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Vascular Physiologic Responses Associated with DES: Evaluation of a Stent Eluting Sirolimus from an Absorbable Salicylate Polymer Coating

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Aim: To examine physiological and biochemical responses of conduit and microvascular arteries in the vasculature associated with a new DES device that elutes sirolimus from an absorbable salicylate based polymer coating.
Methods: A total of 36 stents of 4 different types (BMS, Cypher, polymer only, and polymer+sirolimus) were implanted in pig coronaries. Animals were euthanized at 30 and 90 days and stented vessels were disaggregated into single cell suspensions flow cytometric analysis of cellular phenotypes. Proximal, distal, and resistance arteries of stented arterial vessels were subjected to Western Blot analysis to determine expression of various inflammatory and pro-healing proteins.
Results: At 30d, there was a significant increase in CD31+ cells in the polymer only and poly+sirol compared to BMS and Cypher (P=0.05). By 90d, there were no significant differences detected in cellular infiltrates and proliferating cells between stent groups. At 30d, VCAM and TNFα expression were increased in the proximal Cypher, distal BMS, and poly+sirol stented segments. MnSOD expression was highest in the distal segment of the poly+sirol and the resistance arteries of the polymer only stented vessel. At 90d, VCAM expression was upregulated in the proximal and distal segments of the poly+sirol stented vessels. TNFα levels were highest in the proximal segments of Cypher, polymer only, and poly+sirol stented segments compared to the distal segments. MnSOD expression was observed in the resistance arteries of polymer only and poly+sirol stented segments.
Conclusions: This new polymer, either alone or together with sirolimus increases the number of endothelial-like cells to the luminal surface. Though proinflammatory markers such as VCAM and TNFα were unregulated, only implantation of the absorbable polymer led to an increase in antioxidant protective MnSOD. Therefore, this polymer may reduce vessel injury by increasing endothelial recovery and enhanced antioxidant proteins.