alization compared with smaller size catheters. We seek to determine if the recently approved 8 Fr Angioseal™ device, with its unique 2 × 10 × 1 mm polymer anchor and 26 mg collagen plug construct, can be use for closure of 9 Fr arteriotomy site immediately following percutaneous interventions. We compared pt characteristics and incidence of major in-hospital vascular complications following Angioseal™ placement in 87 consecutive pts following either 8 or 9 Fr intervention procedures (table).

We Conclude: The use of 8 Fr Angioseal™ is safe and effective for access site closure immediately following percutaneous intervention utilizing either 8 or 9 Fr sheath system.

1033-106 Effects of a New Vascular Sealing Device on Coagulation Parameters and Thrombin Generation in Humans

S. Silber, G. Gerahony, M. Spannagl, W. Schramm. *Dr. Mueller Hospital and University of Munich, Germany*

Background: We evaluated a new vascular sealing device (DUET) which incorporates a unique low-profile disk-shaped balloon delivery catheter and a procoagulant (thrombin/collagen suspension) delivered to the adventitial surface of the arterial puncture site immediately following percutaneous vascular interventions.

Methods: Following a diagnostic or PTCA procedure, 24 pts. underwent immediate placement of the DUET sealing device in the cath lab. In all pts., coagulation markers and tests for intravascular thrombin generation were performed pre and post DUET deployment, and at the 30 day followup evaluation.

Results:

	Fibrinogen	D-dimer	F1.2
Pre-DUET	332 (133–542)	180 (40–760)	1.2 (0.60–3.21)
Post-DUET	33.3 (194–308)	515 (180–2620)	1.8 (0.82–8.14)
30 day F/U	291 (213–892)	320 (40–8700)	1.3 (0.68–4.19)

No major in-hospital complications occurred. There was no clinical evidence of intravascular thrombosis in any pt. treated.

Conclusions: Despite the use of a powerful procoagulant suspension delivered to the adventitial surface of the arterial puncture site, the DUET vascular sealing device was not associated with any evidence of excessive intravascular coagulation or thrombin generation. These results paralleled the pts. favorable clinical course.

1034 Approaches to Inhibiting the Postinterventional Proliferative Response

Monday, March 30, 1998, Noon–2:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: Noon–1:00 p.m.

1034-98 Cyclic Thermal Treatment of Coronary Arteries Limits Smooth Muscle Cell Proliferation Following Balloon Injury: Results in a Porcine Coronary Organ Culture System

K. Miyauchi, D.A. Lewis, M. Sangiorgi, C.J. McKenna, P.J. Carlson, D.R. Holmes, R.S. Schwartz. *Mayo Foundation and Mayo Clinic, Rochester, MN, USA*

Low temperature heat treatment induces heat shock proteins (HSP), which have been shown to be cytoprotective. The effect of heat shock protein induction on the smooth muscle cell (SMC) response to injury is unknown. We hypothesized that the arterial response to injury may be modified by periodic, low-level heat exposure. This study examined the effect of cyclic thermal treatment on the induction of HSP, SMC proliferation, apoptosis and iNOS expression using a porcine organ culture system.

Methods: In 8 normal pigs, 16 coronary arteries were dilated with 3.5 mm angioplasty balloon for 60 seconds at 8 atm. Immediately after angioplasty the arteries were dissected free, cut into 5 mm rings, and placed in culture media supplemented with 20% fetal calf serum. The injured coronary rings were divided into 2 groups: cyclic heat treated and controls. In the cyclic heat-treated group, coronary rings were placed in 43°C media for 20 minutes daily for 10 days after injury, and then returned to 37°C.

Results: In the heat-treated group, intimal area was reduced by 30% (1.02 ± 0.11 vs. 1.45 ± 0.21 mm^2; $p < 0.05$) compared to the untreated group. The number of α actin and PCNA labeled cells was significantly decreased (35% and 33%, respectively). Heat treated intima contained significantly more HSP staining than did untreated (145 ± 22 vs 33 ± 6 cells/mm^2; $p < 0.05$). Expression of apotosis (TUNEL labeling) and immunohistochemical expression of iNOS were increased by 43% (103 ± 25 vs. 72 ± 15 cells/mm^2; 1; $p < 0.05$) and 37% (96 ± 15 vs. 70 ± 9 cells/mm^2; $p < 0.05$) in the 43°C treated group respectively.

Conclusion: Low levels of periodic thermal therapy through induction of heat shock proteins, apoptosis and iNOS expression may limit SMC proliferation after balloon injury.

1034-99 Tumor Necrosis Factor Alpha Blood Levels as a Potential Marker of Stenosis in Patients Undergoing Percutaneous Transluminal Coronary Balloon Angioplasty

D. Di Donato, A. Di Roma, C. Iacoboni, L. Addonisio, A. Dagianti, F. Fedele. *"La Sapienza" University Rome, Italy*

Background: There is growing evidence that immune-inflammatory reactions are involved in restenosis phenomena; cytokine signal plays a role in the modulation of cellular functions and proliferation of intimal smooth muscle cells. The aim of this study was to investigate if tumor necrosis factor alpha (TNF_α) serum concentration may identify subjects at high risk of restenosis after percutaneous transluminal coronary balloon angioplasty (PTCA).

Methods: We have estimated TNF_α blood concentrations (available ELISA kit, normal values 0.8–2 pg/ml) in 35 patients (26 males, mean age 61.5 ± 5.5 yr.) with documented unstable angina and single coronary vessel disease before undergoing PTCA. Patients underwent clinical evaluation, coronary angiography and a supine bicycle echo-stress, three months after the PTCA procedure.

Results: Normal TNF_α values (1.54 ± 0.34 pg/ml) were found in 25 patients; at follow up, 23/25 had neither clinical signs of ischema, nor angiographically documented restenosis, nor an ischemia-positive echo-stress, 2/25 presented restenosis. 10/35 had abnormally high TNF_α blood values (12.65 ± 2. 3 pg/ml), 9 of these ten patients showed restenosis at coronary angiograms and 8 of them positive Eco-stress. Positive predictive value for restenosis was 90%, negative predictive value was 92%.

Conclusions: These results show that high serum TNF_α levels are associated to an high risk of restenosis; this marker of restenosis is easily estimated at low post and could be very helpful in revascularization timing and in the decision making for interventional procedures.

1034-100 Parameters Influencing Local Gene Delivery Following Angioplasty in Rabbit Single and Double Injury Models

A. Rivard, H. Perlman, Z. Luo, J.-E. Fabre, K. Walsh. *St. Elizabeth's Medical Center, Boston, USA*

Background: We recently demonstrated a high frequency of vascular smooth muscle cells (VSMC) apoptosis immediately following angioplasty of normal vessels. Here we analyzed the effect of balloon:artery ratio (BAR) on the frequency of VSMC apoptosis and the efficiency of local gene delivery in single and double injury models of restenosis in rabbit iliac arteries.

Methods and Results: New-Zealand White rabbits (n = 36) underwent iliac angioplasty with either a 2.5 mm (BAR 1.08 to 1.13) or a 3.0 mm balloon (BAR 1.29 to 1.34). Arteries were harvested at different timepoints (30 min, 4 hours and 3 days) to determine cellularity and apoptosis (TUNEL staining). In the single injury model, the 3.0 mm balloon induced a 60.6% reduction in cellularity ($p < 0.001$) while the 2.5 mm balloon did not show a significant effect. The hypocellularity of the media at day 3 was correlated with a higher level of TUNEL+ cells at 30 minutes when compared to the 2.5 mm balloon. In the double injury model, the effect of the 3.0 mm balloon was even more pronounced, with a 91.1% reduction in the cellularity of the media ($p < 0.001$). Cellularity was also reduced in the neointima (36.6% reduction, $p = 0.025$). At 30 min, TUNEL+ cells were abundant in both the media and the neointima of 3.0 mm balloon-injured arteries when compared to 2.5 mm balloon-injured arteries. Parallel studies demonstrated that the transfection efficiency of a reporter gene (adeno-βGal) to the vessel wall using a channel balloon was significantly reduced when a higher BAR was used.

Conclusions: 1) Angioplasty induces early hypocellularity that is proportional to the severity of the balloon injury. 2) This hypocellularity is due, at least in part, to rapid onset apoptosis and is associated with a lower efficiency in local gene delivery to the vessel wall.