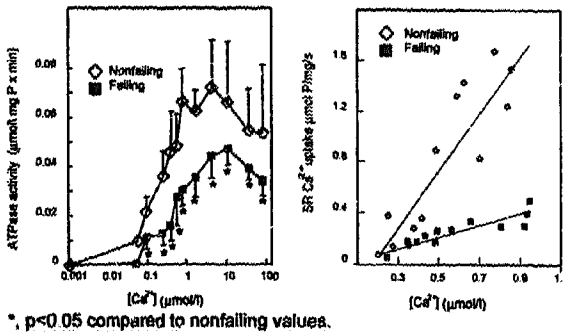
SR Ca^{2+} uptake rate, measured with the fluorescent Ca^{2+} indicator Fura-2, was significantly decreased in failing compared to nonfailing SR vesicles (figure: *, $p < 0.05$ compared to nonfailing values).



*, $p<0.05$ compared to nonfailing values.

Protein levels of SR Ca^{2+} ATPase (Western blot analysis) showed no differences between failing and nonfailing left ventricles. Conclusion: Over a physiological range of $[Ca^{2+}]_i$, the SR uptake is impaired in failing hearts.

3:15

713-6 Expression of Protein Kinase C Isoforms in Human Heart: Evidence for an Isoform Shift in Developing Heart and in Chronic Heart Failure

Ruth H. Strasser, Steffen K. Briem, Rüdiger Lange, Christian F. Vahl, Siegfried Hagl, Rainer Marquetant, Wolfgang Kübler. *University of Heidelberg, Germany*

Protein kinase C (PKC) a key enzyme of the phosphatidylinositol system may mediate growth and hypertrophy. It also has been shown to play an important role in cardiac ischemic preconditioning. It is not known which of the isoforms of PKC are expressed in human heart or if their expression may be modulated in failing and developing human heart. To address these issues biopsies of human left ventricles and right atria were analyzed. The samples were taken from adult donor or failing hearts at the time of transplantantion or from infant hearts (6 weeks up to 3 years) with ventricle septal defects at time of operation. PKC isoforms were analyzed using Western blot analysis with isoform-specific peptide antibodies.

In normal left ventricles PKC-α, -ε, -ζ and -β are expressed, whereas PKC-δ, -γ or -θ could not be detected. In contrast, in right atria only PKC-α, -ε and -ζ, but not -β are expressed. In failing human left ventricle PKC-β was significantly increased to 240% compared to adult controls. In right atria PKC-β could not be discovered in normal or failing human hearts. However, in infants PKC-β is expressed at high levels in right atria with age-related, decreasing intensities.

These data characterize for the first time the specific isoforms of PKC in human heart and their distinct regulation in early growth and in chronic heart failure. PKC-β is increased in failing human left ventricles and is expressed in right atria only in infant hearts demonstrating an isoform shift in failing and developing heart. The understanding of these newly characterized distinct regulation processes may help to further characterize their role in cardiac growth and hypertrophy in the young and in the patients with congestive heart failure.

714 Pediatric Cardiac Surgery

Monday, March 25, 1996, 2:00 p.m.–3:30 p.m.
Orange County Convention Center, Room 315

2:00

714-1 Aortic Valve Replacement in Children

Flavian M. Lupinetti, Thomas K. Jones, S. Paul Hamdon. *Children's Hospital and Medical Center, Seattle, Washington; The University of Washington, Seattle, Washington*

Aortic valve replacement (AVR) in children is complicated by the difficult management required for mechanical valves and the uncertain outcome following the use of human valves. The results of AVRs performed from 1990 through August, 1995, at one children's hospital were reviewed. Mechanical valves were used exclusively through 1993 (n = 25). Starting in 1994, 21 consecutive AVRs were performed as Ross procedures (17) or allograft AVRs (4). Allografts were used for patients with Marfan's syndrome or those whose previous operations rendered the pulmonary autograft unusable. In the Ross/allograft group, patient age was 2–15 years (mean 9 years) and weight was 11–66 kg (mean 34 kg), compared to 2–18 years (mean 12 years) and 12–110 kg (mean 47 kg) in the mechanical group. In the Ross/allograft group, 13 patients underwent 19 prior surgical procedures including 2 previous AVRs with mechanical valves, and 3 additional patients underwent balloon valvotomy. In the mechanical AVR group, 17 patients underwent 17 prior operations, including 2 mechanical AVRs. Operative complications included 1 pacemaker for heart block and 1 mild stroke in the Ross/allograft group and 2 deaths, 1 early reoperation for endocarditis, and 2 pacemakers in the mechanical AVR group. In the Ross/allograft group there were no late complications or reoperations. In the mechanical AVR group, late complications included 5 cases of nonstructural degeneration, 3 of which required reoperation. Reoperation-free survival in the Ross/allograft group was 100% at 18 months. Reoperation-free survival in the mechanical AVR group was 83% at 18 months ($0.10 < p < 0.05$ vs. the Ross/allograft group) and 74% at 48 months. These data call into question the permanence of mechanical AVR in children. AVR with the Ross procedure or with allografts can be carried out uniformly in children with better early results than mechanical AVR. Longer follow-up will be necessary to confirm the superiority of AVR with human tissues.

2:15

714-2 Intermediate Outcome of the Ross Procedure in Children

Susan E. desJardins, Amnon Rosenthal, Ralph S. Mosca, Edward L. Bove. *University of Michigan, Ann Arbor, MI*

Although the Ross procedure is commonly used in patients requiring aortic valve replacement, minimal data are available on the risks and outcome in children. We reviewed our experience with 33 consecutive pediatric pts (age 4 days to 20 yrs; median 8 yrs) who underwent a Ross procedure at our institution from 10/91 to 8/95. Information obtained included preoperative and postoperative clinical, echocardiographic, and hemodynamic data. Indications for the Ross procedure were aortic stenosis (AS) and regurgitation (AR) (n = 14), AR alone (n = 10), and AS alone (n = 9). Prior procedures included balloon valvuloplasty (n = 8) and surgical valvotomy (n = 9). Major complications during hospitalization included reoperation for bleeding (n = 2), myocardial ischemia (n = 1), complete heart block (n = 1), and endocarditis (n = 1). All 33 pts survived the initial hospitalization. Left ventricular outflow tract obstruction was relieved in all pts (PIPG < 17 mmHg). There was no or mild AR at hospital discharge in 31 of 33 pts, with moderate AR in 2 pts. Survival during a follow up period of 0–46 months (mean = 16 months) was 97% (32/33). Of the 17 pts with serial echocardiographic data, progressive AR was seen only in those 2 who had moderate AR on discharge. Late complications occurred in 4 of 7 pts under 2 yrs of age and included ventricular failure and death (n = 1), recurrent severe AR (n = 1), RV to PA homograft calcification requiring replacement and mitral stenosis (n = 1), and mitral regurgitation (n = 1). We conclude that the Ross procedure results in good intermediate outcome in children of all ages, even neonates, with resolution of AS and minimal residual AR. The high prevalence of late complications in pts under age 2 yrs is related to complex associated cardiac disease. The Ross procedure appears to be a safe and effective method of aortic valve replacement in children.

2:30

714-3 Arterial Switch Repair (ASR) for Simple Transposition of the Great Arteries (TGA) in Infants Older Than 21 Days

John P. Foran, Ian D. Sullivan, Martin J. Elliott, Marc R. de Leval. *Great Ormond Street Hospital for Children, London, UK*

Surgical management of simple TGA beyond the age of 21 days is controversial. Concern that regression of left ventricular (LV) myocardial mass will render the LV incapable of coping with the acutely increased work of systemic perfusion has been considered a contraindication to ASR.

Between January 1990 and March 1995 ASR was performed in 22 infants aged 21 to 58 (median 31) days with simple TGA, Group A. During the same era, ASR was performed in 115 neonates with simple TGA aged ≤ 20 days, Group B. Hospital mortality was 1/22 (4.5%) and 12/115 (10.4%) respectively (p = NS) with one late death in Group B. No patient was receiving prostaglandin at the time of operation. The patient in Group A who died was the smallest at operation (2.1 kg, aged 57 days) who also had cleft palate, respiratory failure and systemic pulmonary artery pressure pre-operatively and died after ASR of probable pulmonary hypertensive crisis. In Group A, age, LV mass index, LV posterior wall thickness index, LV volume index, LV mass/volume ratio, patent arterial duct diameter > 2 mm or coronary anatomy did not predict death, duration of post operative ventilation or inotropic sup-

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