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Abstract

Isoliquiritigenin (ISL) is a natural antioxidant that derived from licorice compounds and mostly present in foods, beverages and tobacco. There is amount of evidence that reactive oxygen species plays an important role in cardiac damage during ischemia and reperfusion. We test whether ISL can protect heart against ischemic injury via scavenging ROS. The fluorescent probe H_2DCFDA was used to measure the effect of ISL on the level of intracellular ROS and the results proved that ISL reduced the cardiac ROS level during ischemia/reperfusion. Furthermore, the data from Langendorff *ex vivo* perfused mouse hearts showed much better ($89 \pm 10\%$) recovery of the post-ischemic left ventricular contractility with ISL treatment compared to vehicle treatment group ($72 \pm 8\%$, $p < 0.05$). In conclusion, ISL is a potential small molecule for treatment of ischemic heart diseases in the future which protects heart against myocardial injury via decrease myocardial ROS level during ischemia/reperfusion.

Introduction

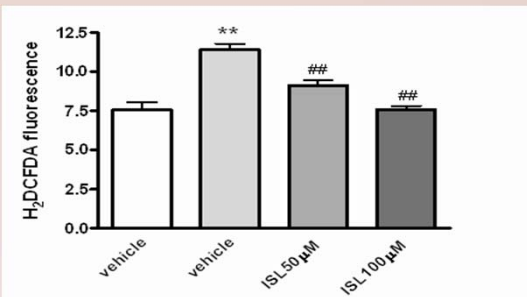
As a flavonoid group compound, ISL exists in some foods and herbal medicines as licorice. There is amount of evidence that ISL can reduce cardiac reactive oxygen species (ROS) that is a critical factor involved in cardiac damage during ischemia/reperfusion. The present study aimed at whether ISL can protect heart against ischemic injury via scavenging ROS using the fluorescent probe H_2DCFDA to measure the effect of ISL on the level of intracellular ROS.

Methods

H9c2 cells, a myoblast cell line derived from fetal rat heart, were cultured in Dulbecco's modified Eagle's medium (DMEM) supplemented with 10% fetal bovine serum and 1% of penicillin and streptomycin and maintained in 95% air and 5% CO_2 at $37^\circ C$. Cardiomyocytes were carefully isolated and removed hearts were then perfused with oxygenated (5% $CO_2/95\% O_2$) Krebs-Henseleit bicarbonate (KHB) buffer and with a Ca^{2+} -free KHB. Isolated cardiomyocytes was measured using the fluorescent probe H_2DCFDA and the glucose uptake was determined by 2-deoxy-d-glucose- 3H accumulation.

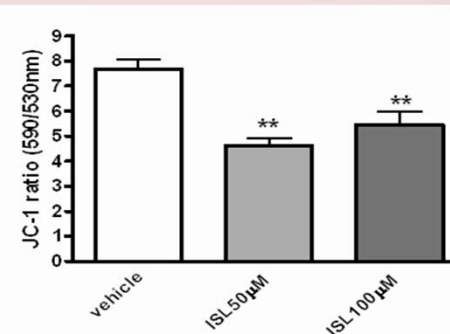
Results

Effect of ISL on the intracellular ROS levels in isolated cardiomyocytes.



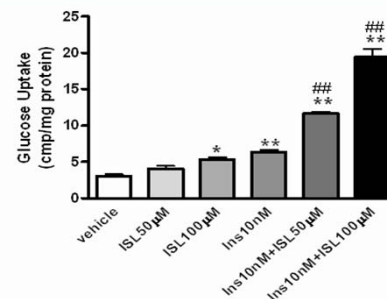
** $p < 0.01$ vs vehicle; ## $p < 0.01$ vs Hypoxia vehicle

Effect of ISL on the mitochondrial membrane potential of cardiomyocytes.



* $p < 0.05$, ** $p < 0.01$ vs vehicle

Effect of ISL on glucose uptake.



** $p < 0.05$, ** $p < 0.01$ vs vehicle; ### $p < 0.01$ vs Insulin 10nM alone

Conclusions

ISL is a potential small molecule for treatment of ischemic heart diseases which protects heart against myocardial injury via decreasing myocardial ROS level during ischemia/reperfusion. Reduction of ROS level and regulation of substrate metabolism & inflammatory response during ischemia/reperfusion may be involved in this effect of ISL.

Isoliquiritigenin



References

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