Change of ST segment in ECG recording and its relation with potassium channels in experimental epilepsy model induced in rats

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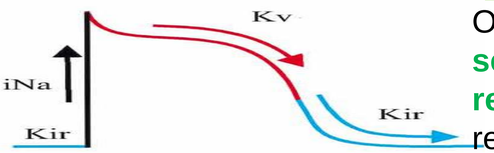
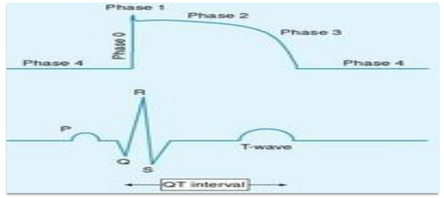
Background and Aim





Our main goal was to **compare** the changes in **the ST segment of electrocardiographic** (ECG) and **the inwardly rectifier potassium channels** (Kir) involved in the repolarization process of the cardiac action potential corresponding to this phase. Kir channels **have function in the repolarization phase** of the cardiac action potential by carrying potassium into the cell.

The **main function** of these channels is **to stabilize the membrane potential** by accelerating repolarization and result in making the action potential a reproducible process.

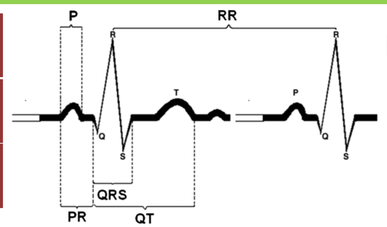
Material and Method

- In line with this objective, chronic epilepsy was induced in animals by administration of 40 mg/kg **pentilenetetrazole** (PTZ) intraperitoneally every two days to rats for one month. Wistar albino (250-350 gr, **28** (n=7)) rats were divided in 4 groups as female/male control and epilepsy groups.
- ECG analyzes were performed on records of intervals based on 30 minutes of stable ECG recordings before epileptic seizure and compared with after epileptic seizure under anesthesia.
- **Quantitative real-time PCR** (qRT-PCR) method and **Western blot method** were used for investigation of Kir channels such as Kir3.1 and Kir3.4 channels activated by acetylcholine carried from vagus nerve in addition to the Kir4.1 channel.

Results

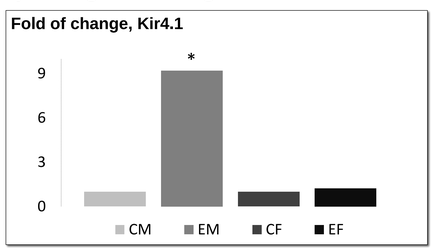
Interval	Control group (ms)	epileptic group (ms)	*p value
ST (male)	46,6 (±3,4)	40,0 (±8,1)	0,05
ST (female)	51,1 (±8,5)	42,7 (±4,8)	0,034

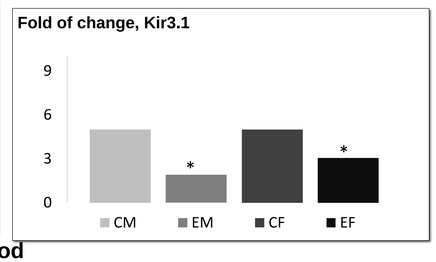
Interval	Control group (ms)	epileptic group (ms)	*p value
RR (male)	312,3 (±31,2)	282,2 (±15,2)	0,08
RR (female)	338,1 (±31)	294,1 (±30,1)	0,009

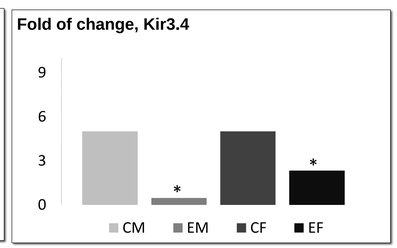


R1) Change of ST segment and RR interval in ECG

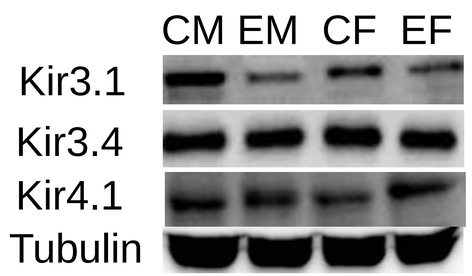
R2) There was no any changes in cardiac enzymes such as **Troponin I**, **Troponin C** and **creatin kinase.**



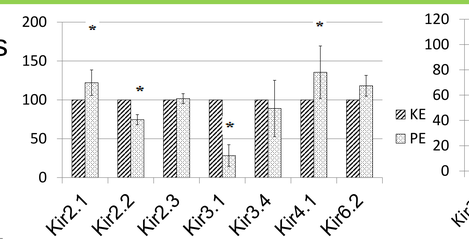


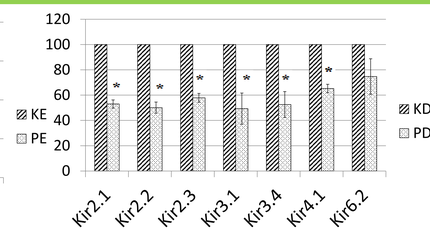


R3) Gen expression results by qPCR method

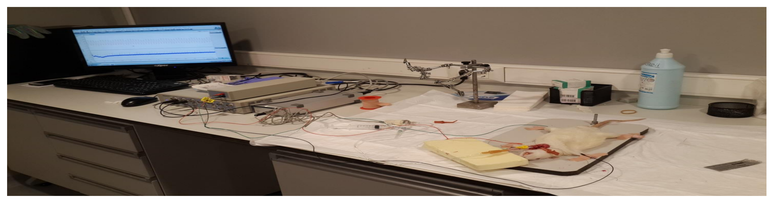


R4) Representative protein expression images by Western blot method





R5) Protein expression results by Western blot method



Conclusion

Hyperkalemia-decreasing solutions resulting from Kir channel dysfunctions should be researched.

Patients with clinical cardiac pathology risk due to the role of Kir channels in the epilepsy, cardiac pathology should be examined with cardiologic methods such as **ECG, ECO** and **HOLTER.**

The external stimulation of **magnesium**, which triggers the flow of potassium ions into the cell, may play a **healing role in epileptic heart**.