Assessment of ventricular repolarization variability in wake states in REM Sleep Behaviour disorder and Parkinson’s Diseases

Parisa Sattar1,2, Giulia Baldazzi2,3, Nicla Mandas2,4, Elisa Casaglia3,5, Michela Figorilli3,5, Laura Gioret1,6, Pietro Mattioli6,7, Francesco Calizzano6,7, Francesco Fama6,7, Dario Pani2,3, Pablo Laguna8,9, Raquel Bailon8,9

1Neuroscience PhD program, Department of Biomedical Sciences, University of Cagliari, Cagliari, Italy
2MeDSP Lab, Department of Electrical and Electronic Engineering, University of Cagliari, Cagliari, Italy
3Interdepartmental Sleep Disorder Research Center, University of Cagliari, Cagliari, Italy
4The Hadron Academy, Istituto Universitario di Studi Superiori IUSS, Pavia, Italy
5SC Neurology, AziendaOspedaliero-Universitaria Cagliari, Italy
6Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health (DINOGMI), Clinical Neurology, University of Genoa, Genoa, Italy
7Neurophysiopathology unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy
8Biomedical Signal Interpretation and Computational Simulation (BSICoS), Aragón Institute for Engineering Research (I3A), IIS Aragón, University of Zaragoza, Spain, María de Luna, 1, 50015 Zaragoza, Spain
9Centro de Investigacion Biomedica en Red en Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Madrid, Spain

Aim: Idiopathic REM Sleep Behavior Disorder (iRBD) patients exhibit autonomic dysfunction symptoms, potentially increasing cardiovascular mortality risk. Although the autonomic irregularities in iRBD are recognised, its association with the risk of cardiovascular mortality in wake or sleep states remain underexplored, highlighting a critical research area. In this regard, the QT-variability (QTV), a promising repolarization variability indicator, have two distinct components: QTV related (QTVrRRV) and unrelated (QTVuRRV) to RR-variability (RRV). This pilot research is focused on studying QT-dynamics in iRBD and RBD with Parkinson’s disease (PD-RBD) populations during two wake states i.e., wake before sleeping (WBS) and wake upon awakening next day (WAS), as markers of potential cardiovascular risk.

Method: The study included 18-controls (CG) (age: 59 ± 8 years, 61% female), 20-iRBD (68 ± 9, 15% female), and 20-PD-RBD (73 ± 5, 35% female) participants. QTV and RRV were derived from a 5-minute ECG epoch of polysomnography records during two wake states. Analyses included the time and frequency domain indexes, followed by non-parametric statistical analysis to assess intra- and inter-group patterns.

Results: No significant differences were found in the mean values of RR, QT, and QT-corrected intervals across all groups and wake states. For intra-group analysis, significant differences (p<0.05) in frequency domain RRV indexes and QTVrRRV were found for iRBD and PD-RBD groups in the WAS compared to the WBS. The inter-groups analysis showed significant reduction (p<0.05) in certain frequency domain RRV indexes and QTVrRRV for iRBD and PD-RBD groups compared to the CG. Yet, no significant differences were noted in QTV indexes or QTVuRRV across all groups and wake states.

Conclusions: RRV and QTVrRRV findings suggest altered autonomic regulation in iRBD and PD-RBD compared to CG. However, the lack of differences in QTV indexes and QTVuRRV suggests that these conditions might not pose a risk of cardiovascular mortality.