Cardiorespiratory coupling in asthmatic children

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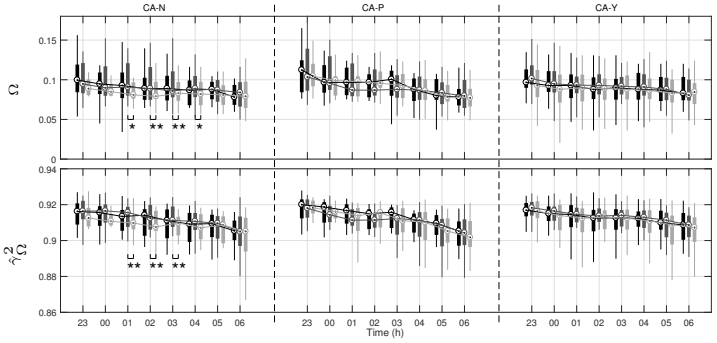
Motivation and aim: The relationship between cardiac and respiratory autonomic control has been suggested to be altered in several respiratory disorders. However, and despite the increasing prevalence of asthma, there are not studies assessing the cardiorespiratory coupling (CRC) with respect to the asthmatic status. Since altered autonomic control has been suggested to play a major role in asthma, in this work overnight CRC was assessed in a group of children who underwent a three-month inhaled corticosteroids treatment (ICS).

Materials: 67 young children were subscribed with three-month ICS treatment, and overnight electrocardiogram and impedance pneumography were acquired in three days at different times with respect treatment completion. Afterwards, they were classified attending to their current asthma (CA) status as having CA (CA-Y), possible CA (CA-P) or absence of CA (CA-N).

Methods: CRC coupling was assessed in each of the three recording days. It was calculated from the time-frequency cross spectrum of the modulating signal (which carries the information of the autonomic modulation of the heart rate) and the impedance pneumoghraphy signal. Differences among recording days were calculated in each group using a paired Wilcoxon test.

Results and conclusion: After treatment completion, CRC was reduced ($p<0.005$) in the subjects without or with a low risk of asthma, whereas it kept unchanged in those with a worse prognosis, suggesting that an altered interaction between cardiac and respiratory activity might be related with an increased risk of asthma.



CRC parameters obtained in the different recording days (black, dark gray and light gray) for the different groups. Significant differences are marked with * ($p<0.017$) or ** ($p<0.005$).