

## Physician - Experimental Researches

[MSB-04]

### Ozone Administration Reduces Myocardial Ischemia Reperfusion Injury in Streptozotocin-Induced Diabetes Mellitus Rat Model

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**Objective:** This study aimed to investigate the effects of ozone therapy on myocardial ischemia/reperfusion injury in a diabetic rat model.

**Methods:** The experimental study included 38 male Wistar Albino rats weighing between 200 and 250 g. The rats were randomly assigned to five groups. The sham group included six rats, while the other groups had eight rats each. The other groups were the diabetic ozone group, the diabetic group, the diabetic ischemia/reperfusion group (DIR), and the diabetic ischemia/reperfusion ozone group (DIRO). A total of 32 rats received 65 mg/kg streptozotocin, and a week after the administration, diabetes was confirmed by measuring blood sugar. The rats were fed ad libitum for 40 days to reveal macrovascular complications of diabetes. Malondialdehyde, catalase, superoxide dismutase, paraoxonase-1, total oxidative status, total antioxidant status, and oxidative stress index were assessed. A TUNEL (terminal deoxynucleotidyl transferase dUTP nick end labeling) assay was employed to assess apoptosis.

**Results:** Histologic and biochemical assessments showed the benefits of ozone in myocardial ischemia/reperfusion injury in diabetic rats. The DIRO group was found to be superior to the DIR group.

**Conclusion:** Ozone has cardioprotective effects in streptozotocin-induced diabetic rats through its antioxidant properties against oxidative stress. The study is unique in terms of ozone's protective effects in diabetic rats against myocardial ischemia/reperfusion injury. However, further studies are needed to confirm our findings.

**Keywords:** Coronary artery disease, diabetes mellitus, experimental, myocardial ischemia, myocardial reperfusion injury, ozone, oxidative stress.



Figure 1.

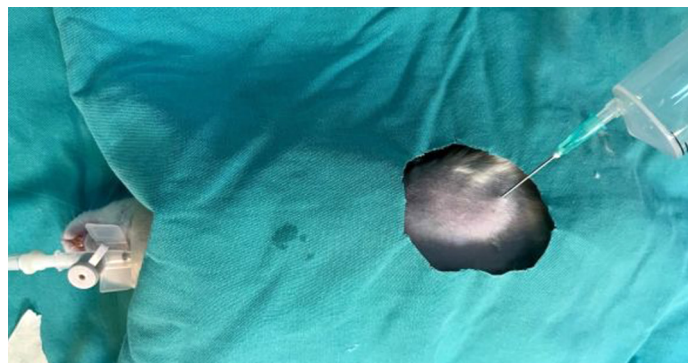


Figure 2.

**Table 1.**

	Group S	Group D	Group DO	Group DIR	Group DIRO
Myocardial ischemia/reperfusion injury score	0.33±0.21	0.83±0.17	1.00±0.36	2.83±0.17	2.0±0.26
TUNEL+ cardiomyocytes/hpf	6.43±5.56	16.20±6.14	11.08±5.52	54.21±7.67	22.92±10.19

**Table 2. Serum**

	Group S	Group D	Group DO	Group DIR	Group DIRO
TAS	1.20±0.07	1.08±0.08	1.10±0.06	1.93±0.38	1.41±0.17
TOS	9.62±1.38	12.05±0.80	12.72±0.53	15.39±5.14	19.05±4.6
OSI	0.85±0.16	1.16±0.14	1.19±0.10	1.11±0.33	1.0±0.15
PON-1	223.04±14.12	192.93±18.48	182.33±6.92	146.31±11.50	174.97±9.60
SOD	173.34±6.85	191.57±6.28	181.17±8.43	208.75±14.49	199.80±3.51
CAT	372.39±89.19	500.92±86.73	610.23±128.50	897.56±118.84	656.54±112.80
MDA	5.38±0.78	5.27±0.39	8.08±0.55	14.79±9.30	11.70±1.81

## References

1. Virani SS, Alonso A, Benjamin EJ, Bittencourt MS, Callaway CW, Carson AP, et al. Heart disease and stroke statistics-2020 update: A report from the American Heart Association. *Circulation* 2020;141:e139-596. doi: 10.1161/CIR.0000000000000757.
2. Eltzschig HK, Eckle T. Ischemia and reperfusion--from mechanism to translation. *Nat Med* 2011;17:1391-401. doi: 10.1038/nm.2507.
3. Buja LM. Myocardial ischemia and reperfusion injury. *Cardiovasc Pathol* 2005;14:170-5. doi: 10.1016/j.carpath.2005.03.006.
4. Cheng YJ, Imperatore G, Geiss LS, Saydah SH, Albright AL, Ali MK, et al. Trends and disparities in cardiovascular mortality among U.S. adults with and without self-reported diabetes, 1988-2015. *Diabetes Care* 2018;41:2306-15. doi: 10.2337/dc18-0831.