E0038  EFFECTS OF ANGIOTENSIN II ON ATPASES IN AORTIC VASCULAR SMOOTH MUSCLE CELLS FROM WISTAR-KYOTO RATS AND SPONTANEOUSLY HYPERTENSION RATS

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Objectives To explore the effects of Angiotensin II on the activities of Ca\(^{2+}\)-ATPase and Na\(^+\),K\(^+\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR.

Methods ASMCs were divided into four groups: Wistar-Kyoto control, SHR control, Lisinopril (1 mg/l) intervened SHR and atorvastatin (1 mg/l) intervened SHR. The activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR were measured by spectrophotometry and mRNA expressions were measured by real time PCR. The content of Angiotensin II (Ang II) in cultured medium was detected by RT-PCR.

Results The activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase of ASMCs were significantly increased in SHR compared with that of the control group (p<0.01). Lisinopril significantly increased the activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR compared with that of the control group (p<0.01). The expression of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase were significantly decreased in atorvastatin intervened SHR compared with that of the control group (p<0.01).

Conclusions The decreased activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase may be related to their lower expression of the mRNA in ASMCs from SHR. Lisinopril and atorvastatin may increase the activities of two ion pumps and upregulate the mRNA expression of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR through blocking the generation of Ang II.

E0039  EFFECTS OF LISINOPRIL ON THE ACTIVITIES AND MRNA EXPRESSION OF ION PUMPS IN AORTIC SMOOTH MUSCLE CELLS FROM SPONTANEOUSLY HYPERTENSION RATS

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Objectives To explore the effects of Lisinopril on the activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in cultured thoracic aortic vascular smooth muscle cells (ASMCs) isolated from spontaneously hypertensive rats (SHR).

Methods ASMCs were divided into four groups: Wistar-Kyoto control, SHR control, Lisinopril (1 mg/l) intervened SHR and atorvastatin (1 mg/l) intervene SHR. The activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase were measured by spectrophotometry and mRNA expressions were measured by real time PCR. The content of Lisinopril (Ang II) in cultured medium was detected by RT-PCR.

Results The activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and the mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR were significantly lower than those from WKY control (p<0.01). Lisinopril significantly increased the activities of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase and mRNA expression levels of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR compared with that of the control group (p<0.01). Lisinopril and atorvastatin significantly more than those from WKY control (p<0.05).

Conclusions Lisinopril may increase the activities of two ion pumps and upregulate the mRNA expression of Na\(^+\),K\(^+\)-ATPase and Ca\(^{2+}\)-ATPase in ASMCs from SHR through blocking the generation of Ang II.

E0040  THE EXPRESSION OF SIGNAL TRANSDUCTION PATHWAY OF TGF1SMAD IN THE RAT CARDIAC TISSUE WITH TYPE 2 DIABETES AND INTERVENTION BY ATORVASTARTIN

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Objective To observe the changes of signal transduction pathway of TGF-β1/Smad in the course of myocardial fibrosis in the rat with type 2 diabetes and preventive effect of atorvastatin.

Methods The experimental type 2 diabetic rats were yielded by injecting streptozotocin (STZ, 30 mg/kg) and fed with high fat and glucose food, then intervention by atorvastatin (20 mg kg\(^{-1}\) d\(^{-1}\)) for 12 weeks. Collagen content was observed by Masson staining. RT-PCR was used to observe the gene expression of TGF-β1 in experiment rat hearts. The protein expression and tissue localisation of TGF-β1, Smad2/3, Smad7 were observed with the immunohistochemistry.

Results The interstitial collagen accumulation and thickened capillary basement membrane in the atorvastatin (Masson stain: 0.80±0.16) administration group was obviously relieved compared with that of the DM (1.36±0.16) group (p<0.01). The expression levels of TGF-β1 mRNA in the DM group was obviously increased compared with that of the control group (1.39±0.10 vs 0.16±0.02, p<0.01). The expression levels of TGF-β1 mRNA in the atorvastatin administration groups was obviously reduced compared with that of the DM group (0.57±0.04 vs 1.39±0.10, p<0.01). Immunohistochemistry: the positive expressions of Smad2/3 and TGF-β1 in the control group (18.19±3.9 vs 3.9±0.1, p<0.01) were even darker and larger in size compared with that in the control group in view of their optic density. There were only the vascular endothelial cells and a few of fibroblasts, vascular endothelial and myocardial cells in the control group. The positive expressions of Smad2/3 (18.19±3.9) were observed with the immunohistochemistry.

Conclusion The positive cells of Smad7 was present in fibroblasts, vascular endothelial and myocardial cells in the control group. The positive cells of Smad7 mainly distributed in the vascular endothelial cells, fibroblasts, myocardial cells, the numbers of the positive cells was reduced compared with that of the control group (1.26±0.31 vs 10.16±0.64, p<0.01). In atorvastatin group the positive cells of Smad7 was increased in such cells as those mentioned above, especially in the vascular endothelial cells (1.26±0.31 vs 4.0±0.20, p<0.01).
and fibrosis in myocardium, thus delay the progress of the diabetic cardiomyopathy.

**e0041** VASOMOTOR FUNCTION FOLLOWING NEWER GENERATION OF BARE METAL STENT OVERSTRETCH IN A PORCINE CORONARY MODEL

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**Backgrounds** Overstretch damage after bare metal stent (BMS) placement could trigger cell proliferation and in-stent restenosis (ISR). Newer Co-Cr BMS has thinner stent struts, which designs to minimise cellular response to injury. We aimed to investigate neointimal growth, as well as vasomotor function after overstretch using Co-Cr BMS in a pig coronary model.

**Methods** 15 vessels in five pigs were assigned to receive BMS (stent struts 91 μm) implantation with either S/A ratio 1.3 (group I, n=7) or 1.5 (group II, n=8). Quantitative coronary angiography (QCA) and optical coherence tomography (OCT) were performed at 14 days after stent implantation. Coronary vasomotor function was evaluated by incremental acetylcholine (Ach) (10⁻³ and 10⁻⁶ M) and nitroglycerin (NTG, 400 μg) infusion before stent implantation and at 14 days. Endothelial response to Ach was measured at 5–10 mm distal to the stent edge.

**Results** Both QCA and OCT showed that in-stent stenosis of group I were significantly smaller than group II at 14 days (QCA-late loss (LL), 1.22±0.21 mm vs 1.79±0.17 mm; OCT % AS, 17.0±7.9% vs 26.9±10.7% at 14 days, p<0.05 and 0.001, respectively). Liner regression analysis QCA-LL is proportional to obtained S/A ratio (r=0.60, p<0.05). Endothelium-dependent vasomotion at distal non-stented reference segments was no difference between groups. The mean coronary diameter changes at Ach 10⁻³ M and 10⁻⁶ M was 2.1%±0.2% and 2.1%±0.2% in group I; 2.2%±0.2% and 2.1%±0.2% in group II (p>0.05, accordingly). There was also no difference before and at 14 days after stent implantation.

**Conclusion** The progression of neointimal hyperplasia after BMS implantation is positively associated with the extent of coronary artery injury. Coronary endothelial function is preserved after BMS implantation at 14 days, which is independently of overstretch degree.

**e0042** THE EFFECT OF ISCHAEMIC POSTCONDITIONING ON THE STRUCTURE, FUNCTION AND CX43 OF MITOCHONDRIA IN RABBIT MYOCARDIAL ISCHEMIA/REPERFUSION INJURY

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**Objective** To investigate the effects of ischaemic postconditioning on structural and functional and connexin 43(Cx43) changes of mitochondria induced by myocardial ischaemia reperfusion (IR) injury of rabbits in vivo and potential mechanism.

**Methods** In anaesthetised open-chest rabbits, the left anterior descending artery (LAD) was occluded for 30 min and reperfused for 4 h. Sixty-four rabbits were randomly divided into four groups (n=16 in each group): Sham operation group (Group Sham), ischaemic reperfusion group (Group IR), ischaemic preconditioning group (Group IP) and ischaemic postconditioning group (Group PC) with sixteen rabbits in each. All rabbits in the four groups were observed under electronmicroscope and mitochondrial membrane potential, Ca²⁺ concentration, MDA content and SOD activity of myocardial mitochondria were examined. The content of the mitochondria Cx43 were detected with Western Blot.

**Results** Myocardial infarct size was significantly reduced in IP (18.9±2.8%) and PC (19.1±5.9%) groups as compared to IR groups (35.7±5.8%), p<0.01). Compared with group IR, the damage of mitochondrial ultrastructure were milder and Ca²⁺ concentration and MDA content were much lower in group IP and group PC (p<0.05). Mitochondrial membrane potential (p<0.01) and SOD activity of myocardial mitochondria in group IP and group PC was significantly higher than that in group IR (p<0.05). Compared with sham group, the mitochondria Cx43 expression is distinctly decreased compared group IR (p<0.05) and no significant difference was found between Group IP and Group PC.

**Conclusion** PC can protect mitochondrial ultrastructure by increasing mitochondrial membrane potential and SOD activity, and by alleviating Ca²⁺ overload, and by decreasing MDA content in myocardial mitochondria. The mechanism of PC protection to mitochondria may be concerned with PC attenuating the decrease the mitochondria Cx43 expression induced by ischaemia/reperfusion injury.

**e0043** EFFECTS OF SIMVASTATIN ON ANGIOGENESIS AND THE EXPRESSION OF ANG1 AFTER MYOCARDIAL INFARCTION IN RATS

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**Objective** To investigate the effects of simvastatin on myocardial angiogenesis and the expression of angiopeotin-1 after experimental myocardial infarction (MI) in rats.

**Methods** 60 healthy adult SD rats were randomly divided into the sham operated group, the control group, low dose of simvastatin (1 mg·kg⁻¹·d⁻¹) group, medium dose of simvastatin (10 mg·kg⁻¹·d⁻¹) group, high dose of simvastatin (40 mg·kg⁻¹·d⁻¹) group. Left anterior descending coronary underwent permanent occlusion to establish the MI model. Rats were administered simvastatin respectively via oral gavage for four consecutive weeks starting at the next day. Density of new microvessels in the ischaemic area, LVMI, protein and mRNA expression of Ang-1 were detected 4 weeks after operation.

**Results** (1) Compared with the control group, the Density of new microvessels in low and medium dose of simvastatin group increased significantly (p<0.05); and those did not changed significantly in high dose of simvastatin group (p>0.05) (2) LVMI in low and medium dose of simvastatin group decreased significantly compared with that in control group (p<0.05), and further decreased in high dose of simvastatin group. (3) The protein and mRNA expression of Ang-1 in all simvastatin group increased significantly compared with that in control group (p<0.05).

**Conclusion** (1) Low and medium dose of simvastatin can stimulate myocardial angiogenesis after MI, whereas high dose of simvastatin have no pro-angiogenic effect. (2) The pro-angiogenic effect of simvastatin may be associated with upregulated expression of Ang-1.

**e0044** THE ROLE OF ANG1 AND ENOS IN THE PRO-ANGIOGENIC EFFECT OF SIMVASTATIN AFTER MYOCARDIAL INFARCTION IN RATS

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**Objective** To investigate the roles of angiopeotin-1 (Ang-1) and endothelial nitric oxide synthase (eNOS) in pro-angiogenic