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### **Cardiac mental stress related indices can be accurately assessed by a wrist wearable device during basic training laparoscopic skills simulation**

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The aim of the study was to investigate if the photoplethysmography (PPG) derived cardiac stress parameters i.e. Heart Rate (HR) and Inter beat Interval (IBI) of a new watch-sized device (Empatica E4), can accurately measure acute mental stress of novice surgeons before (Base Line, BL), during Exercise (E) and in Recovery phase (R) in a basic training laparoscopic skills simulation module (Lap mentor, 3D Systems). 27 novices concomitantly wore both the wrist device and an ambulatory rhythm Holter (HM) which captures HR & Heart Rate Variability (HRV) and is considered as the “gold standard” noninvasive method for cardiac stress monitoring. To avoid multifactorial external stress bias, the percentage differences between BL and E of all parameters measured were derived for each subject. The Bland-Altman method was used to plot the

difference for each subject against HRV and IBI values in order to compare Holter derived HRV versus PPG derived IBI. The mean value of correlation coefficient  $r$  between R-R and IBI data during all sessions showed a high agreement between the two methods ( $r=0.938$ ;  $p<.001$ ), reaching its maximum at BL ( $r=0.947$ ,  $p<.001$ ) and being minimized at E ( $r=0.749$ ,  $p<.001$ ). Bland-Altman analysis showed that the device derived cardiac parameters highly correlated with the reciprocal Holter values during all experiment phases. This study demonstrated that this easy to wear watch-sized device is capable to accurately and noninvasively estimate cardiac stress parameters in novices during a laparoscopic simulation task, thus eliminating the need to wear a rather cumbersome ambulatory Holter device.

#### **Biography**

Konstantinos Georgiou MD is a General Surgery Resident at 1st Department of Propaedeutic Surgery, Hippokration General Hospital of Athens. He has completed his Msc from National and Kapodistrian University of Athens, Medical School.

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