

Guest Editorial

Bio-nano-chip Devices may open up New Oral Diagnostic Opportunities

New diagnostic tools are critical to delivery of effective health care, yet today *in vitro* diagnostics are for the most part tethered to the remote laboratory, require invasive sample collection procedures, force laborious sample processing and need sophisticated instrumentation. While there are a few test modalities, like the blood glucometers, that are available at remote sites using noninvasive sampling (i.e. through needle sticks), the menu for such tests is quite short. Further, modern diagnostic devices have a number of limitations and have been incapable of keeping pace with the rapidly increasing information content related to disease diagnosis and progression generated with advanced ‘omics’ methods, such as genomics, proteomics, metabolomics and glycomics. The movement of new technologies to point of care (i.e. near patient) settings and the use of noninvasive sampling modalities have important implication in terms of improvement in the efficiency of the delivery of health care. The use of oral fluids and brush biopsy samples has strong potential to bring new testing modalities into the main stream dental settings, where there has been for some time a strong tradition of preventative care. Relative to gathering blood by a phlebotomist, the use of saliva appears an attractive diagnostic medium as it can be collected easily and noninvasively, in large quantities, with minimal training and risk. Most traditional serum and plasma biomarkers are present in whole saliva, although at reduced concentrations. New advances in the bio-nano-chip areas have led to the development of ultrasensitive portable test systems that are now poised to change the range of options available to the dental community. In many ways, the convergence of microfluidics, biomarker validation, and porous bead ensembles serve to overcome some of the significant challenges that the medical microdevices have to date faced with respect to scalability and performance. When combined with new concepts for noninvasive sampling, there is now strong potential to move these sensor modalities into broad scale clinical practice. Before this is possible, it will be necessary to complete more thorough clinical testing and validation. This process is now evolving and the initial validated devices are expected to reach the market within the next 5 years. The launch of a dental journal dedicated to experimental science will serve as an important vehicle to educate the community as to the new opportunities afforded by the intersection of nanotechnology, bioinformatics and clinical-dental science *en route* to improving health care for both oral and systemic diseases.



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