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POLYPHENOLS RELAX GASTRIC SMOOTH MUSCLES INDEPENDENTLY TO SYNTHESIS OF NITRIC MONOXIDE

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Introduction. Resveratrol and Quercetin are natural substances found in fruits, leaves and red wine. Studies report their multiple beneficial functions such as anti-proliferative and anti-oxidative capacity. However up to now they have not been examined as possible muscle-relaxant drugs. Additionally clinical trials with resveratrol and quercetin indicate that they may disrupt motility of gastrointestinal tract.

Objective: In our study we aim to assess the effect of resveratrol and quercetin on a contractility of a gastric smooth muscles, as well as to determine whether their action is related with synthesis of nitric oxide.

Materials and methods. Tissues were obtained from patients undergoing sleeve gastrectomy due to morbid obesity (n=10: women=2, man=8; aged 24-56; BMI 47.16±1.84). Samples were taken from part of stomach removed during surgical procedure. After removal, specimens were immediately cooled on ice cold Tyrode's buffer, bubbled with carbogen (95% O2 +5% CO2) and directly transferred to the laboratory. Subsequently, muscle layer was dissected from the gastric wall and cut into 10 × 3 × 1.5 mm strips. The tissues were attached to an isometric force transducer and placed in 20 ml tissue bath chambers. The temperature of bath solution was maintained at 37oC and continuously bubbled with carbogen. Contractile activity was stimulated using carbachol (10-6 mol/L). Only strips showing stable response to the administered agonist were used in further experiments. The contractile activity of strips incubated only with carbachol was considered as control after reaching the plateau. To examine concentration-response relationships, resveratrol or quercetin were added cumulatively to the organ chambers (range 10-7– 10-4 mol/L) at 10-min intervals, and the effects were recorded. To eliminate the effect of resveratrol or quercetin solvent ethanol and DMSO groups were established. As we intended to check the role of NOS in antispasmodic effect of polyphenols, LNNA - NOS blocker, was used. The residual muscle tension, contraction amplitude and area under the curve (AUC) were measured using strain gauge. The statistical analysis was performed using ANOVA or the Kruskal-Wallis test. The results were considered statistically significant at $p \leq 0,05$.

Results and discussion. Either resveratrol and quercetin dose dependently, decreased AUC and muscle tonus comparing to control. The maximal relaxation caused by 10-4 mol/L resveratrol was 83.49 ± 2.85% (n =10; p=0.0003) of the contractions of the strips before resveratrol administration. Quercetin in the highest concentration inhibited gastric contractions in 80.71± 3.60% (n =10; p<0.0001). No obvious effect of preincubation with LNNA on decrease of basal tension was observed. These results indicate that resveratrol- or quercetin- induced relaxation does not involve the activation of the nitric oxide pathway.

Conclusions. Resveratrol and quercetin relax gastric smooth muscles independently to NOS. Additionally side effects of polyphenols therapy, such as distorted motility of gastrointestinal tract might be explained by our results.