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Munck, Kim; Pedersen, Maria Weinkouff ; Udesen, Nanna Louise Kunker; Omar, Massar; Sørensen, Kasper; Struijk, Johannes Jan; Møller, Jacob Eifer; Søgaard, Peter; Schmidt, Samuel Emil

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Variation of the Seismocardiogram Depending on Measurement Position

Kim Munck, Maria W Pedersen, Nanna L J Udesen, Massar Omar, Kasper Sørensen, Johannes J Struijk, Jacob E Møller, Peter Sjøgaard, and Samuel E Schmidt

INTRO

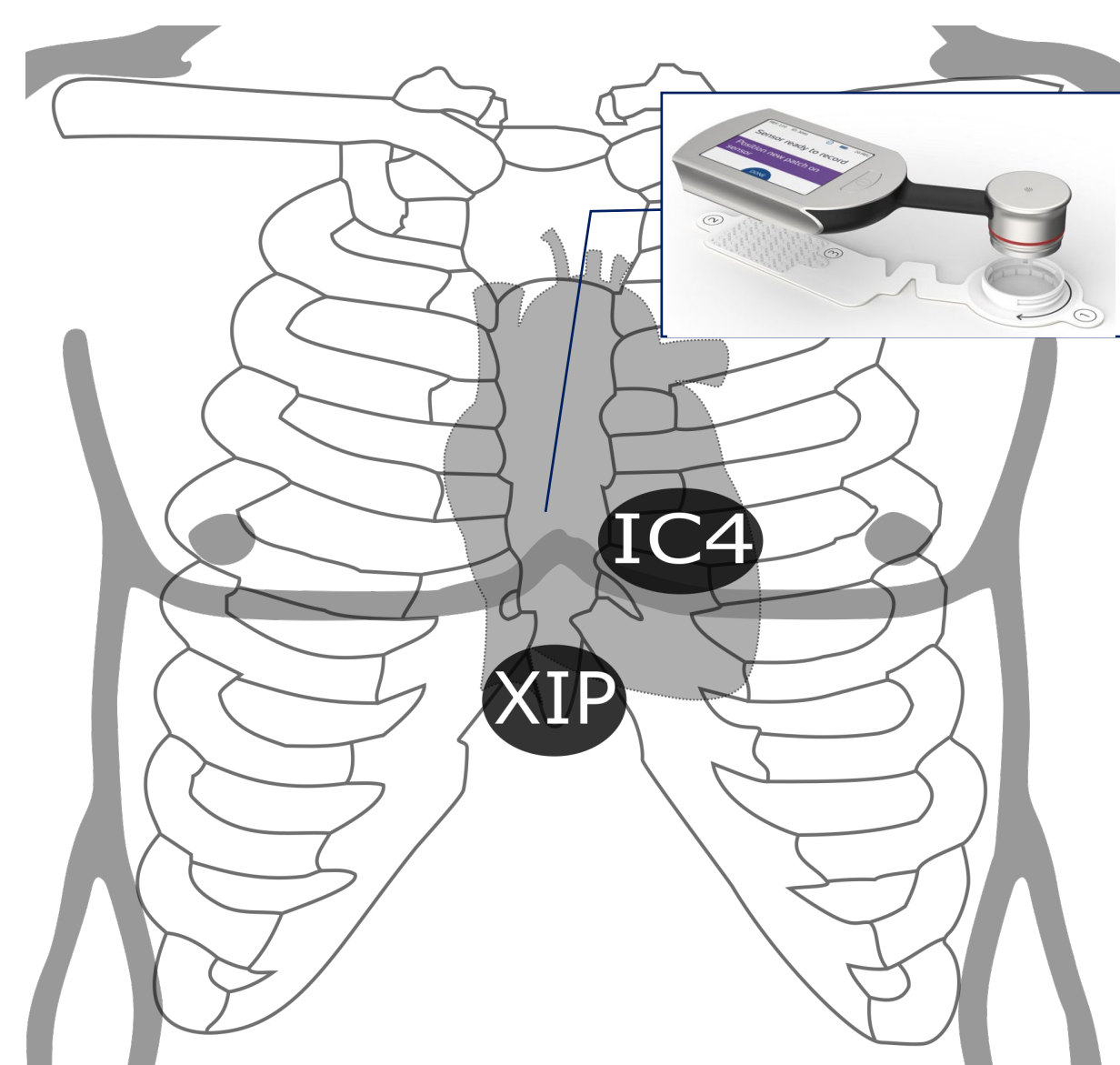
- Do we measure the same seismocardiogram at the xiphoid process and the fourth intercostal space?

METHODS

- 30 patients with suspected heart failure
- Seismocardiogram, with a modified CADSCOR®-system from Acarix

Measurement sites and device

A illustration of the modified CADSCOR®-system, from Acarix, and the location of the measuring sites the xiphoid process (IXP) and the fourth intercostal space (IC4).



- Segmentation and average beat with a duration-dependent hidden Markov model
- Manual annotation of 4 fiducial points in the systolic complex
- Statistical analysis:
 - Pearson's correlation coefficient (r)
 - Paired-sample t-test

RESULTS

Comparison of fiducial point amplitudes

The mean and standard deviation of the fiducial points amplitudes. The table also includes the correlation coefficient R for the comparison between the xiphoid process (IXP) and fourth intercostal space (IC4).

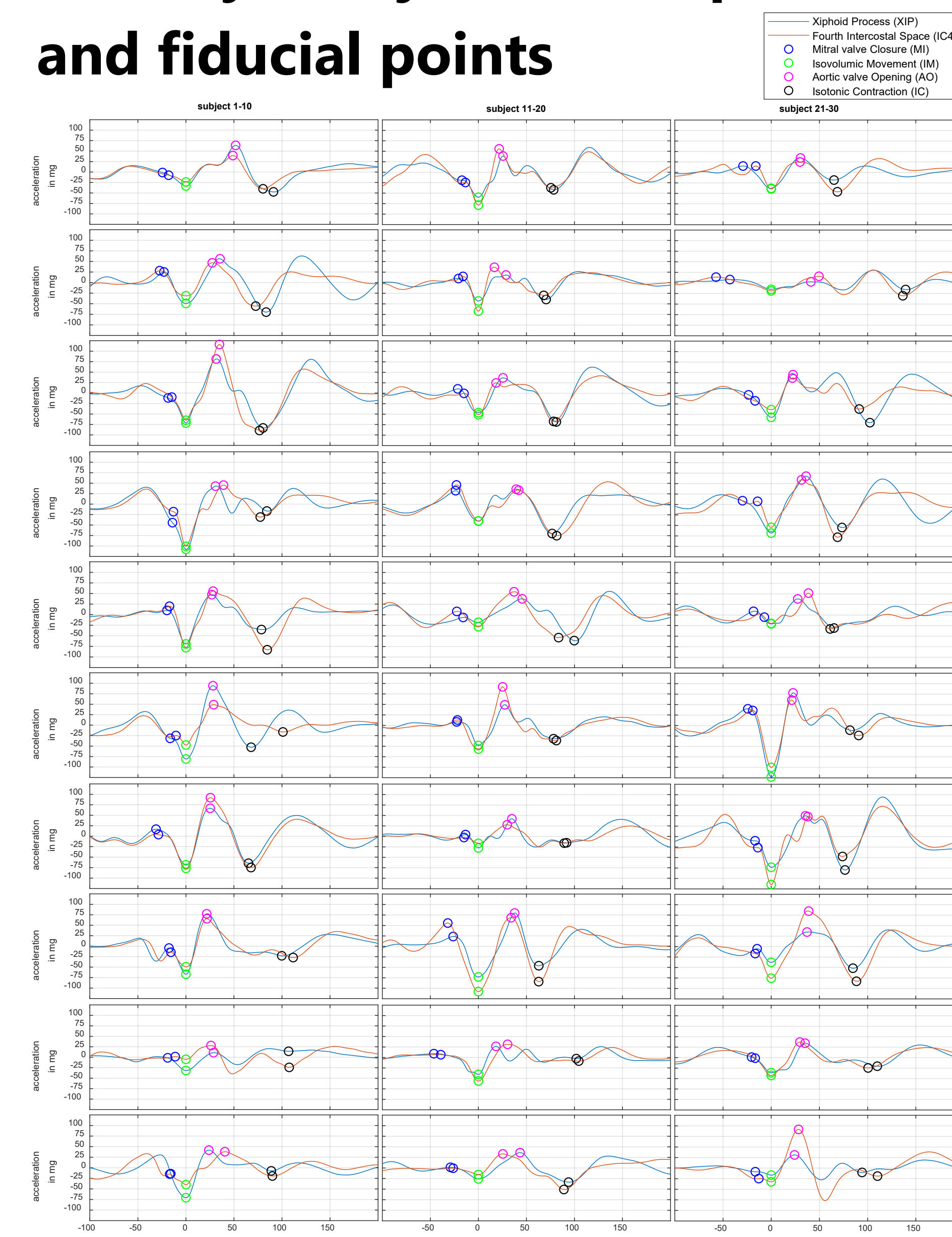
mean(std)	MC	IM	AO	IC	
Amplitude [mg]	XIP 2.5(17.4)	-51.9(26.1)	46.7(21.5)	-38(25.4)	
	IC4 2.0(20.9)	-52.4(29.1)	51.5(24.0)	-44.7(24.2)	
Correlation between XIP and IC4	r	0.82	0.75	0.51	0.67

Comparison of fiducial point timing interval

The mean and standard deviation of the fiducial points timing interval relative to Mitral valve Closure (MC). The table also includes the correlation coefficient R and statistical significance (p<0.05), marked by *, for the comparison between the xiphoid process (IXP) and fourth intercostal space (IC4).

mean(std)	MC to IM	MC to AO	MC to IC	
Interval [ms]	XIP 22.4(7.8)*	53.9(11.1)	108(20.1)	
	IC4 19.6(9.9)	50.6(14.7)	105(22.6)	
Correlation between XIP and IC4	r	0.80	0.76	0.89

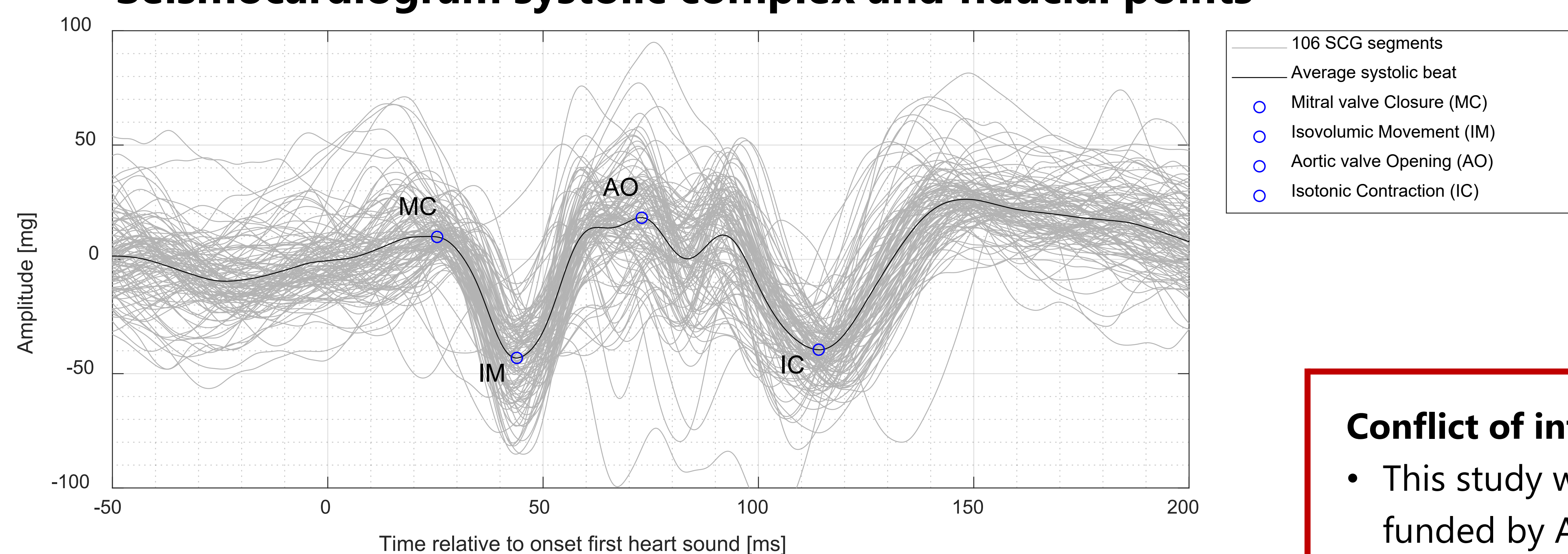
All subjects systolic complexes and fiducial points



DISCUSSION

- A tendency to higher magnitude of AO and IC at the fourth intercostal space
- Only a fair to moderate correlation of the fiducial points amplitude and timing interval
- MC to IM timing interval was shorter at the fourth intercostal space

Seismocardiogram systolic complex and fiducial points



Conflict of interest

- This study was funded by Acarix A/S

