Three Dimensions of Individualized Nanomedicine

In judicious integration with the biological and clinical disciplines, nanomedicine offers unprecedented opportunities for the individualization of prevention, screening, diagnostics, and therapy. The fundamental queries in individualized medical therapy pertain to the delivery of the "right" bioactive agents at the "right" place, with the "right" time profile, triggering the "right" interactions with the target biology, and in a manner that allows for the monitoring for the therapeutic efficacy and undesired effects, as rapidly as possible. In this talk I will review these challenges and the efforts to address them in our laboratory, using a combination of silicon nanotechnology, molecular biology, mathematics, and multiple engineering disciplines. The four technology platforms I will present are: MultiStage Vectors (MSV) for intravascular injection; Nanostructured surfaces (nanochips) for proteomic and peptidomic profiling from biological fluids; the space-bound nanochannel Delivery Systems (nDS) for controlled release from implants; and our 'baby', the BioNanoScaffolds (BNS) for Post-Traumatic OsteoRegeneration.

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