

descending (LAD). The full balloon was inflated and occluded the LAD for 60 min after ischaemia precondition in animals of group A, and then the balloon embolism was positioned in the target vessel; but in group B, the balloon embolism was positioned in the target vessel directly. Intervention operation times and success rate were observed and compared with two groups.

**Results** 27 pigs underwent induction of AMI successful. Three pigs died of ventricular fibrillation and shock. Success rate of group A was 84.6%, and that of group B was 94%, there was not statistic significant compared with two groups. But mean operation time of group B ( $28.4 \pm 9.4$  min) was shorter than that of group A ( $105.8 \pm 27.6$  min), furthermore, compared with two groups, there was statistic significant.

**Conclusions** The method of establishment closed chest porcine model of AMI by implantation balloon embolism in target vessel is feasible, safe, quick and relatively effective.

#### e0178 DIFFERENTIAL EXPRESSION OF N-MYC DOWNSTREAM REGULATED GENE 2 (NDRG2) IN THE RAT HEART AFTER ISCHAEMIA/REPERFUSION INJURY

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**Aims** It has been shown that Ndr2 (N-Myc downstream-regulated gene 2), a Myc-repressed gene, is markedly expressed in heart. Ndr2 can act as a stress responder under hypoxia and is necessary for hypoxia-induced apoptosis in certain tumour cell lines. In the present study, we investigated whether ischaemia/reperfusion (I/R) injury played a role in the regulation of Ndr2 expression in rat heart and further explored the possible relationship between Ndr2 expression and cardiomyocyte apoptosis induced by I/R injury.

**Methods** Rats were subjected to open chest surgery coronary artery ligation for ischaemia only or followed by reperfusion. Immunostaining and Western blot were applied to test the expression of Ndr2, c-Myc, cleaved-caspase3 from myocardium, and TUNEL (terminal dUTP nick end labelling)-staining for apoptosis determination of myocardium.

**Results** The immunostaining confirmed Ndr2 distribution in cardiomyocytes. The Ndr2 expression in myocardial tissue after I/R injury was significantly reduced at both mRNA and protein levels. We also observed that expression of c-Myc can be increased by I/R injury and was significantly inversely correlated with Ndr2 expression. Furthermore, the rapid apoptotic rate at the early phase of reperfusion was ameliorated in the late phase. Some results in vivo were further confirmed by ex vivo study in cultured cardiomyocytes subjected to simulated I/R.

**Conclusions** Our data suggests that up-regulation of pro-apoptotic c-Myc expression induced by I/R injury in rat myocardium may contribute to the down-regulation of also pro-apoptotic Ndr2. Such stress response may be involved in the post I/R anti-apoptosis mechanism and myocardial repair in rat.

#### e0179 IN ORDER TO INVESTIGATE THE POTENTIAL MECHANISM OF PIPERINE, WHICH IS THE ACTIVE SUBSTANCE FROM RHODOBRYUM ROSEUM LIMPR

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**Objectives** In order to investigate the potential mechanism of Piperine, which is the active substance from *Rhodobryum roseum*

Limpr., on acute atrial electrical remodelling in atrial fibrillation by inducing of rapid atrial pacing, as well as its protective effect on injury of oxidative stress in myocardium.

**Methods** 24 healthy rabbits were collected, and randomly assigned to four groups as follows: normal saline (NS), normal saline+rapid atrial pacing (NS+RAP), piperine (PI), piperine+ rapid atrial pacing (PI+RAP). In the study, acute electrical remodelling was conducted by rapid atrial pacing. In pacing group, right atrium was paced with a frequency of 500–600 bpm for 3 h, atrial effective refractory period was measured at 0 h, 0.5 h, 1 h, 1.5 h, 2 h, 2.5 h and 3 h after pacing, respectively. Then we calculated the rate adaptation of atrial effective refractory periods in different basic pacing cycle lengths. Soon after the experiment, we dissected the atrium of rabbits, the left atrium, right atrium and pulmonary veins were dissected, consequently the levels of MDA, SOD, XOD and Calcium were measured with special kits. All the results were analysed with SPSS17.0.

**Results** 1. In the experiment, paroxysmal atrial fibrillation or atrial tachycardia can be induced only in NS+RAP group, whereas no similar phenomenon was observed in the other three groups. 2. AERP was markedly shorter in NS+RAP group but it was not changed in NS and PI+RAP group. The rate adaptation of AERP was reduced in NS+RAP, but got lowest point ( $-0.24 \pm 0.59$ ) 1 h after pacing, while the rate adaptation of AERP presented no significant changes in NS and PI group. 3. MDA of PI+RAP group in left atrium and pulmonary vein was lower than that of NS+RAP group ( $p < 0.01$ ), but no significant difference of MDA in RA was observed between the two groups. 4. SOD activity in PV is higher in PI+RAP than that in NS+RAP, but no significant difference was observed in other locations between PI+RAP group and NS+RAP group. 5. XOD activity in LA and PV is lower in PI+RAP than that in NS+RAP ( $p < 0.05$ ), but XOD activity in RA presented no difference between the two groups. 6. Calcium level in LA, RA and PV, presented lower in PI+RAP compared with that in NS+RAP group.

**Conclusion** 1. Piperine can help reduce incidence of AF, prevent the shortening of AERP and the rate adaptation of AERP, in other words, piperine can alleviate acute electrical remodelling in acute phase of AF. 2. Piperine can alleviate injury of oxidative stress in AF through suppression of MDA overproduction, reducing the consumption of SOD, suppression of XOD activity as well as Calcium overload, consequently develops the protective effect on myocardium during AF. 3. When AF is present, PV has the most serious injury of oxidative stress but RA suffer the slightest injury. Meanwhile, antioxidant effect of piperine is the most conspicuous in PV.

#### e0180 THE ACUTE PROARRHYTHMIC EFFECTS OF LOW CONCENTRATION BPA ON FEMALE ADULT RAT AND THE ELECTROPHYSIOLOGIC MECHANISMS

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**Objective** To investigate the acute proarrhythmic effects of low concentration BPA on adult rat and to demonstrate the electrophysiologic mechanisms.

**Methods and results** Acute exposure to BPA increased the contractility of cardiac myocytes from female rat heart with inverted U-shaped dose-response curve, these effects were female specific. After-contraction or after-transient rate of female rat cardiac myocytes increased in BPA group, and increased much more by exposure to the mixture of BPA and  $10^{-9}$  M E<sub>2</sub>. Increasing BPA or E<sub>2</sub> from  $10^{-9}$  M to  $2 \times 10^{-9}$  M did not increase the effects induced responses. Although BPA combined with E<sub>2</sub> did not induce the

premature ventricular beats of ex vivo heart, under the acute adrenergic challenge, they significantly enhanced the frequency of premature ventricular beats.

**Conclusions** BPA promotes arrhythmogenesis in female rat heart by induced DADs, and effects of BPA and E<sub>2</sub> are synergistic instead of additive.

**e0181 RENALASE DEFICIENCY IN HEART FAILURE—A NOVEL MECHANISM UNDERLYING CIRCULATING NOREPINEPHRINE ACCUMULATION**

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**Background** Sympathetic overactivity and catecholamine accumulation are important characteristic findings in heart failure, which contribute to its pathophysiology. However, the mechanism underlying circulating catecholamine accumulation remains largely unclear.

**Objective** To identify a novel mechanism underlying norepinephrine accumulation in a rat model of heart failure.

**Methods and results** Initially, we constructed a rat model of unilateral renal artery stenosis and found that the expression of renalase, a previously identified secreted amine oxidase, was markedly reduced in the ischaemic compared to the non-ischaemic kidney. Subsequently, we utilised an isolated perfused rat kidney model to demonstrate that the clearance rate of norepinephrine decreased with reduction of either perfusion flow or pressure. On the basis of these findings, we hypothesised that the reduced renal blood supply which occurs in heart failure would result in impaired synthesis of renalase by the kidney and consequently reduced degradation of circulating norepinephrine. To verify this, we used a rat model of infarction-induced heart failure caused by ligation of the left anterior descending coronary artery. In these rats, renal expression of renalase, when measured at 4 weeks, was reduced, and this was associated with an increase in circulating norepinephrine.

**Conclusions** We conclude that impaired synthesis of renalase by the kidney may represent a novel mechanism underlying circulating norepinephrine accumulation in heart failure.

**e0182 ELECTROPHYSIOLOGICAL SUBSTRATE FOR CANINE ATRIUM**

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**Objective** Hypertension is frequently complicated by atrial fibrillation (AF). However, the atrial substrate for AF is not known. This study investigated the electrophysiological properties of atrial repolarisation by monophasic action potential (MAP) in order to explore the mechanism of paroxysmal AF initiation and maintenance.

**Methods** MAP were recorded from left and right atrium in 14 canine. action potential duration (APD) at 90% repolarisation (APD<sub>90</sub>), Repetitive atrial firing (RAF, the occurrence of two or more successive premature atrial activations with return cycle of 250 msec or less following atrial stimulation) and APD alternans (the difference in APD between two consecutive beats, were induced by overdrive pacing at LA and RA) were induced by use of programmed stimulation at LA and RA. In the study, episodes of PAF were recorded and analysed.

**Results** APD<sub>90</sub> were significantly shorter in the left atrium compared to the right atrium ((157.4±43.5) vs (170.9±37.9),

$p<0.05$ ). The mean S<sub>1</sub>S<sub>2</sub> interval induced RAF was (130±32) ms. 15 RAF were induced in 14 dogs. RAF induced in LA were more than in RA (11 vs 4,  $p<0.05$ ). Alternans of APD were induced at CL of (162±25) ms. 13 APD alternans were induced at LA (8) and RA (5) of 14 dogs. In total, 61 episodes of PAF were induced in 14 canines. 38 episodes of PAF were induced in the left atrium, more than in the right atrium (23,  $p<0.05$ ).

**Conclusions** The incidence of RAF and alternans was significantly higher in LA than in RA. Heterogeneity between LA and RA repolarisation creates substrate for re-entrant arrhythmias and vulnerability to atrial fibrillation.

**e0183 LIVIN PROTECTS AGAINST CARDIOMYOCYTE APOPTOSIS IN ANOXIA/REOXYGENATION INJURY VIA P38-MEDIATED SIGNAL PATHWAY**

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**Introduction** Although anoxic preconditioning (APC) in the myocardium has been investigated for many years, its physiological mechanism is still not completely understood. Increasing evidence indicates that transiently increased resistance to ischaemic damage following APC is dependent on de novo protein synthesis. However, the key effector pathway(s) associated with APC still remains unclear. Livin, a member of the inhibitor of apoptosis protein (IAP) family, since IAP-mediated activation of JNK1, as well as protection against TNF-β and ICE-induced apoptosis. The detailed mechanism underlying its antiapoptotic function in cardiomyocytes has not yet been fully characterised.

**Objective** To investigate whether Linvin expression might be aberrantly induced in cardiomyocytes that were subjected to anoxia/reoxygenation (A/R) injury and to investigate whether Linvin might also contribute to cardio-protection after APC.

**Methods** We cloned a Linvin expression vector, transfected it into rat cardiomyocytes, and examined Linvin expression in rat cardiomyocytes that were subjected to A/R injury. Moreover, we studied the role of three major MAPK pathways, for example, p38 MAPK, JNK, and ERK1/2, in order to evaluate the molecular mechanism underlying Linvin up-regulation and A/R induced cardiomyocyte injury.

**Results** APC induced an up-regulation of Linvin and the transfection of Linvin gene into the cardiomyocytes attenuated A/R injury. The inhibition of p38 MAPK by SB203580 abolished both the Linvin up-regulation and the cardio-protection provided by APC.

**Conclusion** APC could act to protect the heart from A/R injury with cooperation from the Linvin in addition, it up-regulates Linvin expression through a p38 MAPK signalling pathway.

**e0184 THE PROTECTION EFFECTS OF TRIMETAZIDINE ON RATS MYOCARDIAL INFRACTION**

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**Objective** To observe the myocardial protection effects of trimetazidine on Sprague-Dawley (SD) rats with myocardial infarctions (MI).

**Methods** 90 SD rats were randomly assigned to normal control group (NL, n=30), Trimetazidine group (T, n=30) and sham-operated group