

Acute exposure to ambient fine particulate matter (PM_{2.5}) extracted from Prishtina and Obiliq urban area induces cardiac electrophysiological changes in rats

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Air pollution is considered a risk factor for developing cardiac arrhythmias [1]. At the University of Parma, Department of Surgery and Medicine, we have conducted a series of *in vivo* experiments using Sprague Dawley rats as a model to measure the electrophysiological changes that happen to cardiac tissues when they are exposed to PM_{2.5} originating from two different cities of Kosovo: Prishtina and Obiliq. Particles were extracted using an established protocol [2]. Rats were exposed through intra-tracheal instillation to saline solution (control group, n=6) or to saline solution plus Prishtina and Obiliq PM_{2.5} [2mg/kg] (exposed groups, n=6). After 4h, extracellular epicardial potentials were measured using a 5.5mm x 5.5mm, 11 row x 11 column, 121 lead electrode array placed on the anterior surface of the ventricles in the *in situ* rat hearts. We assessed: 1. Excitability of the cardiac tissue in the context of Rheobase and Chronaxie; 2. Electrograms wave and interval durations; 3. Conduction velocity evaluated longitudinally (CV_l) and transversally (CV_t) to epicardial fiber direction by means of isochrone maps; 4. Effective Refractory Period (ERP) using S1-S2 protocol. Statistical analysis was performed using GraphPad Prism 6.0 and data were tested using one way Anova. QRS duration was decreased in the Prishtina group compare to control, while CV_l and CV_t were increased in the Prishtina group. No statistically significant changes were observed in the Obiliq group. This study emphasizes the impact of air pollution on cardiac tissue and could contribute to making better public policies toward a greener environment.

References

- [1] Feng B, Song X, Dan M, Yu J, Wang Q, Shu M, Xu H, Wang T, Chen J, Zhang Y, Zhao Q. High level of source-specific particulate matter air pollution associated with cardiac arrhythmias. *Science of the Total Environment*. 2019 Mar 20;657:1285-93.
- [2] Roper C, Chubb LG, Cambal L, Tunno B, Clougherty JE, Mischler SE. Characterization of ambient and extracted PM_{2.5} collected on filters for toxicology applications. *Inhalation toxicology*. 2015 Nov 10;27(13):673-81.

Figures

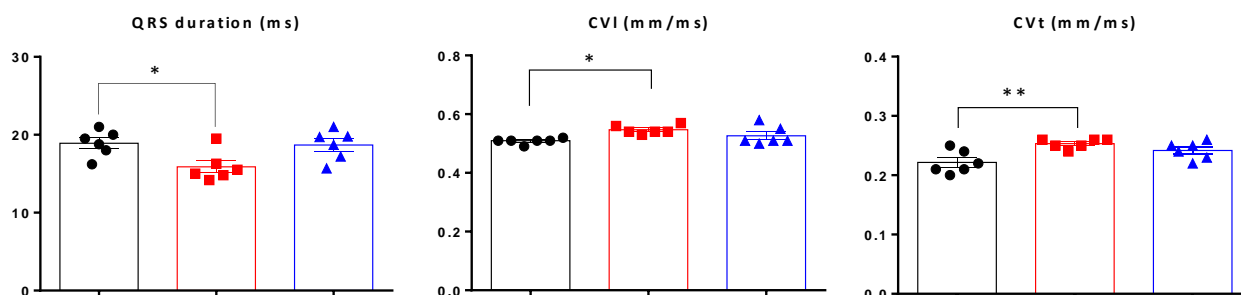


Figure 1: Bar graphs showing the changes in QRS complex duration, conduction velocity evaluated longitudinally (CV_l) and transversally (CV_t) to epicardial fiber direction between control group (black) and exposed groups (Prishtina, red; Obiliq, blue). * p<0.05 ** p<0.01