Basic Science: Cardiovascular Disease Basic Research

e0001 THE EFFECTS OF TRANS FATTY ACIDS ON FATTY ACID CONSTITUTION RATIOS OF ERYTHROCYTE MEMBRANE IN RABBITS

doi:10.1136/hrt.2010.208967.1

Peng Qiang, Su Hai, Wang Jiwei, Wu Qinghua, Chen Xiaoshu. *Second Affiliated Hospital and Cardiovascular Institute of Nanchang University*

Objective To investigate the influences of high trans fatty acids (TFA) intake on fatty-acid constitution ratios of erythrocyte membrane in rabbits.
Method 32 New Zealand white rabbits were randomly divided into four groups: control group with common feed; high TFA group with additional TFA 5.0 g/kg.d; high-fat (HF) group with high cholesterol feed and TFA+HF group. The erythrocyte membranes were prepared at 0, 4, 8, 12 weeks. Two kinds of saturated FA (C18:0 and C16:0), four kinds of unsaturated FA (C18:1, C18:2, C20:4, C20:5 and total ω−3) and two kinds of TFA (t-C18:1 and t-C16:1) in erythrocyte membrane were determined with gas chroma. Four constitution ratios of C18:1/C18:0, C18:1/t-C18:1, ω−3/∑TFA and ω−3/C18:0 were calculated.
Results Compared with the control group, TFA group showed not only obviously higher constitution ratios of TFA, but obviously higher ratios of saturated FA and lower ratios of polyunsaturated FA, especially ω−3 FA (2.38±0.35 vs 3.28±0.48, $p<0.05$), in erythrocyte membrane. The abnormality of constitution ratios of unsaturated FA and polyunsaturated FA in TFA were similar to that in HF group. More abnormal changes of erythrocyte membrane FA constitution ratios were showed in TFA+HF group.
Conclusions High TFA intake could increase the constitution ratios of TFA and saturated fatty acids, but decrease polyunsaturated fatty acids, especially ω−3 fatty acids, in erythrocyte membrane. These effects were equivalent with the effects of high cholesterol intake. Combined with TFA and high cholesterol intake had obviously synergistic effects.

e0002 EFFECT OF TOLL-LIKE RECEPTOR-4 SIGNAL PATHWAY ON THE DYSFUNCTION OF CARDIAC MICROVASCULAR ENDOTHELIAL CELLS CAUSED BY HYPOXIA/ REOXYGENATION INJURY

doi:10.1136/hrt.2010.208967.2

Zhang Zheng, Wang Yanbin, Sun Dongdong, Zhang Rongqing, Cao Feng, Wang Haichang. *Department of Cardiovascular Diseases, Xijing hospital, Fourth Military University, Xi'an, China*

Aim TLR-4 has been proved to take part in MIRI of heart. But the researches mostly focused on the relationship between TLR-4 and global heart dysfunction or cadiocyte apoptosis. The effect of TLR-4 on CMECs which are the most important component in MIRI is not clear. To explore the change of TLR-4 signal pathoway during hypoxia−reoxygenation (H-R) of cardiac microvascular endothelial cells (CMECs) injury.
Methods The CMECs were isolated from the hearts of adult rats. The obtained CMECs were exposed to hypoxia (940 ml/l N_2, 50 ml/l CO_2 and 10 ml/l O_2) for 6 h, following by reoxygenation (950 ml/l air, 50 ml/l CO_2) for 2 h, 12 h or 24 h. The proliferation of CMECs was assessed by MTT colourimetry. TLR-4 and NF-κB expressions were analysed by Western blot. The levels of IL-6 and TNF-α were detected by ELISA.
Results The proliferation ability of CMECs was significantly inhibited by H-R injury ($p<0.01$). H-R injury increased TLR-4 expression after 2 h or 12 h reoxygenation ($p<0.05$). The level of NF-κB increased after 2 h and 24 h reoxygenation ($p<0.05$). H-R injury enhanced IL-6 and TNF-α secretion as compared with the control group ($p<0.05$).
Conclusion H-R injury increases TLR-4 and NF-κB expressions in CMECs and enhances the secretions of IL-6 and TNF-α. The activation of TLR-4 signal pathway on CMECs may participate in the H-R induced of CMECs injury.

e0003 CARDIAC-SPECIFIC EXPRESSION OF E3 LIGASE NRDP1 INCREASES ISCHAEMIA AND REPERFUSION-INDUCED CARDIAC INJURY IN TRANSGENIC MICE

doi:10.1136/hrt.2010.208967.3

[1]Zhang Yuan, [2]Wang Min, [2]Zeng Yong, [2]Fang Quan, [2]Du Jie, [2]Li Huihua. *[1]From the Department of Pathology, Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences and Peking Union Medical College From the Department of Pathology, Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences and Peking Union Medical College; [2]From the Department of Pathology, Institute of Basic Medical Sciences, Chinese Academy of Medical Sciences and Peking Union Medical College*

Objective Neuregulin receptor degradation protein-1 (Nrdp1) is an E3 ubiquitin ligase that regulates the proteasomal degradation and activity of proteins involved in cell growth, inflammation and apoptosis, including ErbB3, BRUCE, MyD88 and TBK1. However, the effect of Nrdp1 on cardiac ischaemia/reperfusion (I/R) injury in vivo has not yet been investigated.
Methods and results We generated transgenic mice with cardiac-specific overexpression of Nrdp1 using α-myosin heavy chain promoter. Echocardiography demonstrated that cardiac-specific Nrdp1 expression resulted in depression of cardiac contractile function under basal condition (TG6 mice, EF, 62.74±4.40%, FS, 33.53±3.17%; WT mice, EF, 67.52±11.07%; FS, 37.64±8.64%). When subjected to 30 min of left coronary artery ischaemia and 24 h of reperfusion, the infarct size, expressed as the ratio of infarct/AAR and infarct/LV, was significantly increased in Nrdp1 TG6 mice (28.6%; 17.0%) compared with that of WT mice (18.4%; 11.4%, $p<0.05$). Furthermore, the survival rate after I/R in Nrdp1 TG6 mice (75.9%, 22/29) was significantly lower than that of WT mice (84.6%, 22/26). Moreover, the numbers of TUNEL-positive nuclei (22.83%; 15.78%) neutrophil and macrophage infiltration after I/R were significantly higher in Nrdp1 transgenic mice than in WT mice ($p<0.05$). Additionally, the activation of ErbB3, AKT, ERK1/2 and STAT3 after I/R were markedly suppressed in Nrdp1 transgenic mice compared with WT mice ($p<0.01$).
Conclusion These data provide the first in vivo evidence that overexpression of Nrdp1 enhances cardiac I/R injury, this effect is mediated by inhibition of ErbB3-dependent signalling pathways.

e0004 HYDROGEN SULFIDE INHABITS NEURONS APOPTOSIS IN RATS AFTER CARDIOPULMONARY RESUSCITATION

doi:10.1136/hrt.2010.208967.4

Liao Xiao-Xing, Lin Ji-Yan, Wei Hong-Yan, Li Hui, Li Xin, Liu Rong, Hu Chun-Lin, Huang Guo-Qing, Dai Gang. *The First Affiliated Hospital of Sun Yat-sen University*

Objective To investigate the effects of hydrogen sulfide (H_2S) on brain injury after cardiopulmonary resuscitation (CPR) in rats by examining neurons apoptosis.
Methods The 40 male SD rats were randomly divided into experimental and control groups equally. In control group, CPR was performed with Utstein mode at 6 min after CA. On this basis, sodium hydrosulfide was administrated to the rats after restoration

of spontaneous circulation in experimental group. On seventh day after CPR, neurons apoptosis was examined using terminal deoxynucleotidyl transferase mediated dUTP biotin nick end labelling (TUNEL) staining and the expression of caspase-3 was detected by the immunohistochemical strepto avidin biotinperoxidase complex (SABC) method in cortex, hippocampus CA1 region and cerebellum of the rats.

Results 1. There were 12 and 10 rats completed the experiment in the experimental and control group respectively. Their fate between the two groups was no significant difference (χ^2=0.404, p=0.376). 2. On seventh day after CPR, The serum concentrations of H_2S was 9.12±3.17 μmol/l in the experimental group and the contrast was 3.72±1.05 μmol/l, the difference between the two groups had statistic significance (t=5.136, p=0.000). 3. Compared with the control group, the experimental group's neurons apoptosis index and the sum of integrated optical density (IOD) of caspase-3 in cortex, hippocampus CA1 region and cerebellum were obviously reduced (p<0.05).

Conclusion After CPR, H_2S can inhabit neurons apoptosis and its mechanism may be through caspase-3 pathway. It may play a role in the treatment of the brain injury after CA.

e0005 MODEL OF CARDIAC ARREST IN RATS BY TRANSCUTANEOUS ELECTRICAL EPICARDIUM STIMULATION

doi:10.1136/hrt.2010.208967.5

Lin Ji-Yan, Li Xin, Li Hui, Wei Hong-Yan, Liu Rong, Hu Chun-Lin, Dai Gang, Liao Xiao-Xing. *The First Affiliated Hospital of Sun Yat-sen University*

Objective To establish a new model of Cardiac Arrest (CA) in rats by transcutaneous electrical epicardium stimulation.

Methods Two acupuncture needles connected to the anode and cathode of a stimulator were transcutaneously inserted into the epicardium as electrodes. The stimulating current was steered to the epicardium and the stimulation was maintained for 3 min to induce CA. Cardiopulmonary resuscitation (CPR) was performed at 6 min after a period of nonintervention.

Results The success rate of induction was 12/20 at the current intensity of 1 mA; and reached 20/20 when the current intensity was increased to 2 mA. The average time from the electrical stimulation to CA induction was 5.10 (±2.81) s. When the electrical stimulation stopped, 18/20 rats had ventricular fibrillation and 2/20 rats had pulseless electrical activity. CPR was performed for averagely 207.4 (±148.8) s. The restoration of spontaneous circulation was 20/20. The death rate within 4 h after CA was 5/20, and the 72-h survival rate was 10/20. There were only two cases of complications, a minor muscle contraction and a minor lung lobe injury.

Conclusion The model of CA in rats induced by transcutaneous electrical epicardium stimulation is a stable model that requires low-intensity current and has fewer complications.

e0006 EFFECTS OF NEOTYPE PERITONEAL COOLING ON THE INJURED OF INTESTINAL MUCOUS AFTER CARDIOPULMONARY RESUSCITATION IN RABBITS

doi:10.1136/hrt.2010.208967.6

Dai Xuan, Liao Xiao-Xing, Hu Chun-Lin, Wei Hong-Yan, Li Xin, Zhan Hong. *The First Affiliated Hospital of Sun Yat-Sen University*

Objective To explore whether the peritoneal cooling after cardiopulmonary resuscitation could improve the injured of intestinal mucous in rabbits.

Methods 36 adult New Zealand rabbits were induced ventricular fibrillation by AC current. After the restore of spontaneous circulation (ROSC), rabbits were randomly divided into three groups according to the way of body temperature controlling, that is, nomothermia group (NT), surface cooling group (SC) and peritoneal cooling group (PC). The changing of tympanic temperature and peritoneal temperature were observed after ROSC. The animals were sacrificed by over anaesthesia after ROSC for 12 h, the end ileum was removed and fixed in formalin, the histological injured and the expression of TNF-a and VCAM-1 in ileum were observed by H.E staining and immune chemical methods.

Results 12 animals in each group, 9 in group NT, 10 in group SC and 9 in group PC were successfully resuscitated; all animals were on mechanical ventilation for 2 to 4 h. 5, 6 and 8 animals in each group respectively survived to the end of the experiment. The temperatures of tympanic and peritoneal cavity of animals in group NT were maintained in normal range. The tympanic temperature of animals in group SC and PC was arrived target temperatures at 29±6.55 min and 62±8.27 min. During the stage of maintenance of hypothermia, the tympanic and peritoneal temperatures of animals in group SC were in range 33 to 35°C, while the peritoneal temperatures of animals in group PC were in range 31 to 34°C, 1 to 2°C lower than the tympanic temperature. The scores of histological injured of ileum were 1.43±0.53 in group PC, 3.4±0.55 in group NT and 3.17±0.41 in group SC. The differences among them were significantly, PC versus SC, p<0.000; PC versus NT, p<0.000; while SC versus NT, p=0.30. The expression of TNF-a in ileum was 9.98±1.79% in group NT, 5.87±1.43% in group SC and 3.78±0.53% in group PC, the differences among them were significantly. The phenomenon of the expression of VCAM-1 was little like the TNF-a, 3.78±0.53% in group PC was significantly from the 8.53±1.53% in group NT and 5.92±1.06% in group SC.

Conclusion The neotype peritoneal cooling can improve the injured of ileum mucous beside quickly induce hypothermia after ROSC in rabbits.

e0007 THE EFFECT OF OMEPRAZOLE ON THE OXIDATIVE STRESS AND ACUTE ATRIAL ELECTRICAL REMODELLING IN RABBITS

doi:10.1136/hrt.2010.208967.7

[1]Yuan Guan, [2]Kai Ren, [2]Dexian Zhang, [2]Zhaoliang Shan, [2]Yutang Wang, [3]Yunming Li, [2]Hongyang Guo, [2]Ye Zhang. *[1]PLA General Hospital; [2]General Hospital of PLA; [3]General Hospital of Chengdu Military Region*

Objective To investigate the effect of omeprazole on the acute atrial electrical remodelling and oxidative stress status in rabbit atrial fibrillation (AF) model.

Methods 18 rabbits were randomly divided into atrial tachypacing (ATP) group, sham operating (SM) group, and atrial tachypacing with omeprazole therapy (A+O) group. In the ATP group and A+O group the right atrium was tachypaced at 500–600 bpm to induce and maintain AF for 3 h. The A+O group were given intravenous administration of omeprazole treatment (4 mg/kg) 15 min before tachypacing. The ATP group were given intravenous administration of physiological saline 10 ml 15 min before pacing. The SM group were not paced. The atrial electrophysiological indexes (AERP, Rate adaptive of AERP) were measured at different time point (baseline, 0.5 h, 1 h, 1.5 h, 2 h, 2.5 h and 3 h after pacing). Oxidative stress markers (SOD, MDA, T-NOS) in serum were measured at different time point (baseline and 3 h after pacing).

Results 1. Compare to SM group, the atrial effective refractory period (ERP) at a cycle length of 200 ms was decreased from 93.89±5.88 to 72.78±5.37 ms (p<0.01) after pacing in ATP group, and the Rate adaptive of ERP appeared non-performing significantly after tachypacing in ATP group (from 0.10±0.02 to 0.04±0.01, p<0.01); but no change in A+O group, with ERP and Rate adaptive of ERP averaging 100.17±8.93 ms and 0.09±0.02. The level of lipid