Will Nanoporous Stents Replace Polymer-Based Stents for Drug and Gene Delivery?

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At the present time, most drug delivery systems to control restenosis are based on complex polymers requiring adhesive bonding. Although efficacy has been established, there remains the unanswered issue of inhomogeneity in drug distribution at the appropriate site. Current drug eluting systems are also based on the efficacy of diffusive and transmucosal delivery, which also accounts for the variations in local drug concentrations. A nonpolymer nanoporous surface to facilitate drug elution has been developed that may answer certain problems that exist with polymer-based platforms. The nanoporous surfaces are produced using microelectronic fabrication processes and the same biologically inert material as the underlying implant. In particular, we have demonstrated both nanoporous nitinol and platinum suitable for use on self-expanding stents and potentially neuro-embolic coils, respectively. We have developed nanoporous cobalt-chromium alloys. This technology holds the promise of enabling intravascular drug-delivery systems using modified metallic surfaces, which are more adherent, mechanically robust, and chronically biocompatible than the current polymer-based systems.