

***Modulating effect of respiration on atrioventricular conduction time assessed using PR interval variation. Shouldice R, Heneghan C, Nolan P, Nolan PG, McNicholas W. Med Biol Eng Comput. 2002 Nov;40(6):609-17.***

Respiratory sinus arrhythmia (RSA) is the variation of heart rate (or RR interval) in phase with respiration and has been extensively studied. However, the effect of respiration on atrioventricular conduction delay (and hence PR interval length) has not yet received much attention. This work reports on measurements of respiration and associated RR and PR variability, in 11 subjects, assessed through surface electrocardiogram measurements, for both paced and spontaneous respiration in the supine position. A wavelet-based approach was used to extract RR and PR intervals. The accuracy of RR and PR interval measurement was consistent with previously published work. Respiratory atrioventricular conduction delay variability (RCV) was assessed using three techniques: spectral, peak-to-trough and cosinor methods. All measures showed statistically significant variations in PR interval due to respiration during paced respiration at 6 min<sup>-1</sup>. Of the three measures, cosinor analysis was most reliable in highlighting RCV. Using this measure, statistically significant RCV was seen in ten out of the 11 subjects during paced respiration. The magnitude of the variability was estimated as  $\pm 5.9\%$  of the mean PR interval. In spontaneous respiration, statistically significant RCV was seen in approximately half of the subjects, with an estimated variability of  $\pm 1.5\%$ . As a control, statistically significant values for RSA were also obtained from the same data, which agreed with previously published measurements. It was concluded that respiration does indeed modulate atrioventricular conduction delay, deep breathing in the supine position accentuates this effect, and cosinor analysis provides a reliable means for quantifying this effect.