

GRSP IG on CRS – 53rd meeting – London, Sept 2, 2015

# Tests of first APTS 40 in Q3 moulded abdomen

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# Objectives

- Characterize the difference of response between the APTS50 (50mm) in Q3 drilled and new APTS40 (40mm) in Q3 molded
- Protocol: similar to biodifidelity but simplified:
  - Isolated abdomen
  - 25 mm bar compression at 1m/s



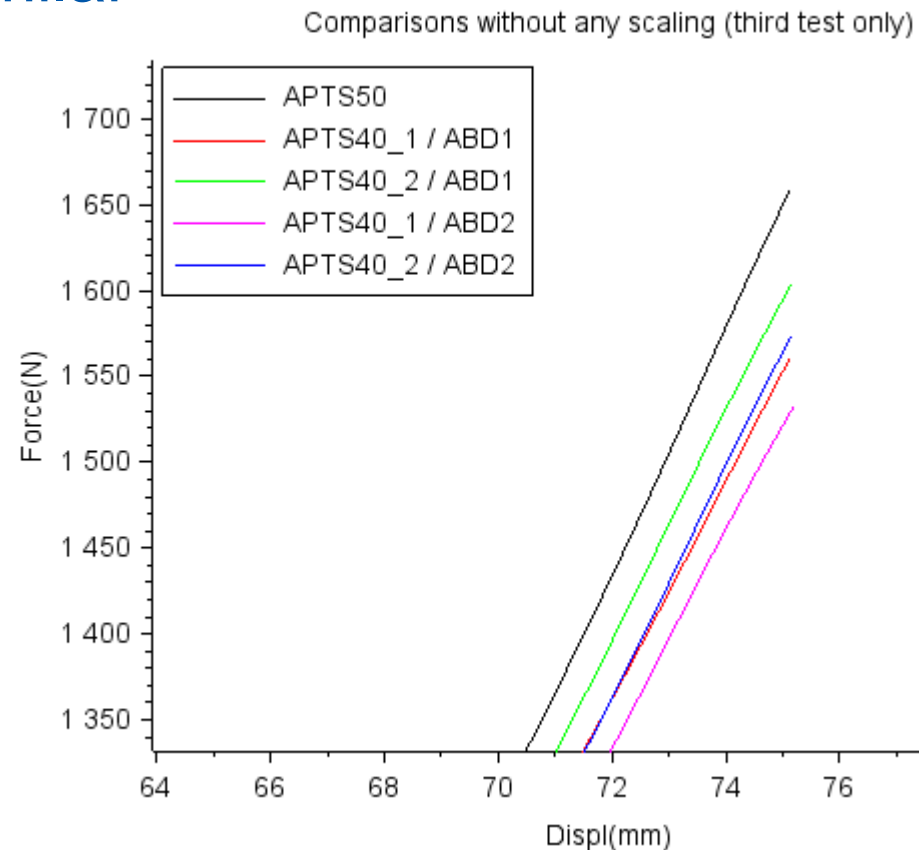
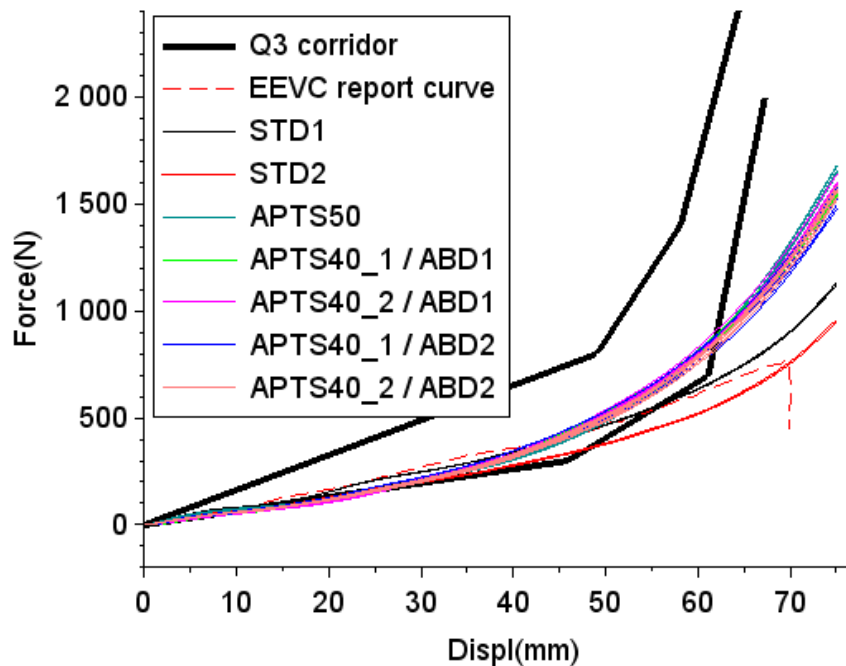
# Q3 Test matrix

- Two standard Q3 blocks (STD1 and STD2, not drilled, 779g and 815g, Ifsttar)
- One pair of APTS50 with a drilled block (APTS50, 1170g with sensors, Ifsttar)
- Two pairs of APTS40 prototypes (APTS40\_1, APTS40\_2, 160-165g for each sensor, Transpolis)
- Two moulded abdomens (Humanetics)
  - Standard (ABD1, DP5220, 769g)
  - Lightweight (ABD2, DP5221, 574g)



# Results: force vs. displacement

- Similar for all instrumented blocks (within a few %)
- Stiffer than standard block at the end of response (bar?)
- Lighter block response similar

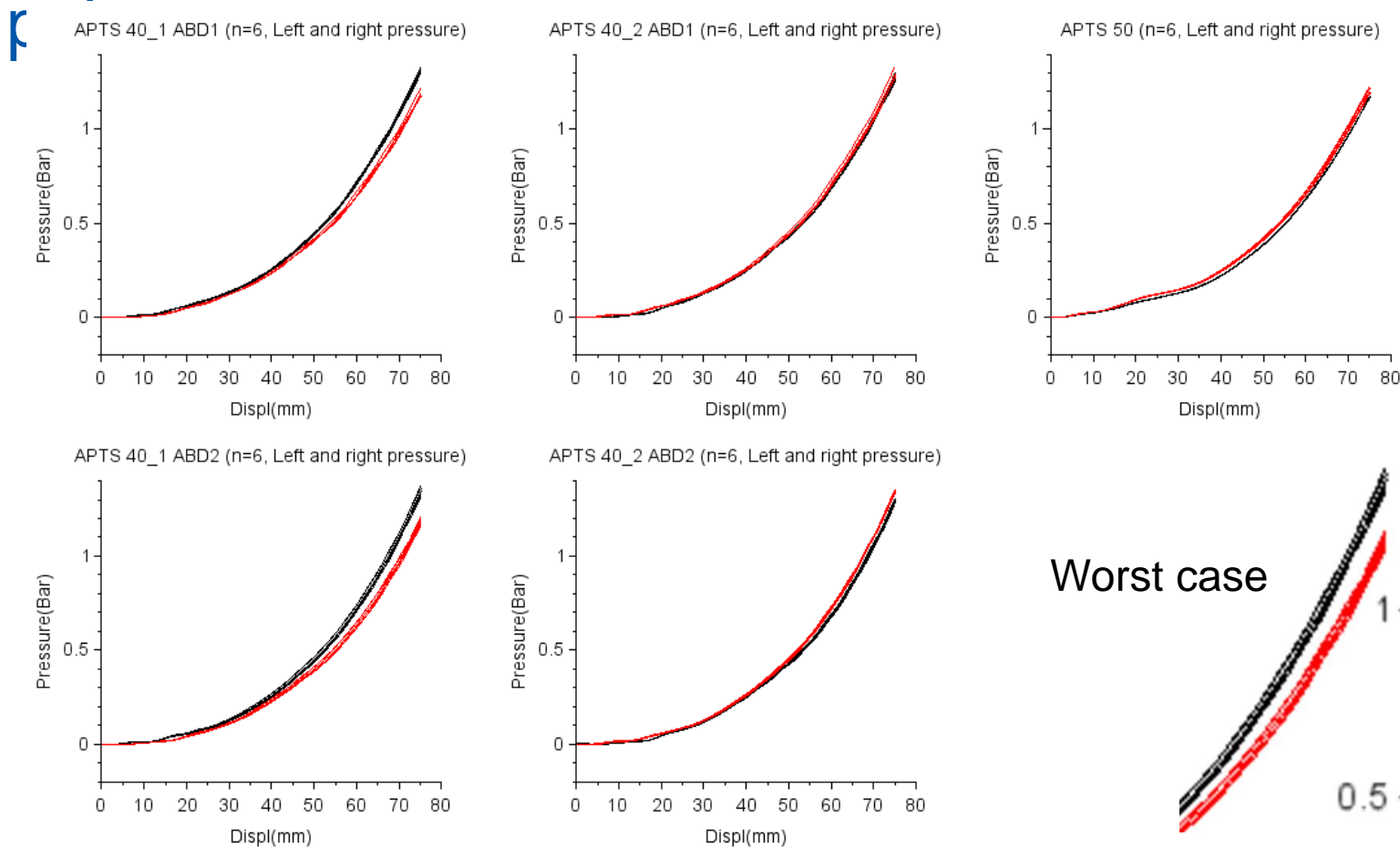


EEVC 2008 report curve in belt config



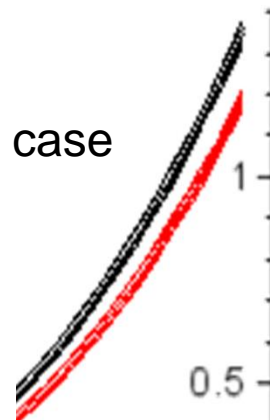
# Results: pressure vs. displacement

- 4 combinations APTS40, 1 APTS50: repeatability ok.
- Symmetry: excellent one pair, some differences other



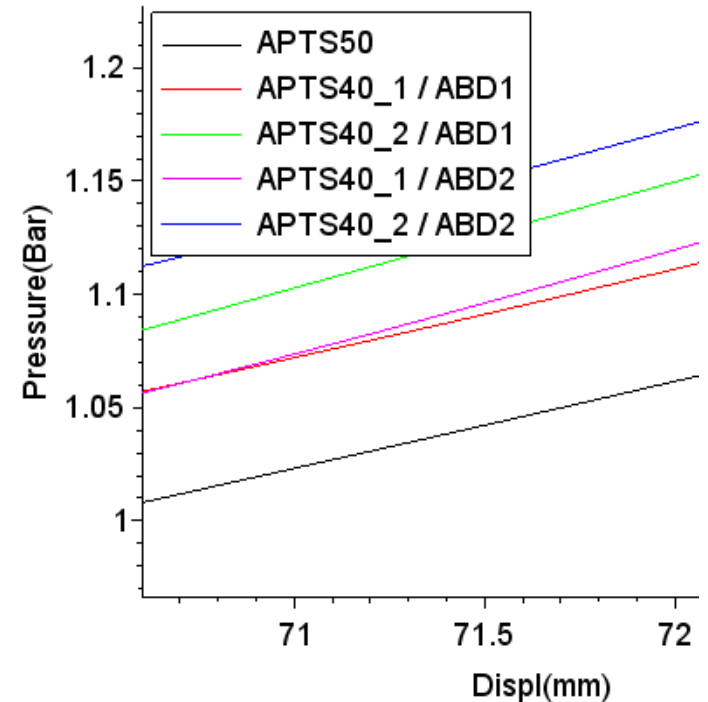
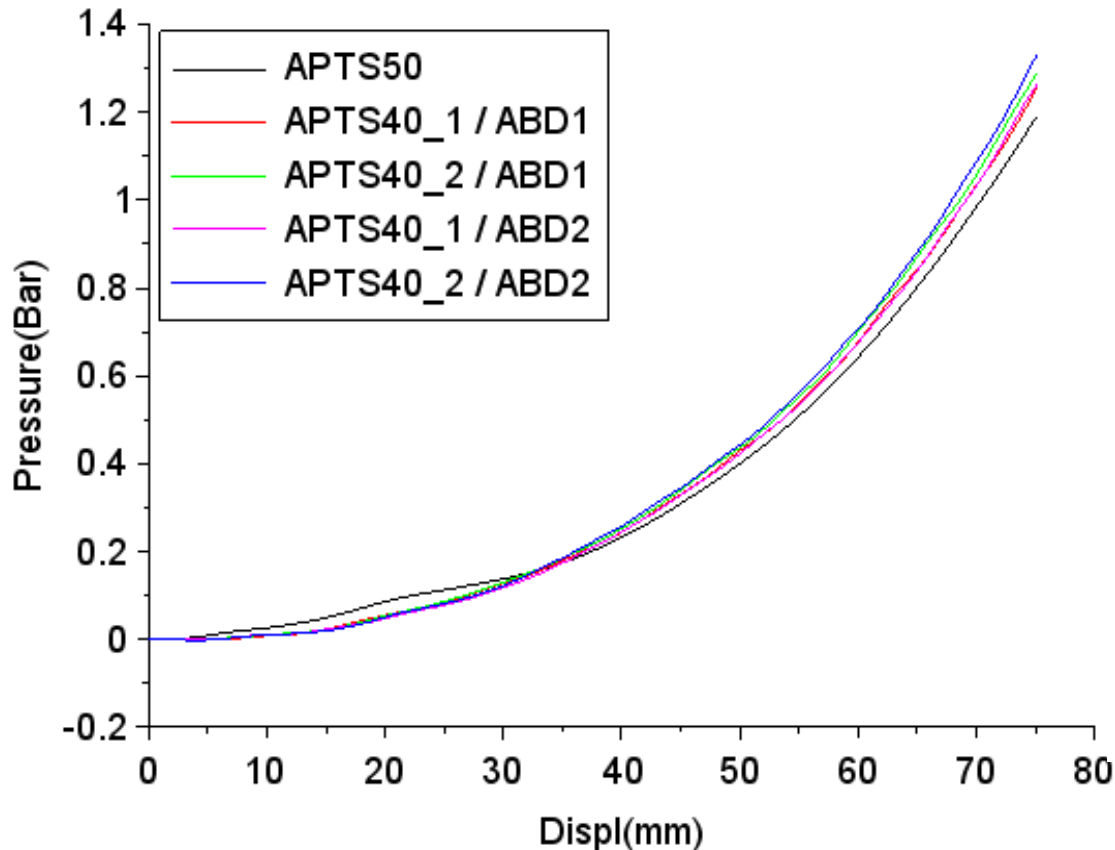
N=6 for each plot

Worst case  
12.5% Diff. At 70mm



# Response comparison

- Average L/R, only third test plotted
- Difference between APTS50 (n=1) and APTS40 (n=4) combinations) is small



# Repeatability: coefficient variation @ 70mm

- $CV = \text{StDev} / \text{Average}$  at 70mm displ.:  $CV < 3\%$
- Average dissymmetry: 6.5% (5 combinations)
  - Max: 12.5%
- Difference between APTS50 and APTS40 average (4 combinations)
  - Force: 5.1%
  - Pressure: 6.3%

	Mean			CV		
	Force (N)	Press L (bar)	Press R (bar)	Force	Press L	Press R
apts50	1302	0.97	1.00	1.11%	0.26%	1.34%
apts401abd1	1245	1.08	0.98	1.18%	0.79%	1.55%
apts402abd1	1266	1.05	1.06	1.71%	1.14%	1.62%
apts401abd2	1219	1.10	0.97	2.78%	1.42%	1.71%
apts402abd2	1228	1.06	1.10	1.60%	0.99%	0.50%



# Conclusions

- Based on few samples tested (=limitation):
  - Repeatability is good (similar to previous)
  - Differences of response are limited between APTS 50 and APTS 40
    - Less than 7% on stiffness response
    - Less than 7% on pressure vs displacement response
  - Differences are smaller between combinations of APTS 40





- Questions?
- Comments?



# Appendix: Q3 biofidelity testing APTS50

- Q3 tests biofidelity testing: tests performed a few years apart with two setup variations

Tests: 2011  
(Beillas, Stapp 2012)

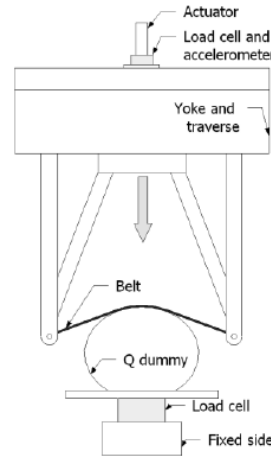
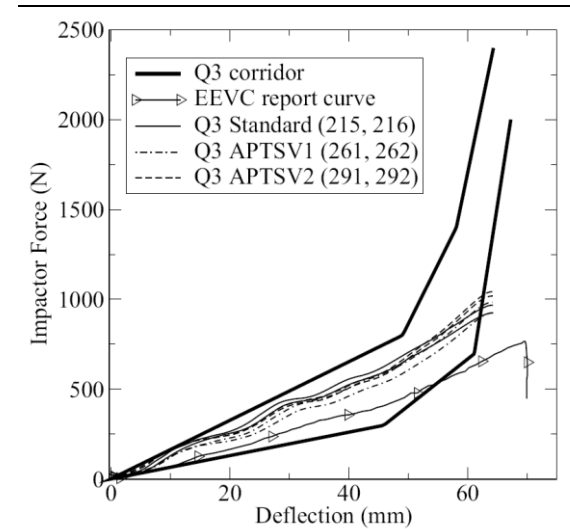
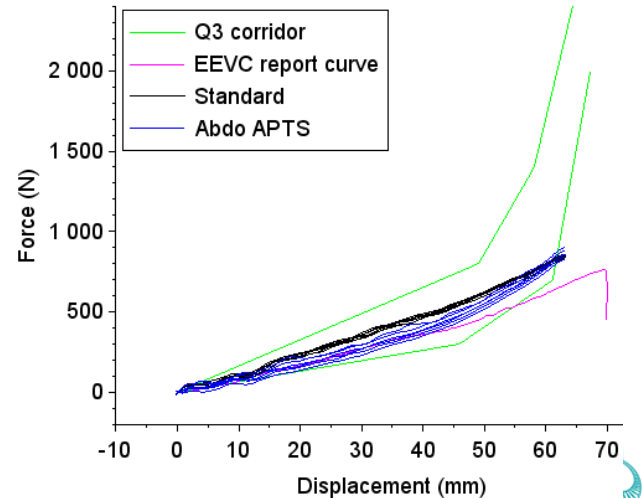
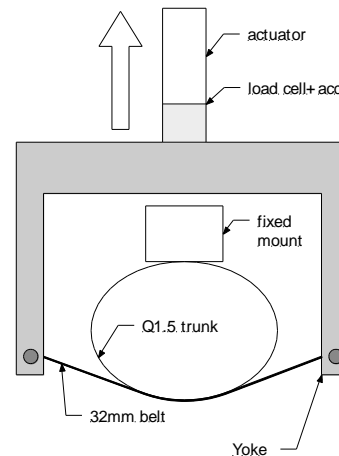


Figure 2: Q3 abdominal compression test setup

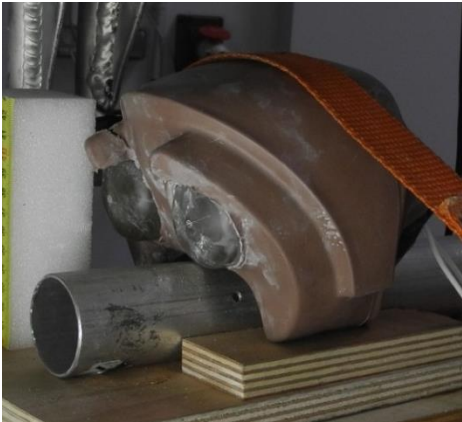


Tests: 2014

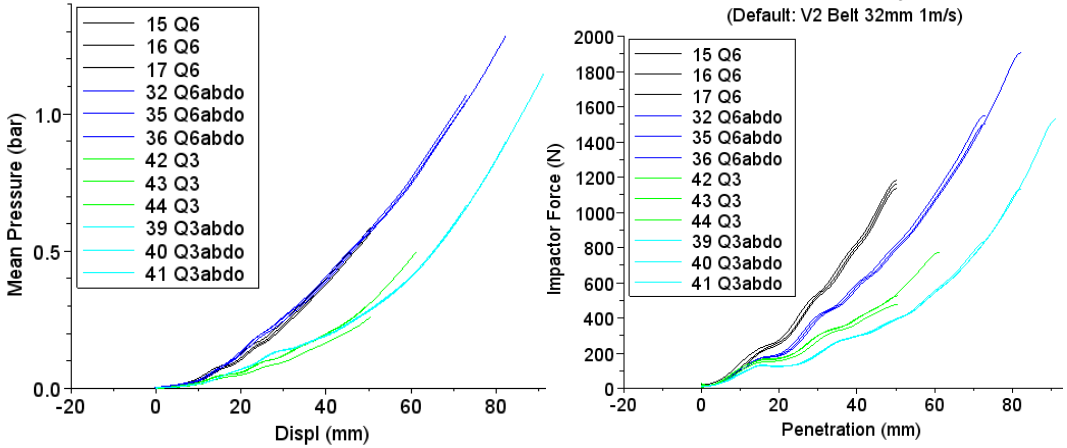


# Appendix: simplified protocol (Pres GRSP IG Jan 2013)

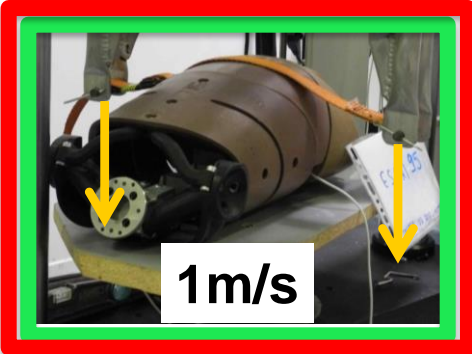
- Displ/pressure response similar in dummy and isolated abdo (force is different)



Q3 and Q6 (abdo=abdo only)



- Between in and outside abdomen: 25mm bar similar belt...



Same abdo and sensor tested in Q10

