

Current Injury Criteria ECE-R 94 Comparison with US NCAP

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IWG Frontal Impact
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Outline

Objective

- Comparison of existing test data from the HIII 5th female Dummy in frontal crash tests (FWRB)

Data base

- NHTSA website (tests from 2011 to 2014)
- Mainly US NCAP tests with 56 km/h against rigid wall, 100% overlap
- Dummy: front seat passenger, 5th female Dummy HIII

2014 Jeep Grand Cherokee	2013 Tesla S	2014 Mercedes E350
2014 Kia Forte	2013 Smart electric drive	2014 Dodge Durano
2014 Kia Sorento	2014 Chevy Silverado	2011 Toyota Camry
2014 Subaru Forester	2014 Nissan Versa	2012 VW Beetle



Occupants protection

1	HPC	1000	1000	1000	1000	✓
2	a Head 3ms	80g	80g	80g	80g	✓
3	Neck tension	1,1 kN (60ms) 2,9 kN (35ms) 3,3 kN (0ms)	1,1 kN (60ms) 2,9 kN (35ms) 3,3 kN (0ms)	3.3 kN	2.9 kN	✓
4	Neck shear	1,1 kN (>45ms) 1,5 kN (25-35ms) 3,1 kN (0ms)	1,1 kN (>45ms) 1,5 kN (25-35ms) 3,1 kN (0ms)	3.1 kN	2.7 kN	✓
5	Neck Moment- ext.	57 Nm	57 Nm	57 Nm	57 Nm	✓
6	ThCC	42 mm	42 mm	42mm	[34 mm - 42 mm]	? Rod Pot
6a	aTh 3ms	-	-			✓
7	V*C	1,0 m/s	1,0 m/s	1,0 m/s	1,0 m/s	✓
8	FCC	7,58 kN (10ms) 9,07kN (0ms)	7,58 kN (10ms) 9,07kN (0ms)	9,07 kN	7 kN (0ms)	✓
9	TCFC	8kN	8kN			✓
10	Kneeslider	15 mm	15 mm			✓
11	TI	1,3	1,3			✓

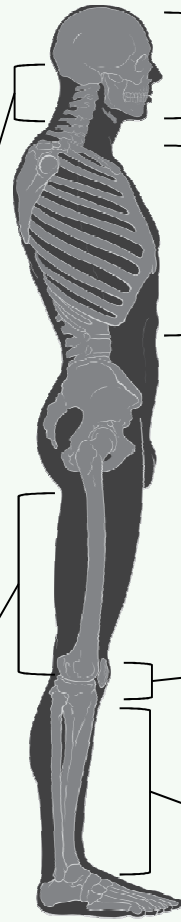
Proposal for IARVs from 22nd IWG FI Meeting

NIC* tension (upper): 2,01 kN @ 0ms
(scaled based on 1,83 kN @ 28ms
Mertz et al. 2003) 0,7 kN @ ≥ 48 ms

NIC* Shear (peak): 1,95 kN
(Mertz et al. 2003)

$M_y(-)*$: 29 Nm
(scaled based on Mertz et al. 2003)

FFC: 6,16 kN @ 0 ms
(Mertz et al. 2003) 5,13 kN @ ≥ 9 ms



HPC36: 1000 (ECE-R 94)
 HPC_{15} : 700 (Eppinger et al. 2000)
 a_{3ms} : 80 g (ECE R-94)

ThCC: 34 mm
(scaled to chest depth, Mertz 2003)

VC*: 1.0 m/s (ECE R-94)
Thorax Acc Peak: 60g
(Mertz et al. 2003)

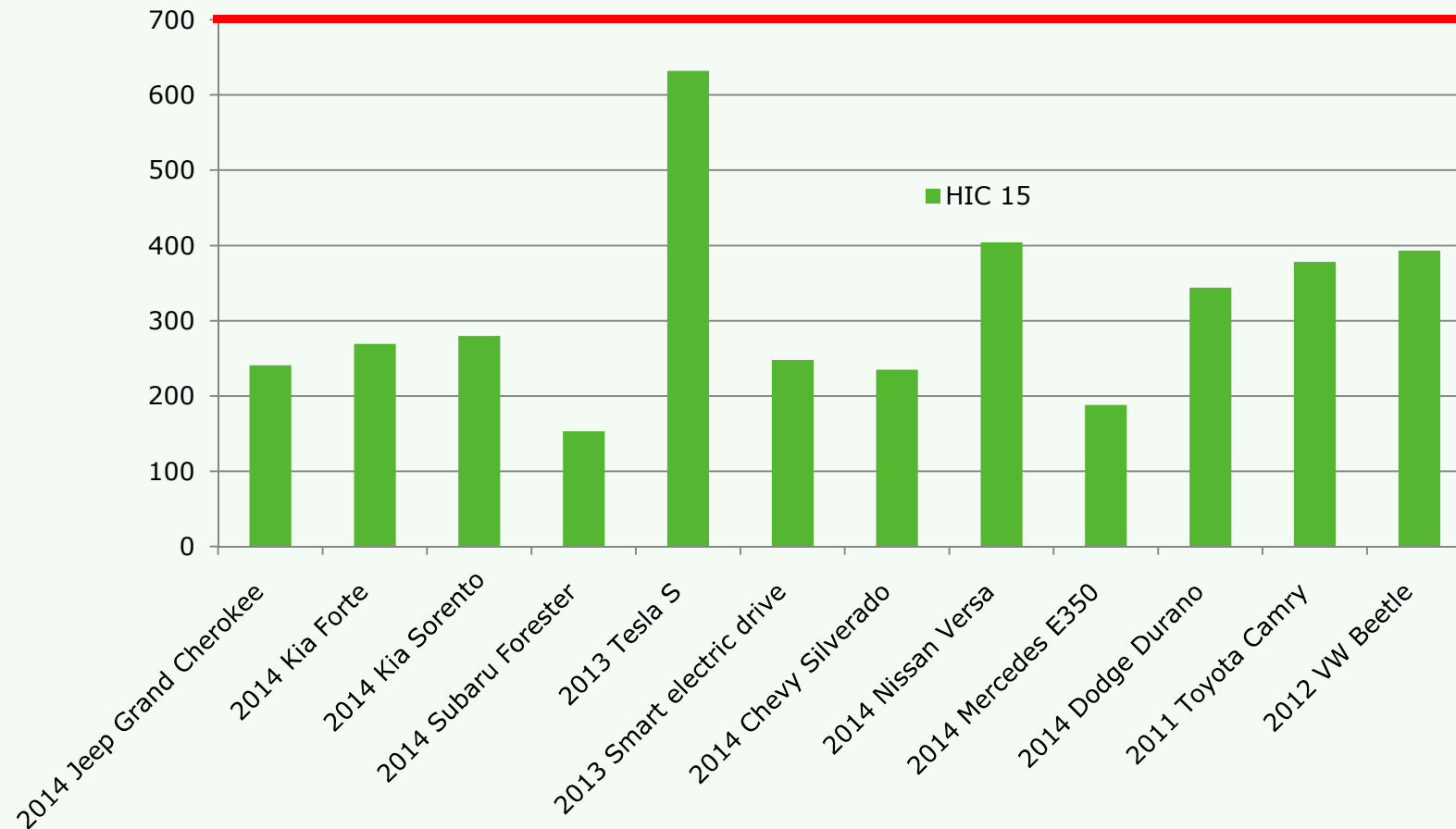
Knee Slider: 12mm (Mertz et al. 2003)

TI: 1 (M_C)_R 114 Nm and (F_C)_Z 22,9N
(Mertz et al. 2003)

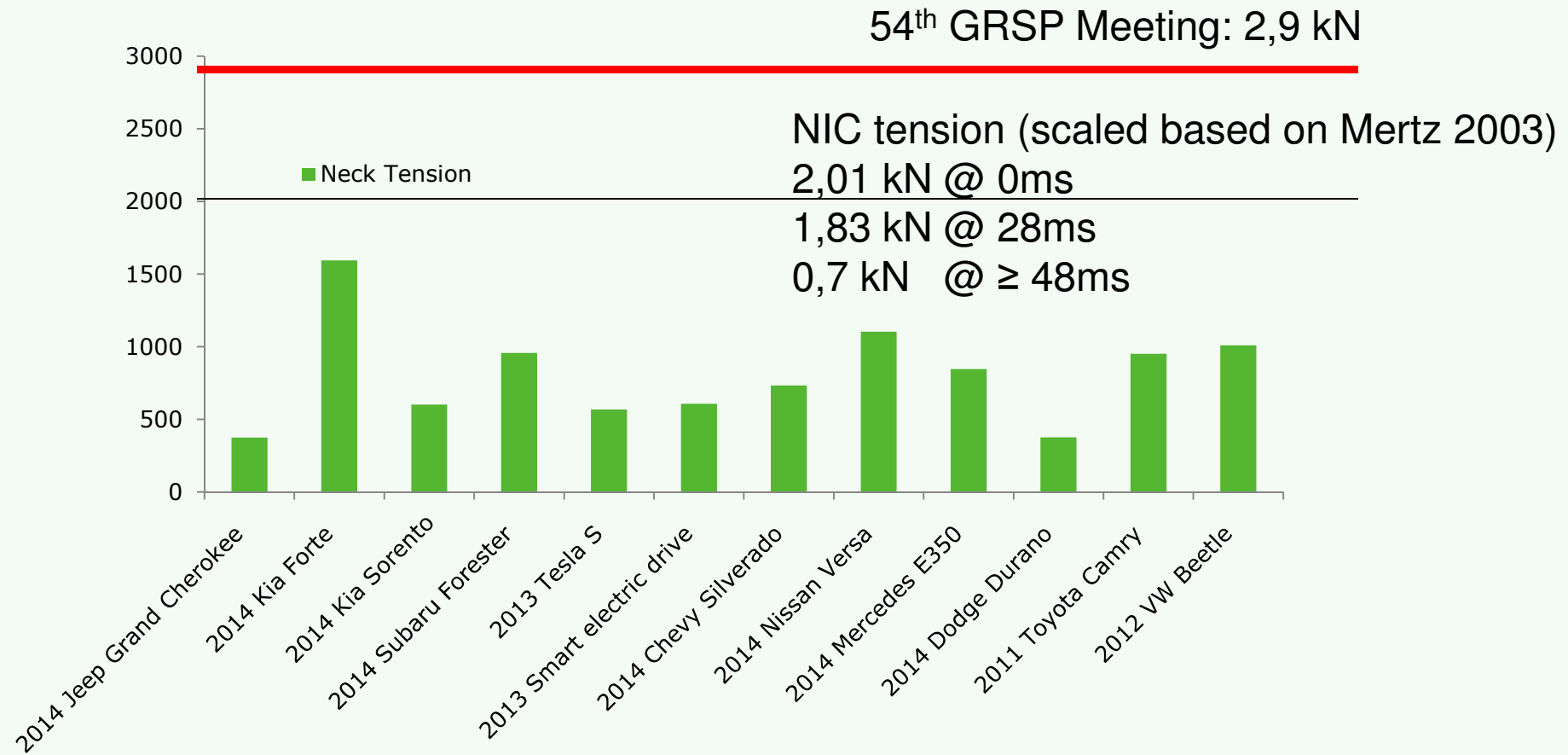
TCFC: 5,1 kN
(Tibia Compr., F_z ; Mertz et al. 2003)

Comparison of HIC₁₅ values

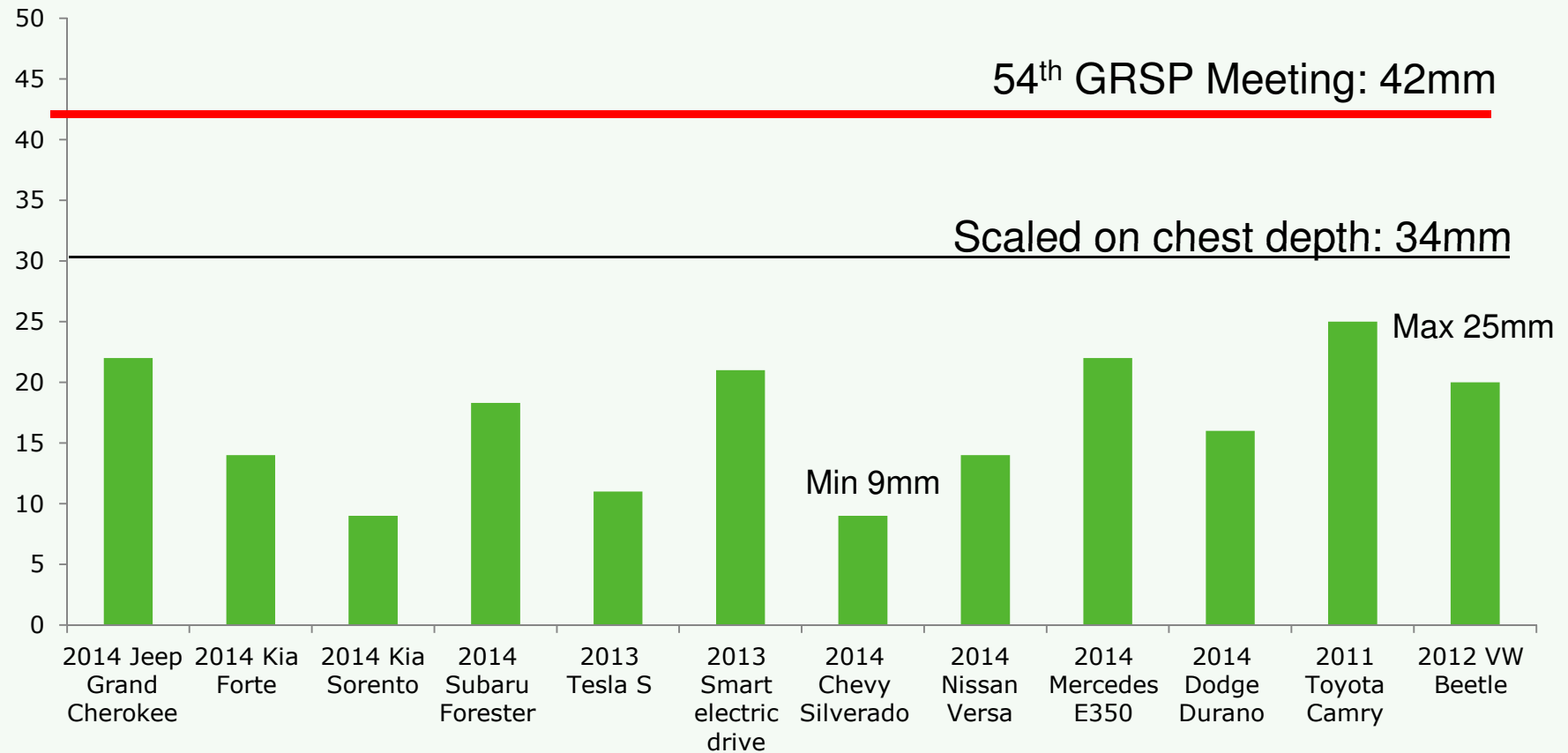
NHTSA uses HIC₁₅ with 700 which is almost comparable to HIC₃₆ with 1000



Comparison of Neck Tension Values

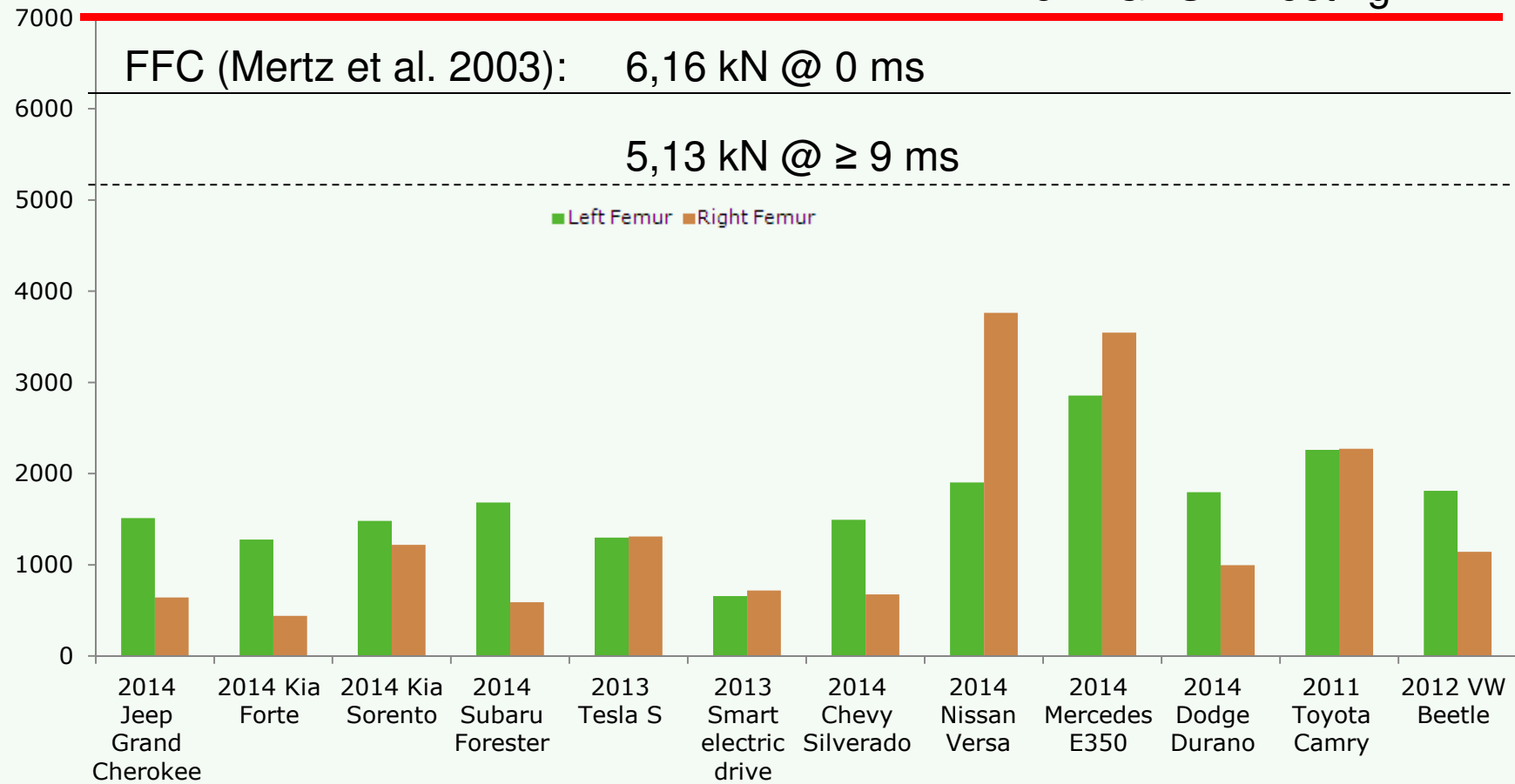


Comparison of Chest Deflection Values



Comparison of Femur Forces

54th GRSP Meeting: 7 kN



Conclusions

- Current vehicles in US NCAP with 56 km/h are well below the proposed limits from the 54th GRSP
- Scaled values shall be used for the 5th Dummy, in particular 34mm for the chest deflection

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Thank you for your attention

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Conclusions

- Current vehicles in US NCAP with 56 km/h are well below the proposed limits from the 54th GRSP
- Scaled values shall be used for the 5th Dummy
 - NIC tension
 - NIC shear
 - Neck moment
 - Thorax deflection
 - Femur forces