

High throughput array technologies: Expanding applications from clinics to applied research

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Commentary

The electronic micro-nanoarray technology is providing accountable contribution in field of clinical diagnosis and biological research [1]. Currently, based on fine tools and aid supported by nanotechnology and nanochip patterning advancement [2,3], micro-nanoarray is revolutionizing molecular biology and genetics research. Utilizing best optical detection methods and DNA chemistry detecting changes in genomics/transcriptomics and more challenging, proteomics via hybridization and fine optical detection at nanochip, micro-nanoarray technology going beyond the expectation in the field of current research. Henceforth this technology is delivering the best output to look into individual gene and its subsequent mutation that affects population towards debilitating neurological disorders and imposes genetic susceptibility in disease prognosis [4].

Recently, based on the advances in machine learning, there has been tremendous spurge in the field of micro-nanorobotics to complex data analysis revealing new insight into fundamental biology [5-8]. In this regard, potential application set forth by electronic micro-nanoarray ranges in detecting point mutations to single nucleotide polymorphisms (SNPs) in human genome relevant to disease diagnosis in oncogene SNP array, indications to predisposition of cancer to population, responses to chemotherapeutics and associated toxicity helping out best way cancer treatment and diagnosis.

Other associated partners benefiting maximum with electronic micro-nanoarray technology are neurodegenerative disorders including Alzheimer diseases (AD), Parkinson (PD) and multiple Sclerosis (MS) [9]. In past few years genetic susceptibility in Neurodegenerative disorders, Venous Leg ulcer (VLU) and Cardio vascular diseases associated with Iron over load gene polymorphism (MMPs, HFE, FPN, HEPC, Tf etc.) had recalled much interest of clinicians and researchers to evaluate genetic susceptibility associated with polymorphic gene profile. Electronic micro-nanoarray contributed a lot in this view as quick and accurate assessment of genetic eclipse if any on pathophysiology of diseases.

Micro-nanoarray by definition comprises, exact point placement of numerous DNA samples on the smallest area. For this, oligonucleotides, which represent the genes to be examined, are placed with high precision onto a glass slide (spotting). In the hybridization process that follows, these oligonucleotides identify and link the corresponding structure in the sample. The components of a complete system can be

divided into three parts as given blow in Figure 1 sample preparation, array generation and sample analysis.

The focus area of micro-nanoarray investigation in our lab are the association of SNPs those increase susceptibility and progression of MS and VLU related with iron homeostasis gene. Among various factors related with MS and VLU, we projected our studies related with possible associations between HFE genes (H63D, C282Y) and -8CG SNP in the promoter of the ferroportin (FPN1) gene in MS. For VLU, we considered FXIII V34L, MMP-12, FPN1 -8C/G and HFE C282Y as candidate gene for polymorphism [10,11]. The above recommendation of candidate genes were made considering their vital role in iron metabolism and homeostasis and to investigate any probable role in diagnosis, prognosis and prevention of MS and ulcer [12]. Specially, there is scarcity of available research regarding the role of FPN1 gene polymorphism in MS or associated neurodegenerative disorders though it plays a critical role in iron export outside the cells [13-15].

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Conflict of Interest

Authors state no conflict of interests.

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Special Issue: Nanotechnology: Challenges and Perspectives in Medicine

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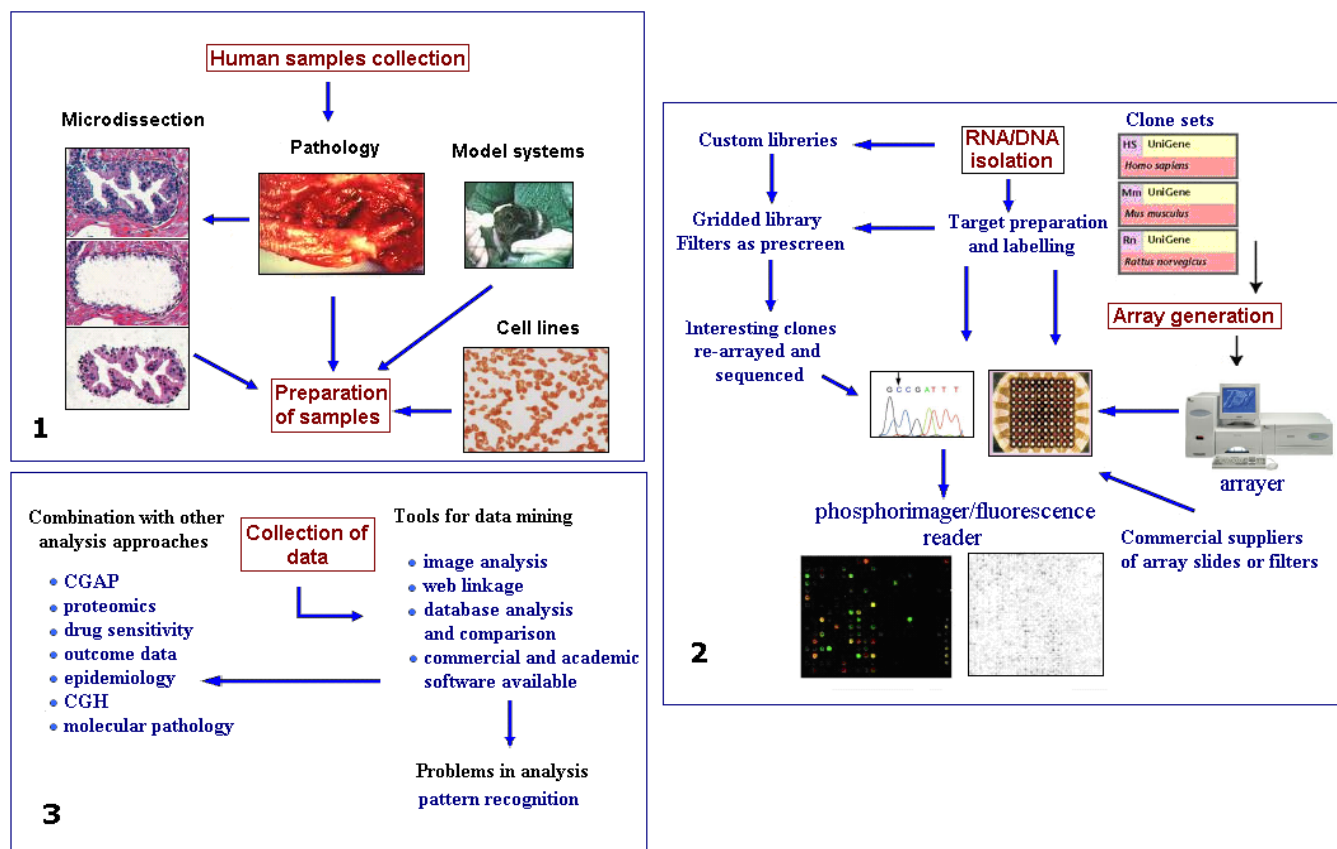


Figure 1. Sample preparation, array generation and sample analysis.

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