in elevated PVR postoperatively. To assess the importance of NO production before and after CPB and DHCA, twelve 4-6 week old pigs were instrumented with pulmonary artery (PA) and left atrial milliar micromanometers and a PA ultrasonic flow probe. NO synthesis was blocked with a 5 mg/kg bolus of Nω-Nitro-L-Arginine Methyl Ester (L-NAME) into the main PA either before (Control, n = 6) or after CPB and DHCA (DHCA, n = 6). The DHCA animals were placed on CPB, cooled to 18°C, arrested for 60 minutes, rewarmed to 37°C, and weaned from CPB. The L-NAME bolus was given 5 minutes after weaning from CPB in this group. PVR and input impedance (Zin) were measured immediately before and 10 minutes after L-NAME in both groups. The results are expressed as means ± SEM.

**Conclusions:** 1) PVR and Zin are significantly increased by CPB and DHCA. 2) Blockade of NO synthesis increases PVR and Zin to a similar degree pre and post-DHCA, demonstrating that the pulmonary endothelium produces NO after CPB and DHCA. 3) Since the endothelium continues to produce NO following CPB and DHCA, other mechanisms, such as increased endothelial production of vasoconstrictors or interstitial edema, may be important mediators of post-CPB pulmonary dysfunction.

**953-35 Reduction of Nitric Oxide Induced Reoxygenation Injury in the Cyanotic Immature Heart by Controlling Oxygen Content**

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**Introduction:** Abrupt reoxygenation of cyanotic infants on cardiopulmonary bypass (CPB) is followed by a burst of nitric oxide (NO) releasing free radicals, leading to impaired myocardial contractility. This oxygen related damage may be reduced by controlling NO release using NO synthesis inhibition methods: Twenty-five piglets (2-3 weeks) were made hypoxic on Ventilator for 2 hours. Six were not made hypoxic (Control). Simulating clinical routine, 9 hypoxic piglets were placed on hyperoxic (Po2 400 mmHg) CPB (Hyperoxic). Five others were put on normoxic Po2 100 mmHg (Normoxic), and 5 underwent hypoxic CPB at ambient Po2 (25 mmHg), delaying reoxygenation until blood cardiopulmonary (BCP) arrest (Hypoxic). During 30 a min period of BCP-arrest Nitric oxide (pmo100 g/min) and conjugated diene production (A233nm/100 g/min) were measured. Post CPB measurements included % recovery of end-systolic elastance (impedance catheter) and tissue antioxidant reserve capacity (MDA production after exposure to t-BOOH).

**Results:**

<table>
<thead>
<tr>
<th>Minutes</th>
<th>PVR (dyne sec cm(^{-5}))</th>
<th>Zin (dyne sec cm(^{-5}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-L-NAME</td>
<td>Control</td>
<td>Post-DHCA</td>
</tr>
<tr>
<td>0</td>
<td>526 ± 53</td>
<td>1893 ± 395*</td>
</tr>
<tr>
<td>10</td>
<td>1456 ± 136*</td>
<td>3278 ± 668*</td>
</tr>
</tbody>
</table>

1* p < 0.006 vs Control by unpaired two-tailed t-test. 2* p < 0.01 vs Time 0 by paired two-tailed t-test.

**Conclusions:** 1) PVR and Zin are significantly increased by CPB and DHCA. 2) Blockade of NO synthesis increases PVR and Zin to a similar degree pre and post-DHCA, demonstrating that the pulmonary endothelium produces NO after CPB and DHCA. 3) Since the endothelium continues to produce NO following CPB and DHCA, other mechanisms, such as increased endothelial production of vasoconstrictors or interstitial edema, may be important mediators of post-CPB pulmonary dysfunction.

**953-36 L-Arginine Administration Improves Left Ventricular Performance in Neonatal Lambs Following Cardiopulmonary Bypass and Two Hours of Global Hypothermic Ischemia**

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Prior studies in isolated neonatal lamb hearts showed that the nitric oxide precursor L-Arginine (L-ARG), infused during reperfusion (rep) improved left ventricular (LV) function and coronary blood flow (CBF) after hypothermic ischemia. We evaluated the effects of L-ARG in an in situ model of cardiopulmonary bypass (CPB) and hypothermic circulatory arrest (HCA) in 13 neonatal lambs with LV micromanometers and LV free wall sonomicrometer crystals.

Before CPB, hemodynamics and LV regional preload recruitable stroke work (RPRSW) were recorded. Coronary blood flow (CBF) was determined with microspheres. Animals were cooled to 15°C prior to 2 hrs HCA. Group L-ARG (n = 6) received an infusion of L-ARG calculated to achieve a plasma concentration of 3 mM during the first 15 min of rep on CPB. Group CON (n = 7) received 0.2 mg/kg phenolamine at rep, according to the clinical protocol. Animals were weaned from CPB and data obtained for 3 hrs. No intergroup differences were seen in heart rate, systemic vascular resistance, cardiac output, or left atrial pressure at baseline or during rep. (p > 0.05) CBF at 1 and 2 hrs rep was not different between the two groups (p > 0.05). Rep RPRSW data are expressed as mean % recovery of baseline.

**953-37 Nitric Oxide is a Potent Arterial Duct Dilator in Neonatal Lambs**

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Neonates with duct dependent pulmonary circulations require patency of the arterial duct (AD) to maintain the underdeveloped circulation before palliative or reparative surgery. Nitric oxide (NO) has been used in both animals and patients to relax the pulmonary vasculature and hence reduce pulmonary artery pressure and increase pulmonary blood flow. However AD response to NO is unknown. To determine the responses of the AD to NO, we used the NO donor SIN1, in vitro on freshly removed ADs and aortas from newborn lambs (aged 1-5 days, n = 7). Vessels were cut into rings and mounted on tension gauges in 37°C organ baths containing Krebs-Henseleit. After equilibration with 1 gtm of tension, the rings were tested for smooth muscle responses to oxygen (O2), prostaglandin E2 (PGE2), potassium (K+), and SIN-1. O2 constricted the AD rings at tensions over 89 mmHg. PGE2 had no effect in concentrations ranging from 10-5 - 10-4 M. K+ constricted the aortic rings in concentrations ranging from 10-6 - 10-5 M. K+ relaxed the AD rings at tensions ranging from 10-5 - 10-4 M. SIN-1 relaxed the K+ preconstricted aortic rings in concentrations ranging from 10-3 - 10-2 M. SIN-1 relaxed the AD rings in concentrations ranging from 10-2 - 10-1 M. Conclusions: 1) SIN-1 relaxes the AD in a concentration dependent manner. 2) The NO donor SIN1, which mimics SIN-1, relaxes the AD in a concentration dependent manner. 3) SIN-1 has a lower affinity for the K+ channel than SIN-1. 4) SIN-1 relaxes the AD rings at tensions ranging from 10-2 - 10-1 M.