ECG monitoring of treatment response in the rat pulmonary arterial hypertension model

Citirik D.(1), Hallioglu O (1), Buyukakilli B. (2), Gurgul S. (3), Tasdelen B. (4)
1.Mersin University, Faculty of Medicine, Department of Pediatric Cardiology, Mersin, Turkey.  
2.Mersin University, Faculty of Medicine, Department of Biophysics, Mersin, Turkey.  
3.Gaziosmanpasa University, Faculty of Medicine, Department of Biophysics, Tokat, Turkey 
4.Mersin University, Faculty of Medicine, Department of Biostatistics, Mersin, Turkey. 

INTRODUCTION 
Although, recent studies emphasize the relationship between experimental pulmonary artery hypertension (PAH) and arrhythmias, the issue is not so clear. The aim of this study is to evaluate the effects of bosentan, sildenafil, and combined treatment on the surface ECG in rats with monocrotaline (MCT) induced PAH. 

METHODS 
Sixty three-month-old male Wistar rats were included in this study and randomized into five groups. All the rats were given monocrotaline (MCT) subcutaneously except the control group. After 4 weeks, following the development of PAH, bosentan sildenafil and combined therapy was given to the groups for 3 weeks. Another group that developed PAH did not receive any medication. ECHO and surface ECG studies were performed in all the rats at the baseline, after PAH development (4th week), and after treatment. 

RESULTS 
Right ventricular pressure, calculated from the tricuspid regurgitation, was increased in all MCT groups. After the treatment, only in sildenafil group right ventricular pressure was significantly decreased (p<0.001). 

ECG Studies: P amplitudes increased after developing PAH comparing to the saline group (p=0.011) and this effect continued after treatment (p=0.014). There was no significant change related with other P and QRS parameters. Although, there was no significant change on T amplitude and QTc values after PAH, the values were significantly increased in all groups after treatment (p <0.001). In all treatment groups after the treatment period, T repolarization duration was longer comparing to saline group (p <0.001); however, T depolarization duration was longer only in bosentan and combined therapy groups (p = 0.002). By means of T wave parameters, combined treatment group had the longest amplitude and duration whereas sildenafil group had the shortest. 

CONCLUSIONS 
It has been found out that the development of PAH in rats especially influenced T-wave parameters. The continuum of the influence for both treatment and non-treatment groups has supposed to increase based on the longer duration of PAH. That the most considerable T-wave changes occurred in combined group whereas the least in sildenafil group thought to be the effect of medication on ECG changes as well as PAH should also be taken into consideration.