3rd International Conference on
Clinical & Experimental Dermatology
April 15-17, 2013, Hilton Chicago/Northbrook, USA

Skinomics: Using DNA microarrays to guide pharmaco- and immuno-therapies

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Abstract

Past few years witnessed the birth of 'omics' technologies that address comprehensively the entire genome, transcriptome, proteome, microbiome etc. 'SKINOMICS' is a field of Bioinformatics applied specifically to dermatology and skin biology. Because of its accessibility, skin was among the first organs analyzed using DNA microarrays, and dermatology among the first medical disciplines to embrace the approach. The well-studied skin diseases have been, unsurprisingly, melanoma, basal and squamous cell carcinomas and psoriasis. In addition, atopic dermatitis, wound healing, keloids etc. have all been analyzed using microarrays. Importantly, and distinctly in dermatology, noninvasive skin sampling for microarray studies has been developed, which will greatly accelerate the use of skinomics in everyday dermatologic practice.

Psoriasis is among most comprehensively explored diseases using DNA microarrays. Noninvasive tape stripping has been used in studies of psoriatics. The transcriptional changes correlated with genomic markers and several signaling pathways important in psoriasis have been identified. Moreover, specific molecular changes even in uninvolved skin and in healed lesions of psoriatics have been defined. Currently, DNA microarrays can be used to predict genetic susceptibility to psoriasis, to follow its course of treatment and to predict responses or resistance to various pharmacological agents. Recently, the specific changes in the microbiome of psoriatic and of atopic dermatitis patients have been correlated with each disease and the different antimicrobial defense mechanisms.

As dermatology advances toward personalized medicine, microarrays and the related 'omics' techniques will be directly applied to the personalized dermatology practice of the near future.

Biography

Miroslav Blumenberg is the Associate Professor in the R.O. Perelman Department of Dermatology and Department of Bioch and Molecular Pharmacology, NYU Langone Medical Center. He has completed his Ph.D. at the Massachusetts Institute of Technology and postdoctoral studies at Stanford University. He has published more than 100 papers in refereed journals, ser editorial boards of BMC Genomics, Acta Dermatovenerologica APA and World Journal of Biological Chemistry and holds Dr Blumenberg pioneered the use of DNA microarrays in skin biology.