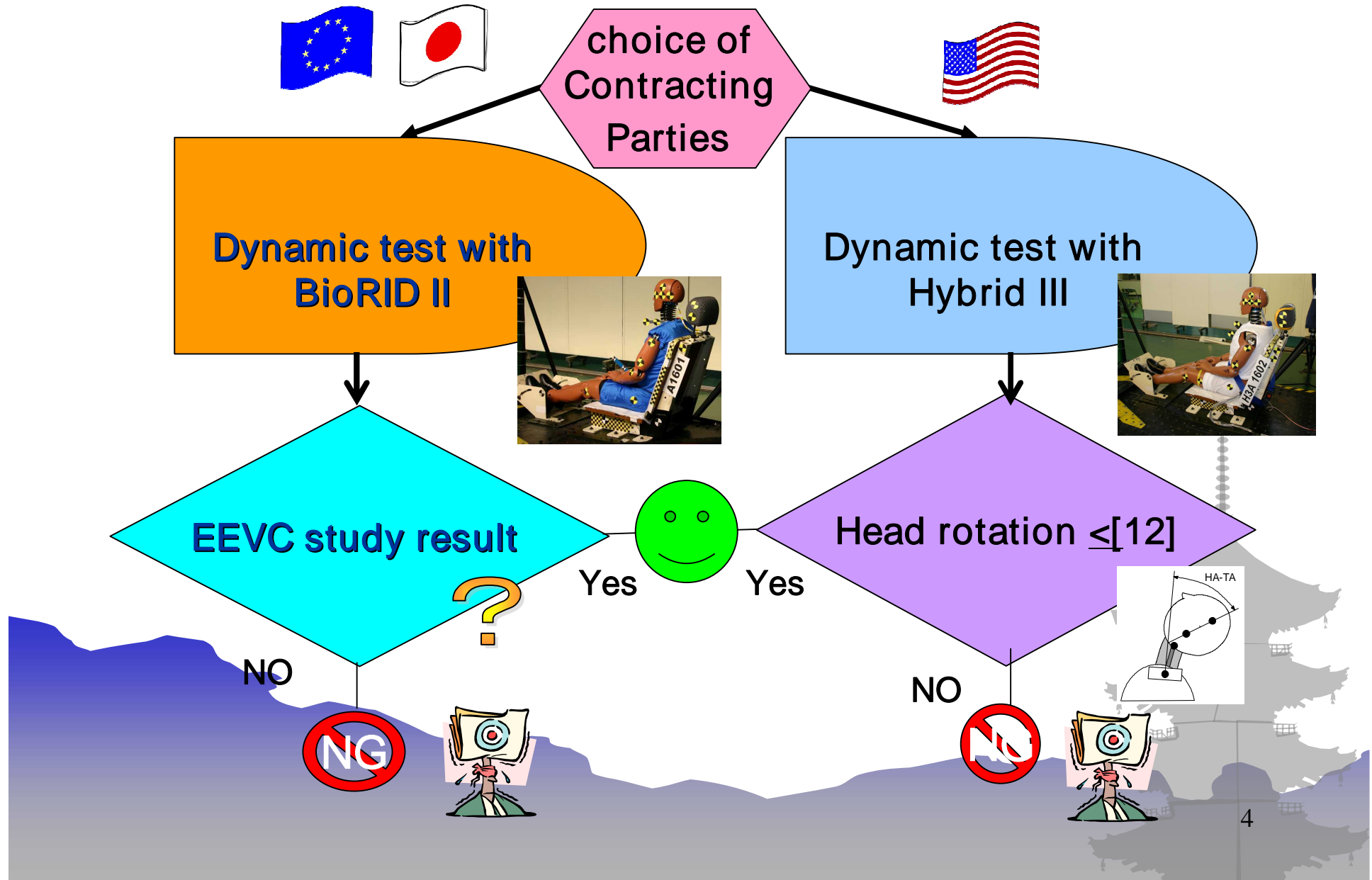
Japan support either “Option 1” or “Option 2”, however, based on the following reasons , **we believe “Option2” could be only the solution to compromise different opinion between US and EC.**

Reason;

- Could be accepted by both USA and EC.
- Could keep studying the global dummy and test method harmonization in the future.
- Could harmonize at least in 58 agreement countries.

		Hy-III	BioRID II
Option	1	✓	
	2	✓	✓
	3	-	-
Acceptance	EC	Not Accept	Recommend
	USA	Indispensable	Not Accept
	Japan	Accept	Accept

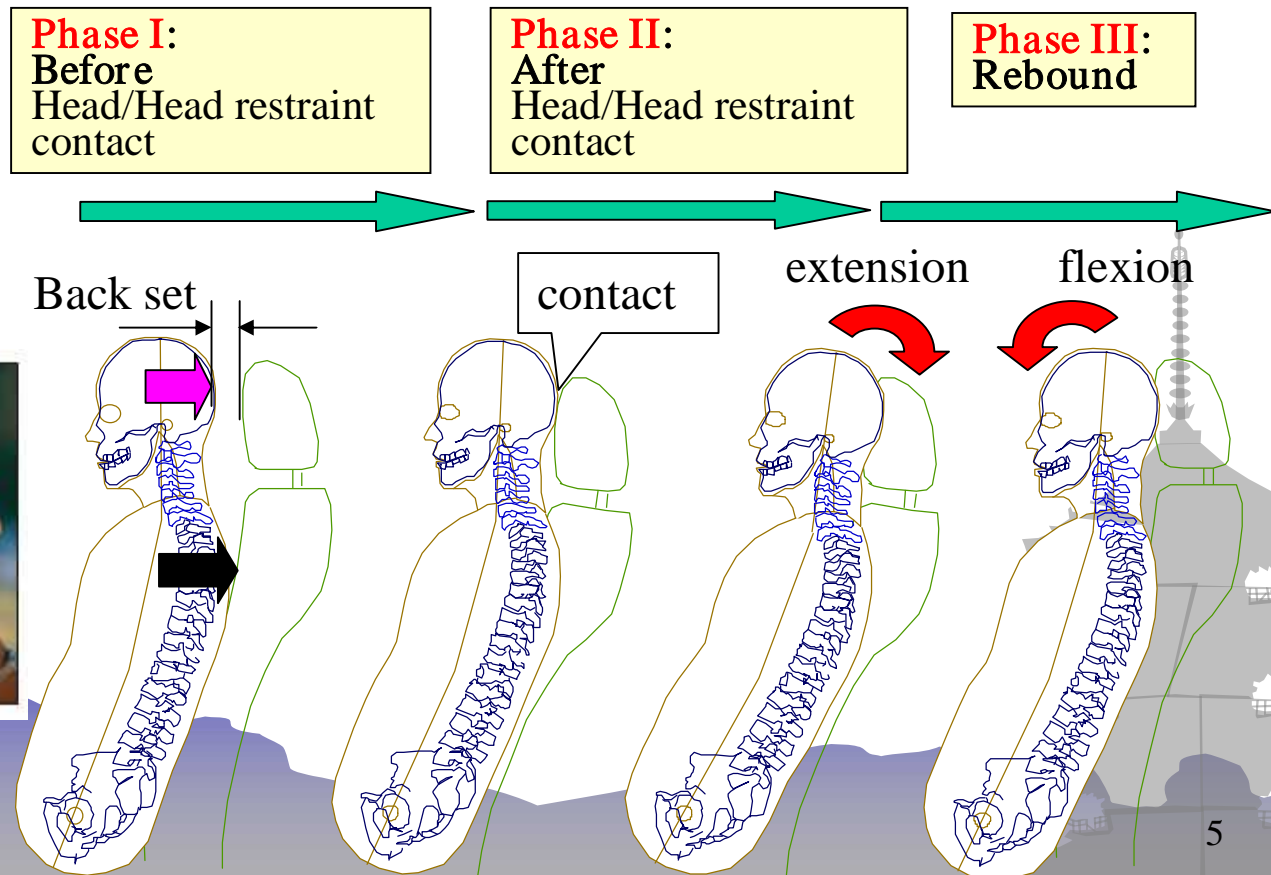
Dynamic Test Option (2) for gtr Phase1



Condition of Dynamic Test for gtr phase1

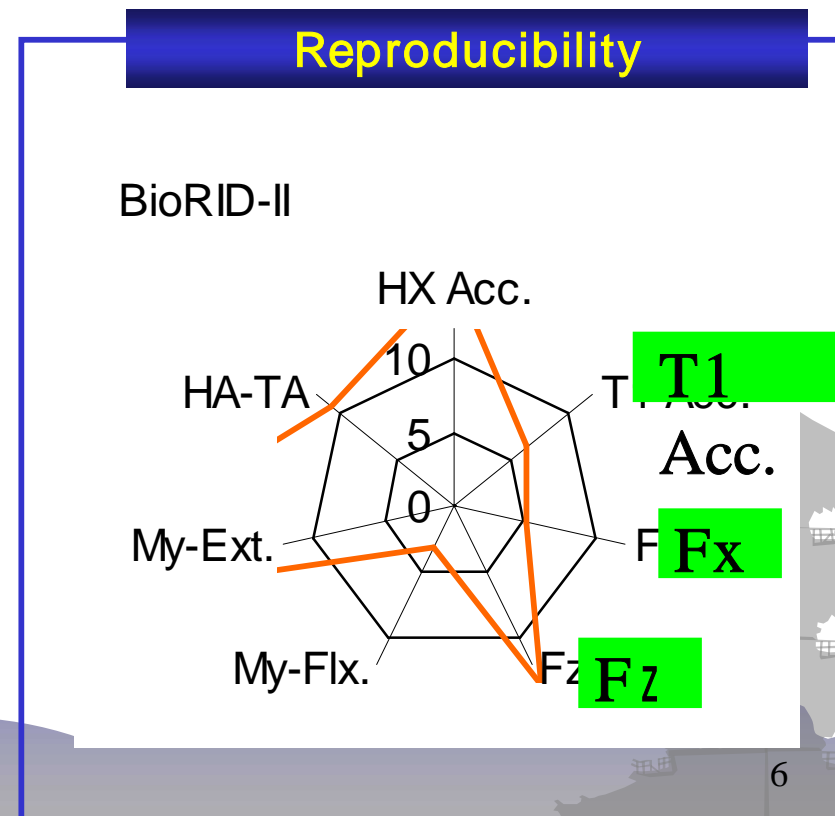
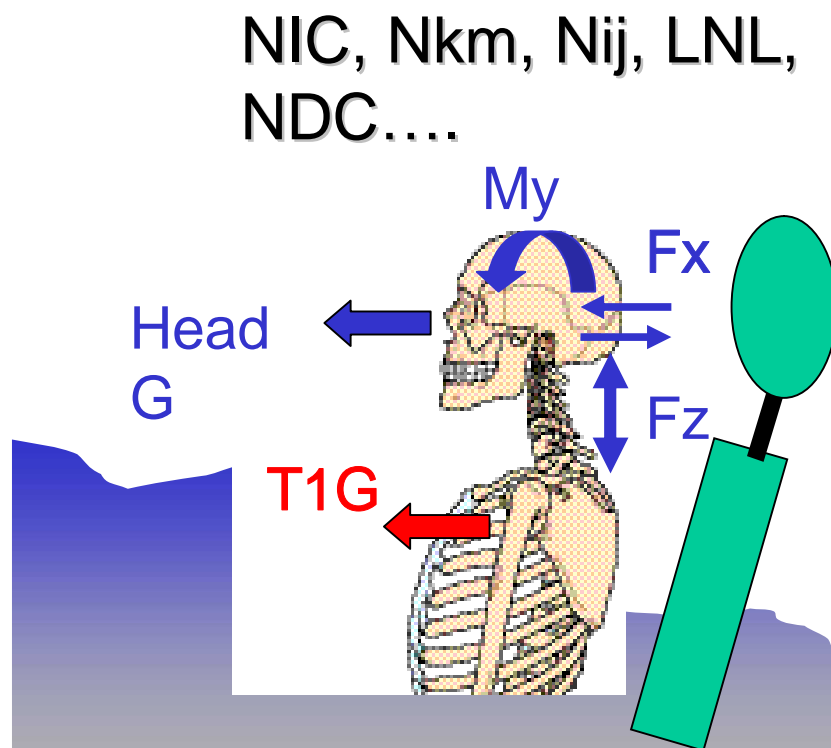
- Dynamic test for Head restraint gtr Phase1 should be a alternative test for static Backset, and had better to equivalent to Backset.
- It is considered with evaluate following phase I stage of whiplash phenomenon.

Whiplash Phenomenon



Condition of Dynamic Test for gtr phase 1

- BioRID II is promising with its high biofidelity to the human body, but still need to study reproducibility, evaluation indicators, reference values, test pulse, etc. for appropriate dynamic test.
- It was decided to study as gtr phase 2.

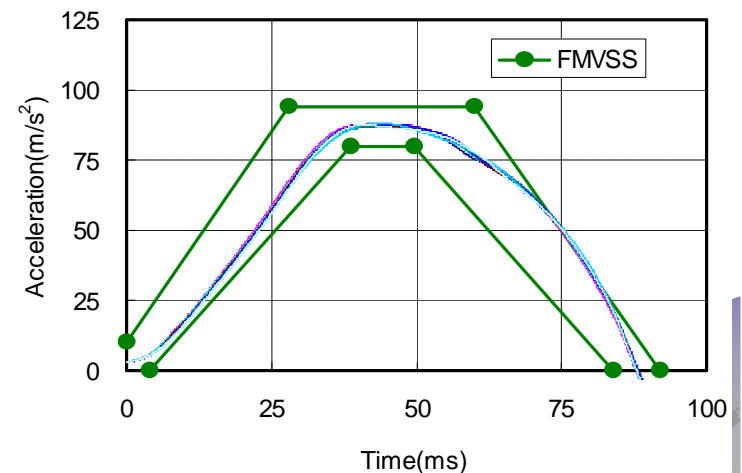
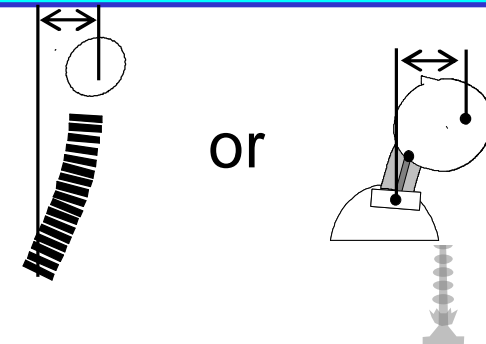
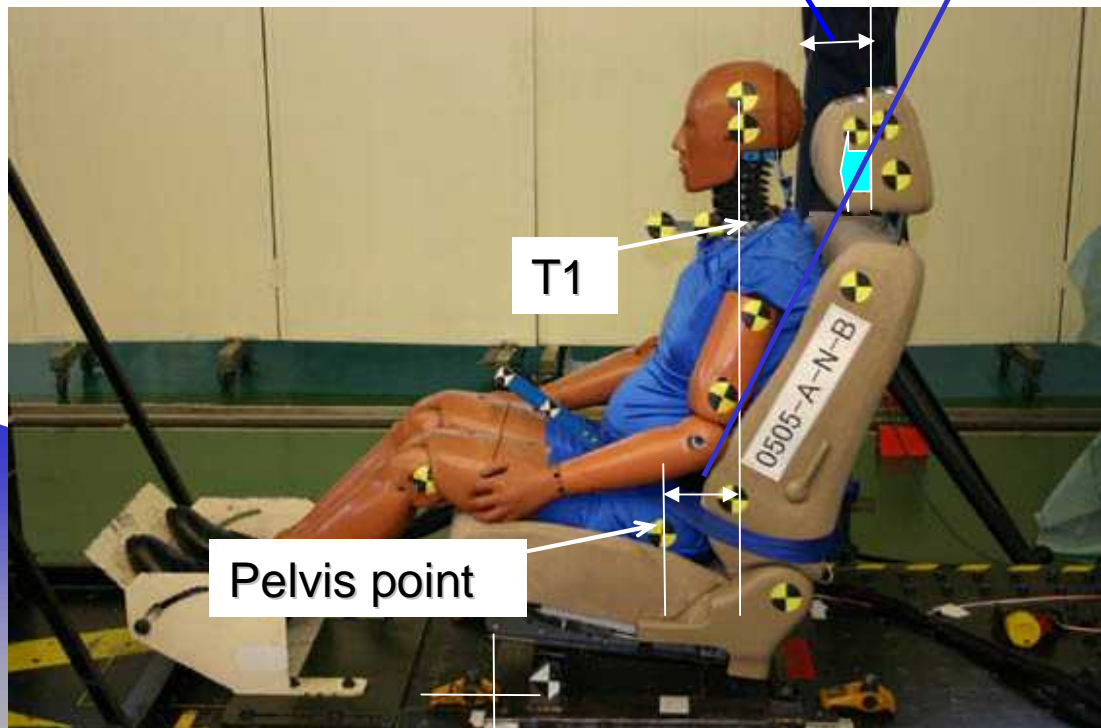


Proposal for Dynamic Test for Option (2)

Head Movement up to HRCT (Prop. 1 and 2)

:Set BioRID II equivalent distance as R-point static backset

:Measure the Head Center of Gravity Displacement relative to Pelvis point or T1 up to HRCT

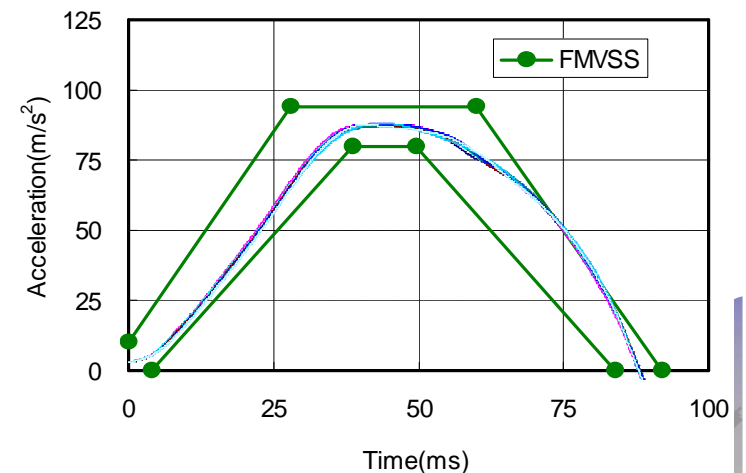
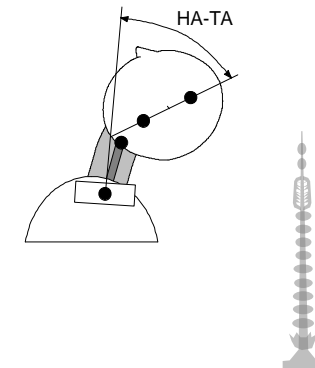
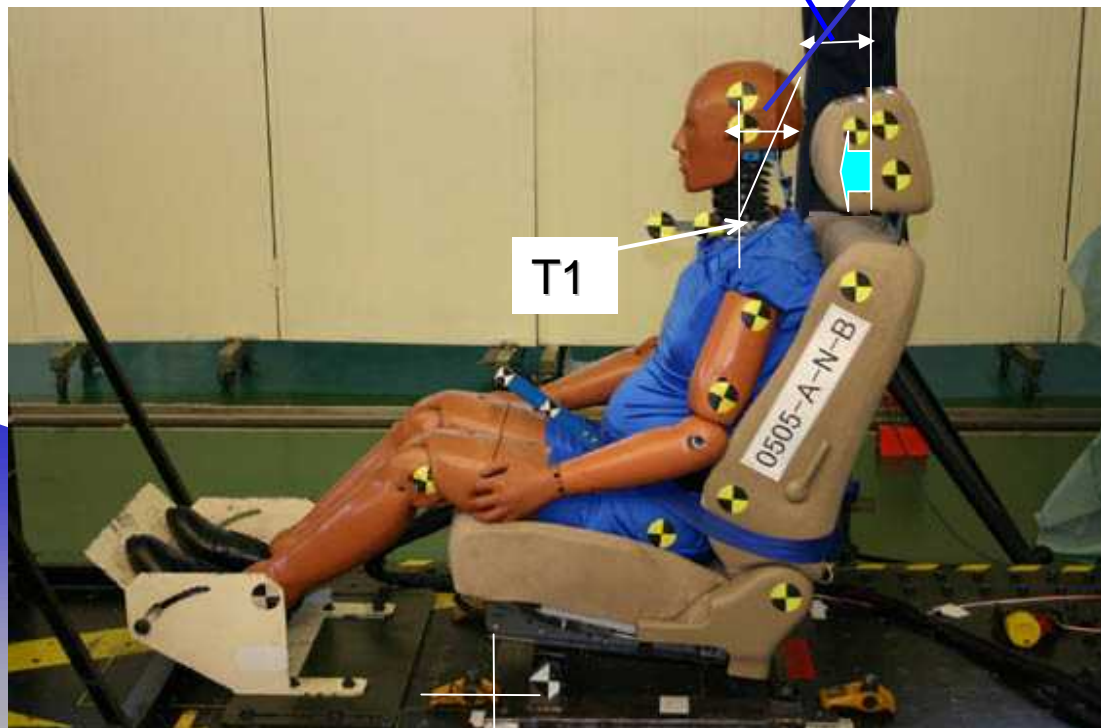


Proposal for Dynamic Test for Option (2)

Head Rotation up to HRCT (Prop. 3)

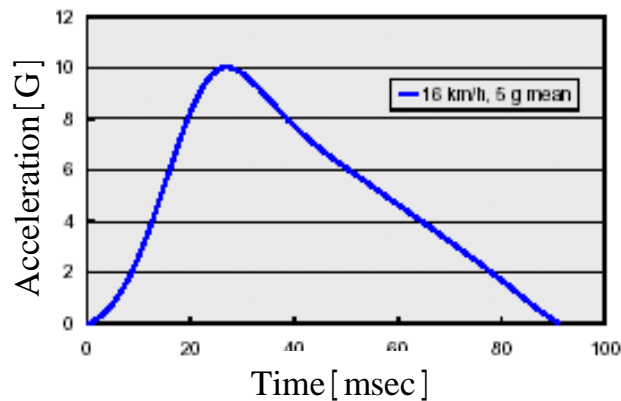
:Set BioRID II equivalent distance as R-point static backset

:Measure the Head Center Rotation angle relative to T1 up to HRCT

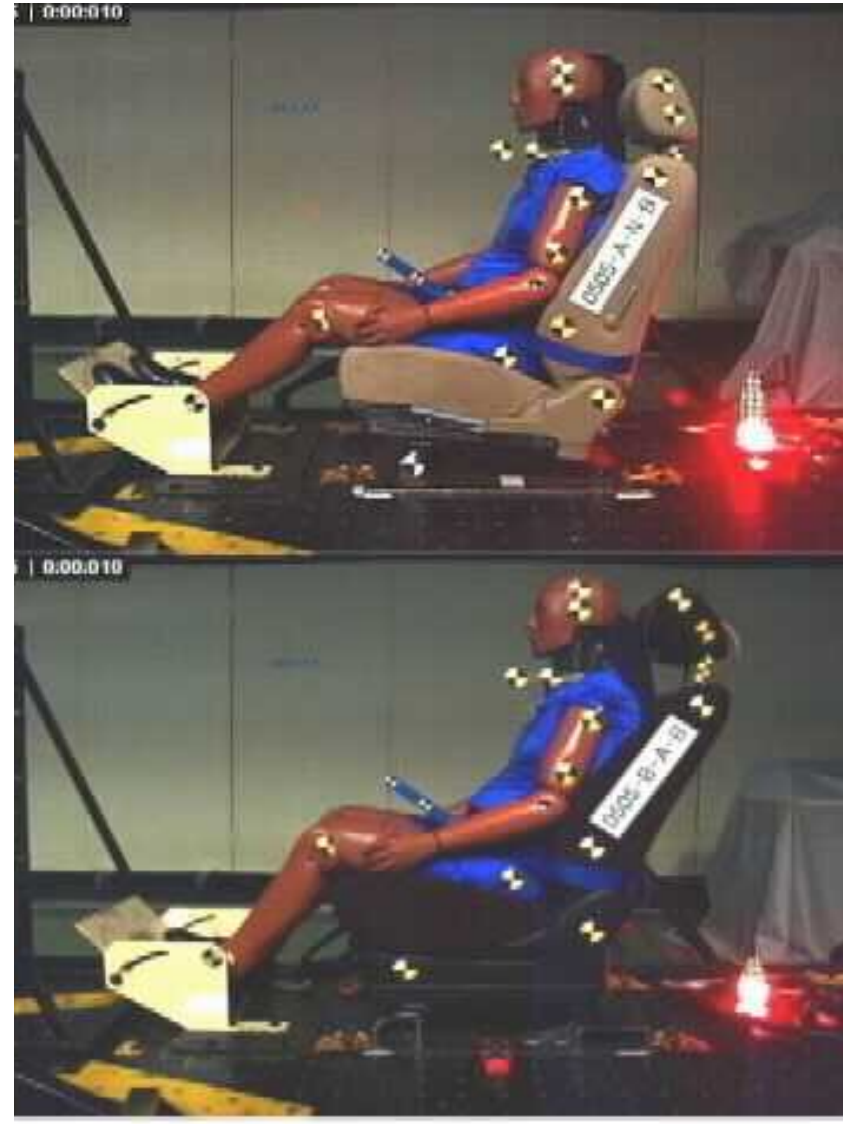


Trial Tests

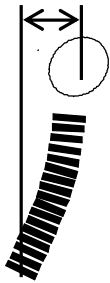
- Test samples
 - 10 seats
 - (2 reactive HR)
- Test pulse
 - IIWPG pulse *



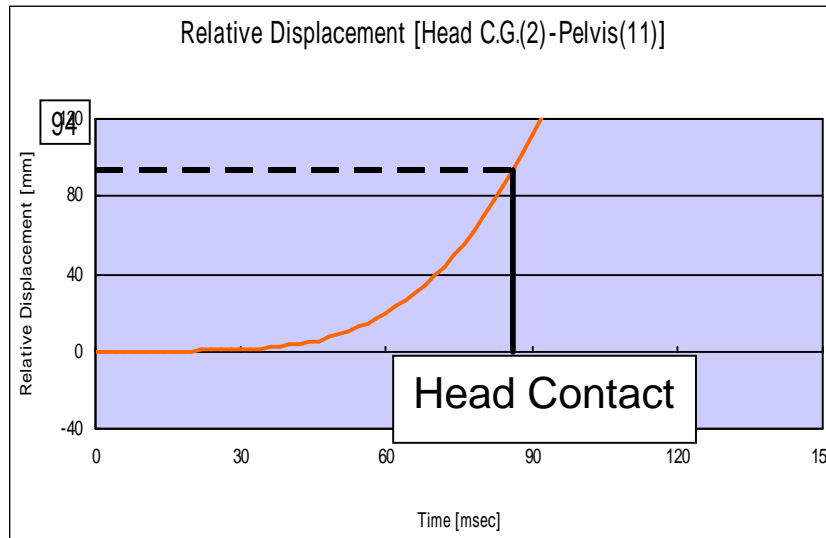
* FMVSS202a pulse test will be conducted by the end of Dec.



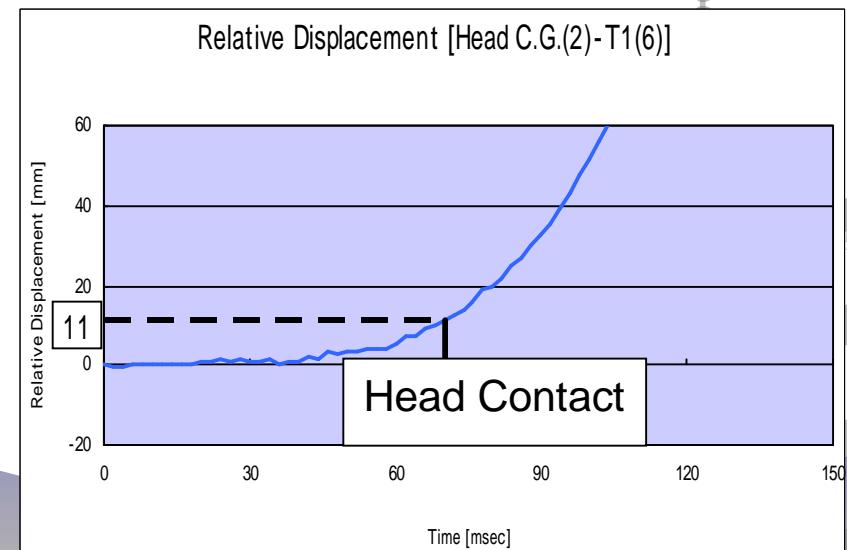
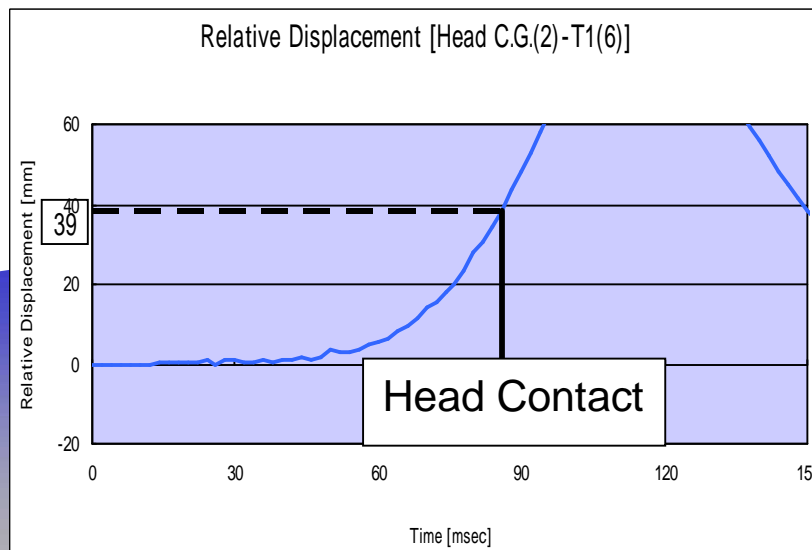
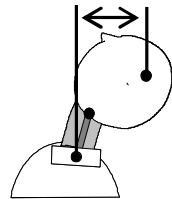
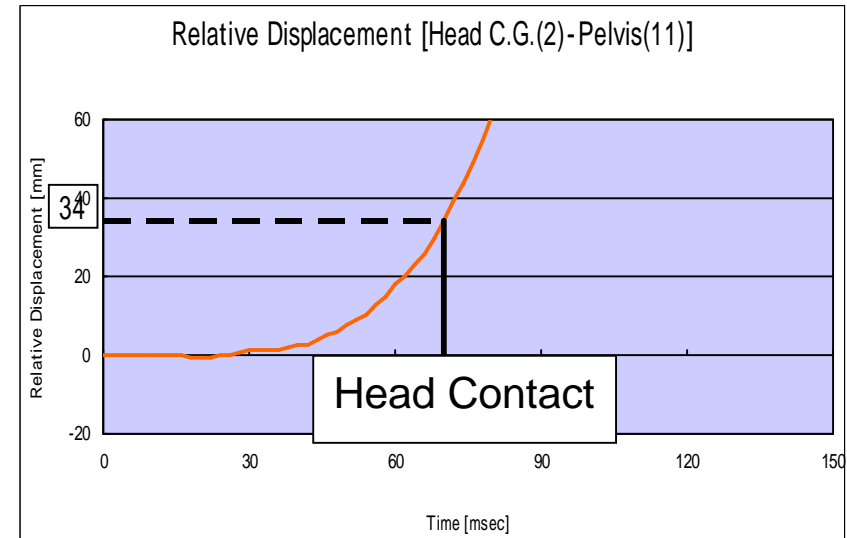
Sample (Head C. G. Displacement relative to Pelvis and T1)



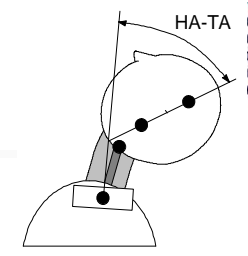
Seat A (Normal)



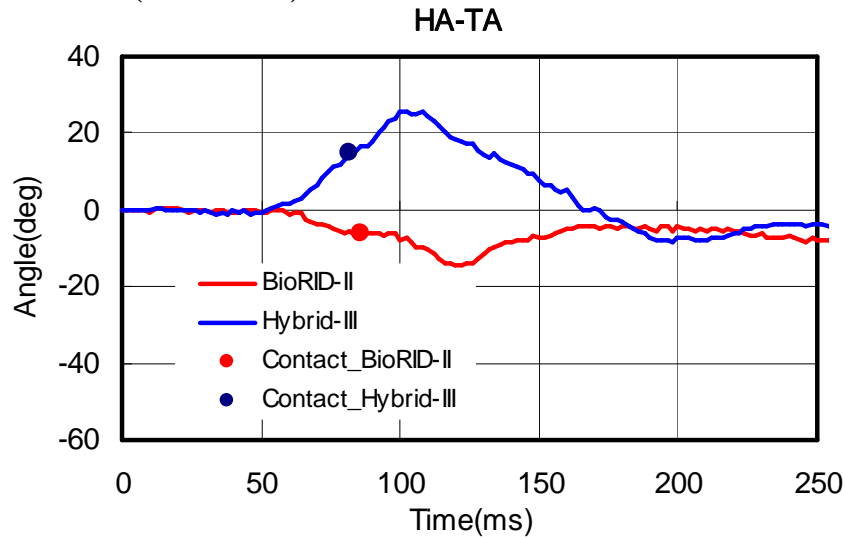
Seat B (Active)



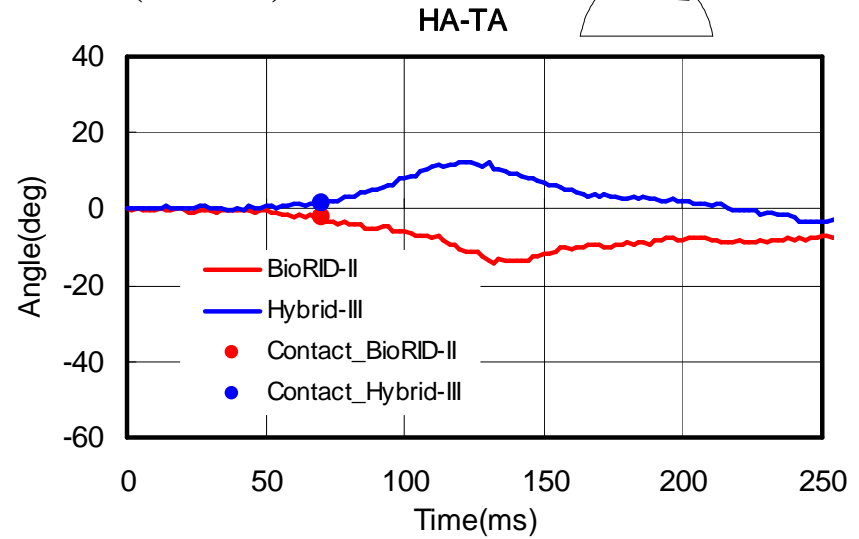
Sample (Head Rotation angle relative to T1)



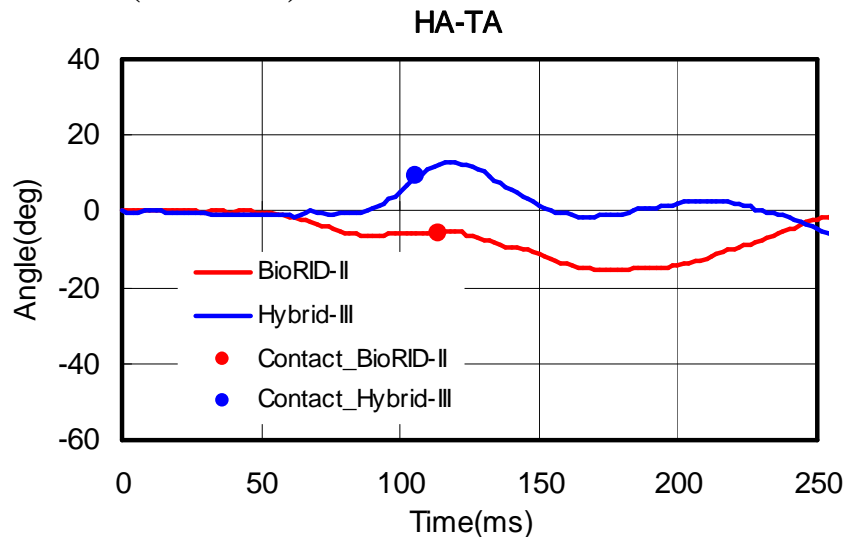
Seat A (Normal)



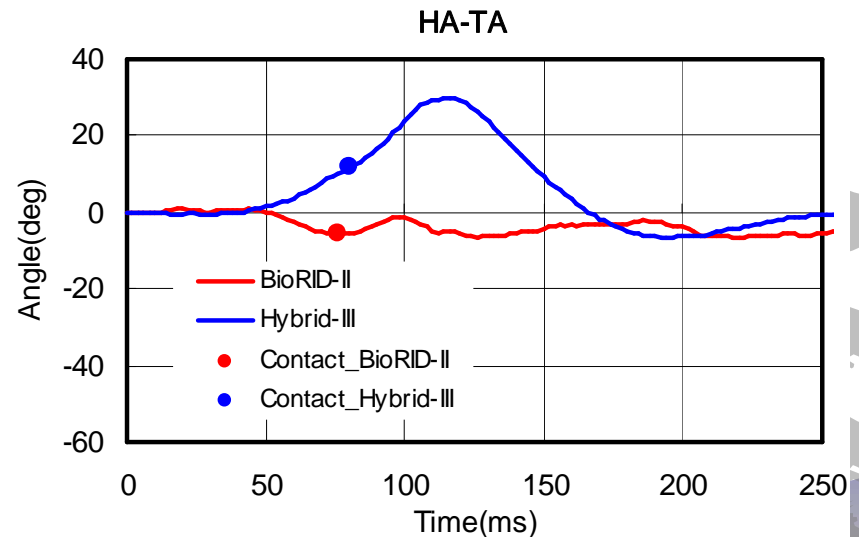
Seat B (Active)



Seat C (Normal)



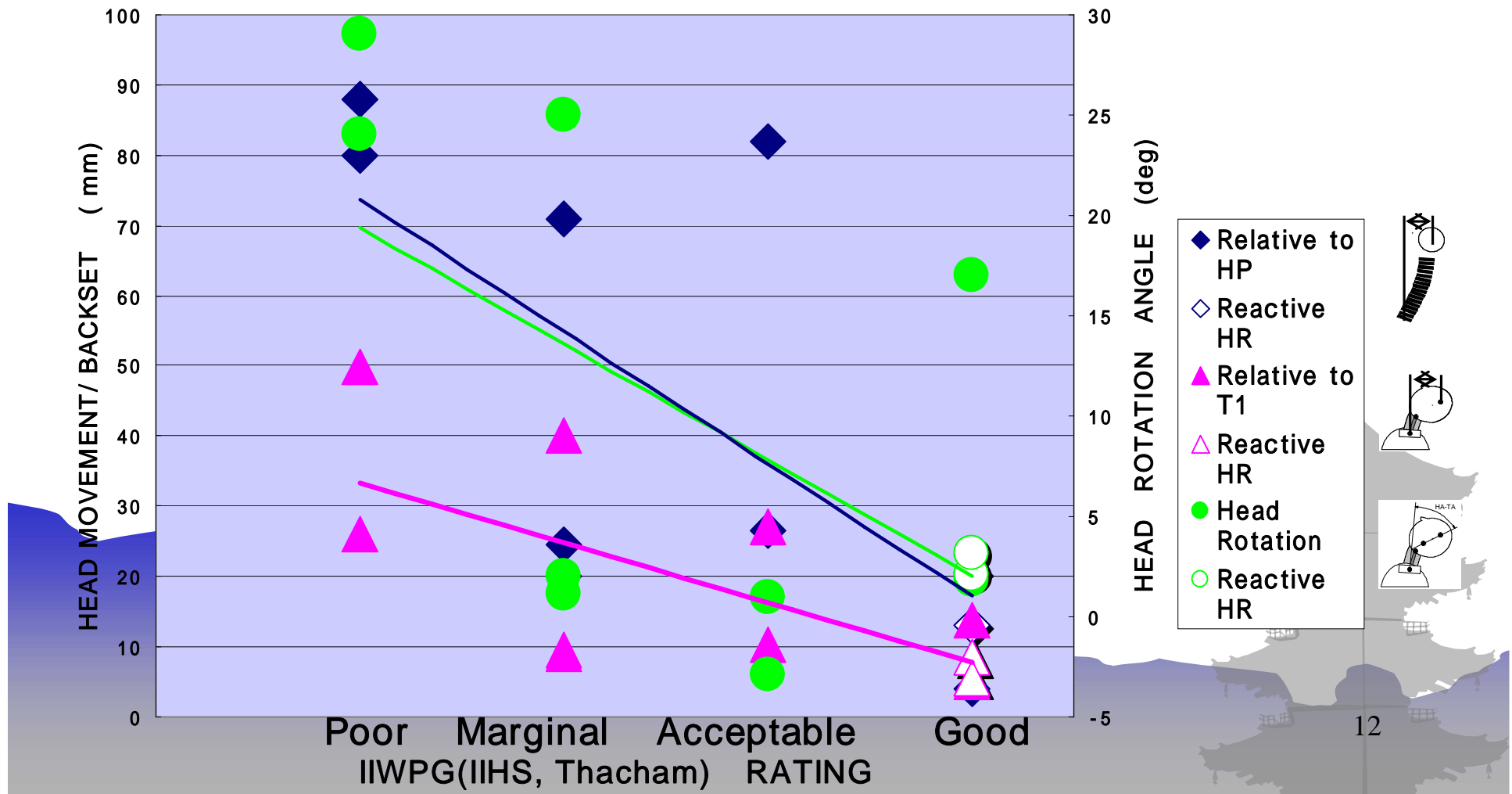
Seat D (Active)



HA: Head Angle TA: Torso Angle

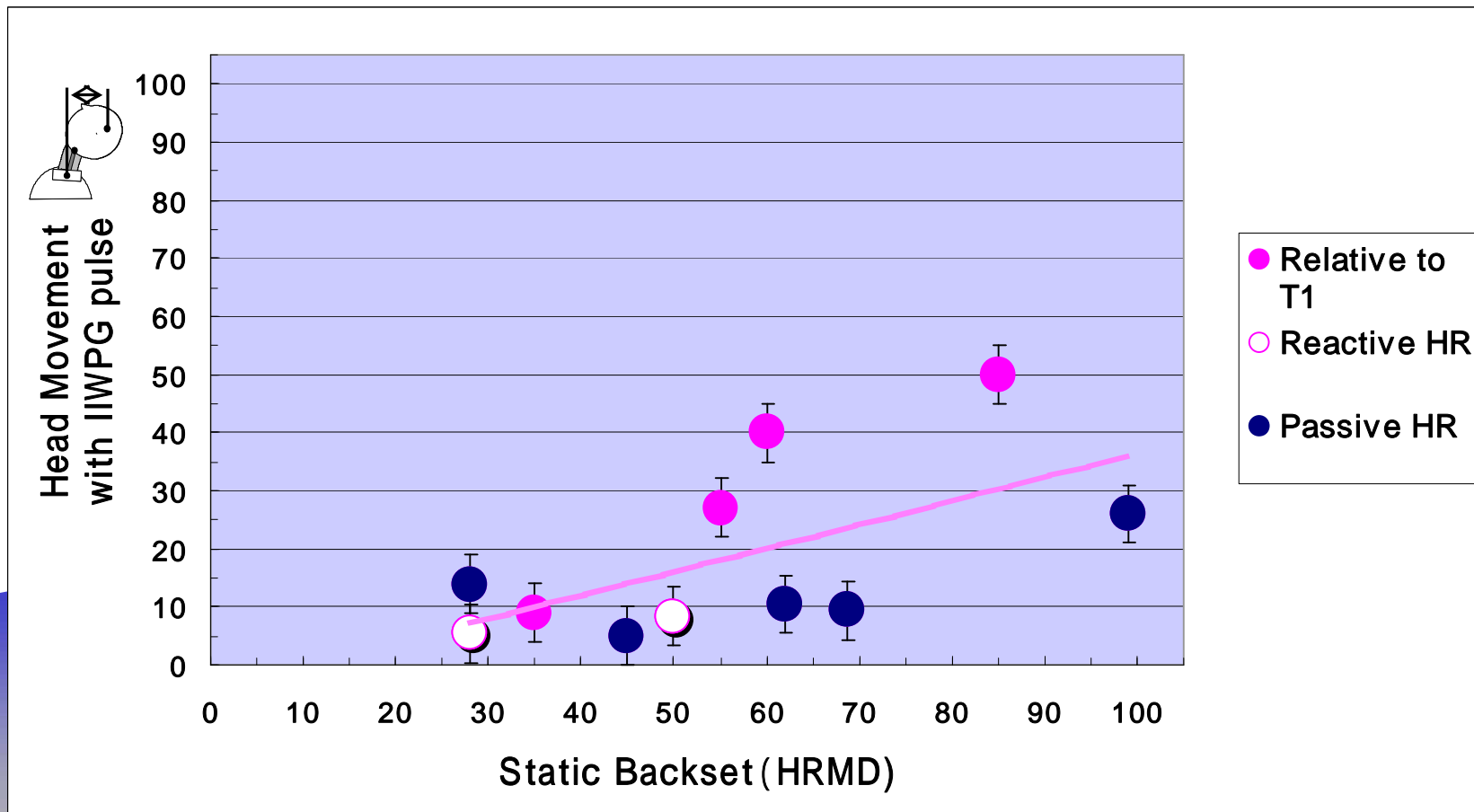
Comparison between IIWPG Rating and Proposed indicators

“Head C.G. displacement relative to T1 [Dynamic Backset] ” show better correlation with IIWPG rating than other indicators.



Comparison between Static Backset and [Dynamic Backset]

[Dynamic Backset] also have correlation between static backset, and show the effect of reactive and passive head restraint.



[Dynamic Backset] Limit value study

Biomechanical Basis

JARI Volunteer Mini Sled Test Series

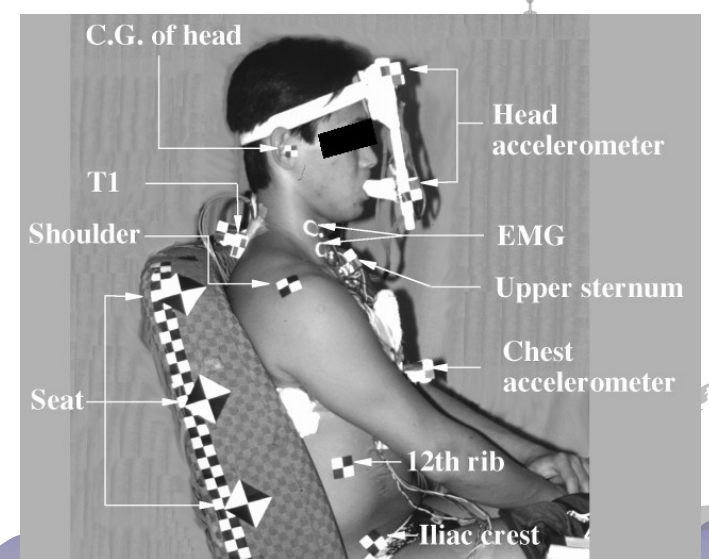
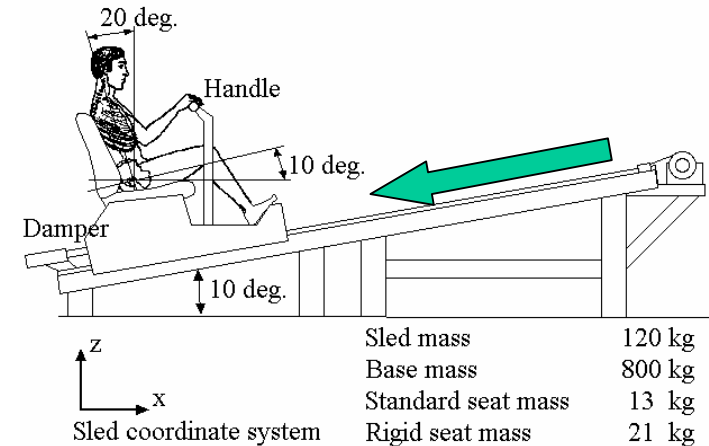
- Method

- Freely Sliding Sled on a 10 deg. Ramp
- Wooden Rigid Seat without HR
- Velocity = Approx. 8 km/h*

- Volunteers (Average \pm S.D.)

- 25 (3.8) years old Healthy Male (n=6)
- Height: 1.75 (0.31) m, Mass: 70 (6.1) kg

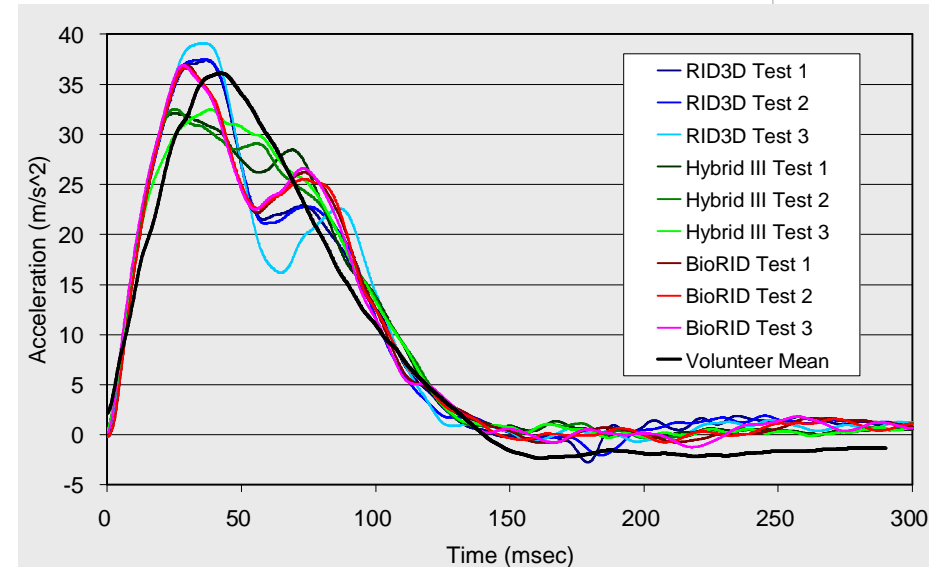
Detail information were reported by K.Ono in 1998 and 1999 IRCOBI Conference



[Dynamic Backset] Limit value study

Test Set-Up and Condition

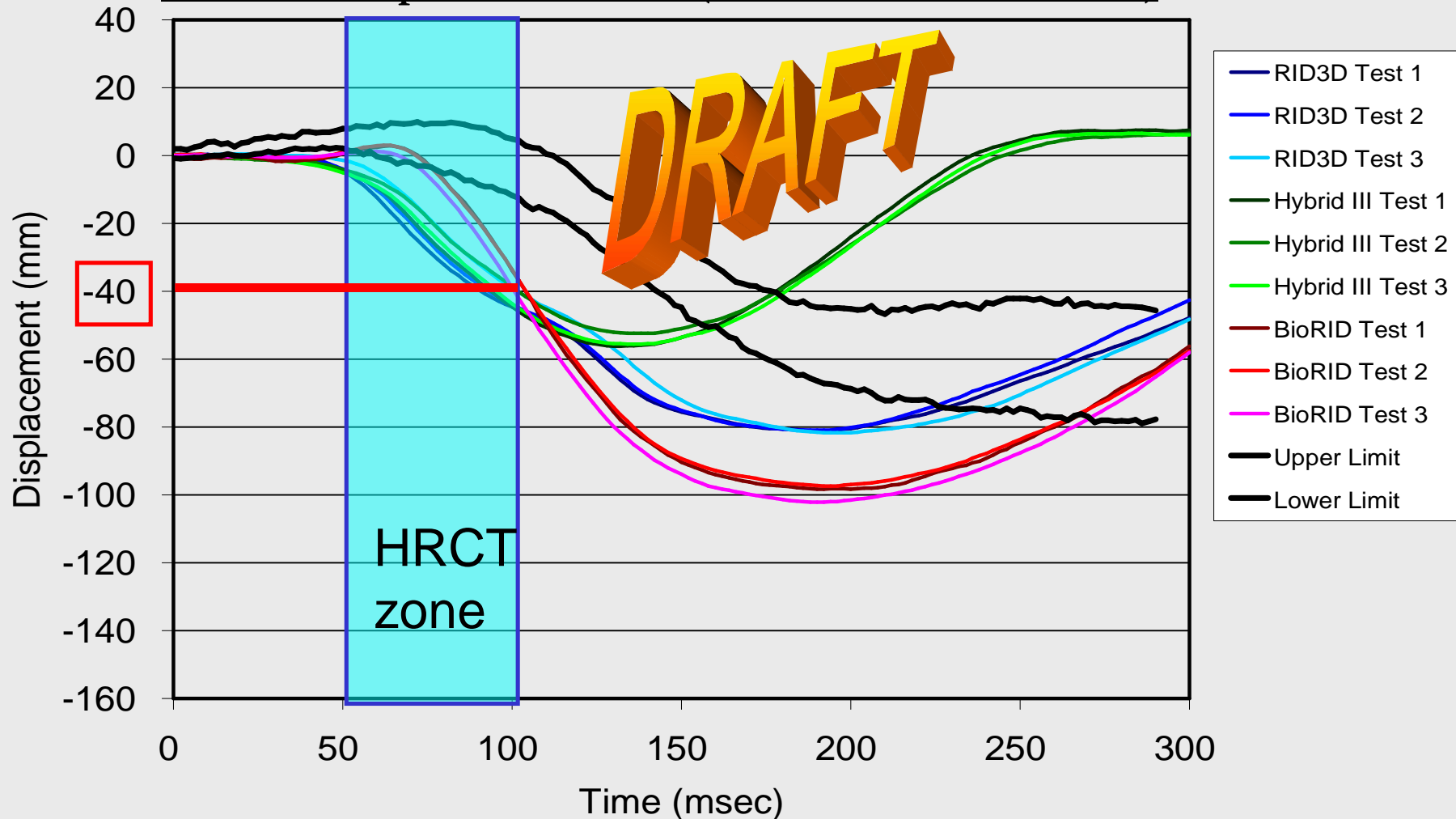
- Dummies
 - Hybrid-III (JARI)
 - BioRID-II Version “G”
(provided from EEVC WG12)
 - RID3D
(provided from EEVC WG12)
- Dummy Posture
 - Head X-axis = Horizontal
 - Hands are rest on the Cross Bar
- Sled Acceleration
 - See Figure -->
- Number of Tests
 - Three Repeat Tests were
Conducted in Same Condition
- Seat
 - Rigid seat without Head Restraint



[Dynamic Backset] Limit value study

Limit value may be [40mm], if it is considered that head displacement until HRCT in case of near boarder of volunteer initial symptom pulse.

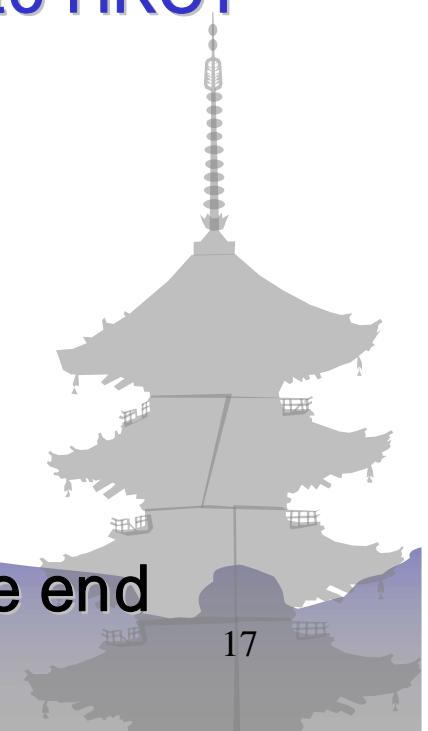
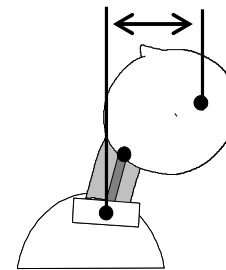
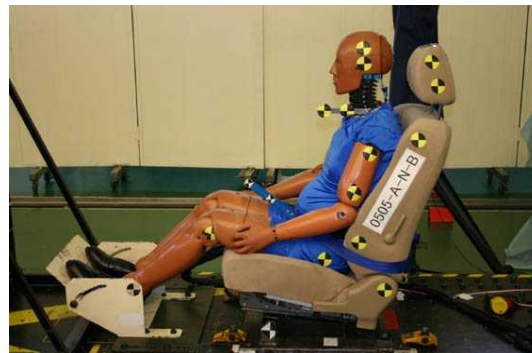
Linear X Disp. of O.C. to T1 (without Head Restraint)



Conclusion & Future action

- ◆ “ Head C. G. displacement relative to T1”
[Dynamic Backset] could be reasonable indicator
for head restraint gtr phase1 dynamic option for
BioRID II.
- ◆ Tentative limit value may [40mm]

Head C. G. Displacement Relative to T1 up to HRCT
[Dynamic Backset] \leq [40mm]



- ◆ Appropriate limit value will be studied by the end
of Dec. 2007.

Proposal to set up a new WG for Phase2

We believe

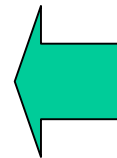
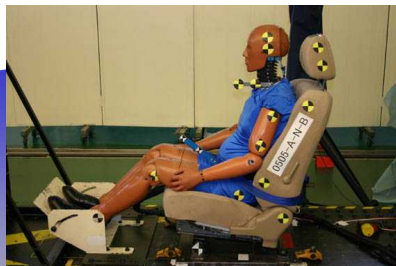
- Gtr should be globally harmonized technical requirements.
- One common dynamic test could unify 4 different requirements in phase 1.

To study such one common appropriate requirement, we strongly propose to establish WG for head restraint gtr phase 2. Japan will come forward as a candidate of technical sponsor.

Phase 2

Dynamic

Appropriate dynamic test requirement w BioRID II



Phase 1

Static

R-point with Backset $\leq 45\text{mm}$

or

H-point with Backset $\leq 55\text{mm}$

OR

Dynamic Option

Head rotation w HY-III $\leq 12\text{ deg}$

or

Some criteria with BioRID II

END

