

Urinary biomarkers*

The urologic cancer burden has increased globally amid population growth and ageing. Urological tumours represent approximately 25% of all human cancers. The primary cause for such high fatality associated with the disease is that cancers of almost all types are diagnosed at advanced stages. This is due to the lack of easy and rapid screening technologies for early cancer diagnosis. Usually, patients in the early stages of cancer will experience symptoms that generally overlap with those of minor illnesses, nominal infections, ulcers, colds and coughs. As a result, patients are hesitant to get themselves checked at such a stage because the present diagnostic approaches like tomographic scans, X-ray imaging, sputum cytology, a biopsy of tissues, etc. are expensive, lab-intensive and sometimes invasive. There is a need to use inexpensive, highly sensitive biomarkers, which require a small volume of easily collectable patient samples (saliva, sputum, urine, etc.), require less or no additional chemicals, and enable quick diagnosis. Several interesting and promising biomarkers have been under clinical scrutiny in recent years, although only those approved by regulatory entities (e.g. FDA, DCGI) are commercially available for use. It is anticipated that urine biomarker studies will promote early diagnosis, prevention, treatment and prognosis of a variety of diseases and provide strong support for translational and precision medicine. To develop a consortium for providing excellence in urinary biomarkers for better healthcare, an international workshop under the theme 'Diagnosis of genitourinary cancers' was organized. It aimed to disseminate information, discuss and debate controversial issues in the continuously evolving field of urinary biomarkers. There were 113 participants from different healthcare institutions in India and USA.

Shishir Devaraju (KLES Dr Prabhakar Kore Hospital and MRC, Belgaum) welcomed the delegates. He highlighted the scientific content of the workshop and in-

roduced the first session on urinary biomarkers. R. B. Nerli (KLES Dr Prabhakar Kore Hospital & MRC) spoke on the current status of urinary biomarkers. He presented the ongoing research on urinary biomarkers and their potential for the non-invasive detection of urinary tract tumours. Biomarkers can be proteins and peptides (e.g. an enzyme or receptor), nucleic acids (e.g. DNA, microRNA), antibodies or metabolites. They can have single or multiple components, for example, individual proteins (e.g. CA-125) or genomic, proteomic or metabolomic signatures. Urine is a prototype non-invasive sample and a useful biological fluid for discovering biomarkers due to its accessibility and potential for repeated samples and unlimited volumes. The collection is cheap and is usually without side effects or complications. Thus, it fits the description of an ideal biomarker source for clinical validity detection. M. L. Thakur (Thomas Jefferson University Philadelphia, USA) spoke about a non-invasive, uniplex, urinary optical imaging assay for detecting prostate cancer. He suggests that targeting VPAC receptors on prostate cancer cells shed in voided urine is a promising approach that is truly non-invasive, simple, affordable, reliable and cost-effective. Ranjit Kangle (Department of Pathology, J. N. Medical College, Belgaum) spoke on 'Diagnostic modalities in renal tumours'. D. R. Harish (ICMR-National Institute of Traditional Medicine (NITM), Belgaum) spoke on 'Advanced molecular techniques in diseases diagnosis and therapy'. He mentioned that targetted antibodies show hope in cancer therapy. He also stated that several monoclonal antibodies approved by the FDA, GEAC and DCGI can be utilized for cancer therapy.

Ruma Gosh (Indian Institute of Technology (IIT), Dharwad) spoke on 'Electronic sensors for prostate cancer biomarkers'. She shared her experience in the simple diagnosis of cancer by detecting carcinoembryonic antigen and cytokeratin fragment 19 (CYFRA 21-1) in saliva using electronic sensors. The developed prototype was tested on 14 live samples, and the predicted concentrations of carcinoembryonic antigen were found to be in excellent agreement with the commercially purchased

ELISA kit. Hopefully, this study will lead to the development of portable and easy-to-use point-of-care devices for detecting cancer biomarkers, which might subsequently lead to the early diagnosis of terminal diseases. Sudhanshu Shukla (IIT, Dharwad) spoke on 'LncRNAs as biomarkers and therapeutic target in prostate cancer'. Long non-coding RNAs (LncRNAs) have been increasingly recognized as potential biomarkers for various human diseases. Altered expression of many circulating LncRNAs, known to have a role in tumorigenesis and metastasis, has already been reported in prostate cancer patients. These LncRNAs modulate prostate cancer pathogenesis by modulating multiple genes, thus altering metabolic pathways. Sustained androgen receptor (AR) signalling is one such key feature of castration-resistant prostate cancer, a cancer stage that has an unmet need for accurate diagnostic and prognostic tools. Ankit Mathur (Bangalore Medical Services Trust (BMST)) spoke on 'Transplant immunology: techniques of human leukocyte antigen (HLA) cross match and tissue typing'. A detailed discussion of the methods used for HLA typing was held, and how HLA matching between potential donors and transplant candidates is determined by comparing their HLA antigens.

During the panel discussion, the moderators concluded that the discovery and clinical application of new urinary biomarkers is expected to play a vital role in redesigning life science research and the industry, thereby profoundly influencing the detection and treatment of many diseases and cancer. Further research on urine biomarkers will promote the early diagnosis, prevention, treatment and prognosis of a variety of diseases and provide strong support for translational and precision medicine.

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