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Titel des Beitrags: Polymer coatings and delayed arterial healing following drug-eluting stent implantation.

Abstract: The antirestenotic efficacy of drug-eluting stent (DES) technology is based on the local delivery and modulated release of cytotoxic drugs targeted at inhibition of neointimal hyperplasia. Control of drug-release kinetics is a critical component of device efficacy. To date this has been most effectively performed by stent coatings comprised of non-erodable (permanent) polymer which facilitate drug loading and delay elution of the active drug. In fact all 4 of the systems currently approved by the Food and Drug Administration (FDA) use a permanent polymer-based drug release system. Balancing the need for lipophilicity (to bind active drug) with hydrophilicity (which offers superior biocompatibility) is a key challenge in polymer technology. Delayed arterial healing (DAH) following DES implantation has been demonstrated in human autopsy studies and animal models and is implicated in late thrombotic occlusion and delayed loss of antirestenotic efficacy. It is characterised by 1) persistent fibrin deposition; 2) delayed endothelialization; 3) chronic inflammation; and 4) persistent platelet activation. Within segment heterogeneity in degree of healing is typical. Inflammatory response to polymer residue plays an important role and may be non-specific (monocyte-macrophage predominant) or hypersensitivity related. Failure of early preclinical models to sufficiently predict DAH in man was an important problem. Second generation DES attempt to address the issue of DAH.
by using thinner stent struts, lower drug load and more biocompatible polymer. At present the focus of development is towards biodegradable polymer coatings which offer the attractive prospect of controlled drug-release without the potential for late polymer-associated adverse effects. This review highlights the role of polymer coatings in determination of DES efficacy, summarises the preclinical and clinical evidence linking polymer coatings with DAH and evaluates the promise of third generation polymer-free and biodegradable polymer DES.

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