

Sport?Sicuro! A Graphical User Interface for Continuous Cardiovascular Monitoring while Playing Sport Based on Heart Rate and Heart-Rate Variability

Sofia Romagnoli, Agnese Sbrollini, Ilaria Marcantoni, Micaela Moretti, Laura Burattini

Università Politecnica delle Marche
Ancona, Italy

Heart rate (HR) and heart-rate variability (HRV) are increasingly used to assess the body response to heavy physical effort and to define cardiovascular risk indices for sport-related sudden cardiac death. The complexity of physiological phenomena affecting HR and HRV makes difficult the interpretation of measures provided by commercial wearable technologies for athletes and trainers. Availability of interactive applications for analysis of HR series can optimize continuous cardiac self-monitoring while training. This work proposes Sport?Sicuro!, a MATLAB® graphical user interface that allows automatic computation of prevention and performance indexes from HR series for cardiovascular monitoring while practicing sport. Automatic analysis of HR series is based on fixed features definitions provided by literature, and other arbitrary settings, the default values of which can be changed by the user. Eventually, Sport?Sicuro! provides a report file listing the quantitative results of the HR analysis presented in the output panel along with the plot of HR series (Figure). Colors help the identification of training phases and acceleration (green band) and deceleration (light blue band) on the HR series plot. The reference ranges of normality relative to each index permit a first and rapid check of prevention indexes. These measures along with performance indexes can be examined in depth by including athlete's data and training notes. The existent commercial applications for HR monitoring are finalized to assess athlete's performance and their improvement. Whereas Sport?Sicuro! includes both performance indexes and cardiovascular risk indices for sport related sudden cardiac death, which is the leading medical cause of death across all sports and prevention by continuous screening remains the only weapon to contrast sport related sudden cardiac death. Thus, Sport?Sicuro! represents a potentially useful graphical tool for automatic and objective analysis of HR series in support to sport medicine clinicians and automatic self-monitoring of athletes during sport.

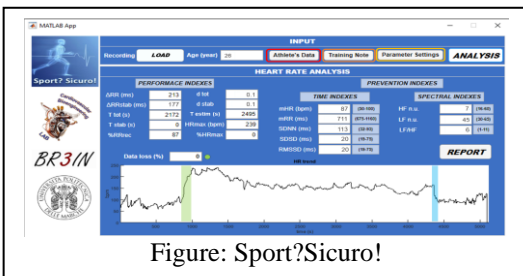


Figure: Sport?Sicuro!