Indian Journal of Biochemistry & Biophysics
Vol. 56, August 2019, pp. 333-335

MOLECULAR DIAGNOSTICS & THERAPEUTICS: Conference Report

Molecular diagnostics is a collection of techniques used to analyze biological markers in the genome and proteome—the individual's genetic code and their expression in cells. The increased demand for genetic and genomic information has led to the rapid expansion of molecular techniques within clinical laboratories. In this context, Department of Biochemistry, College of Medicine & JNM Hospital (COMJNMH), WBUHS, with Association of Clinical Biochemists of India (ACBI) organized a Symposium on "Molecular Diagnostics & Therapeutics" on June 21-22, 2019.

Inaugural program began with Saraswati Vandana followed by welcome address by Prof K. Mukhopadhya, Principal COMJNMH. Prof. Subir Kumar Das, HOD, Biochemistry, COMJNMH felicitated the dignitaries. Prof. L. M. Srivastava, President, ACBI had explained the objective and role of ACBI in the field of clinical biochemistry. Prof. P K Mitra, Hon'ble Director of Medical Education, Govt of West Bengal, urged for development of early predictive markers to identify disease progression. Prof Saumitra Das, Hon'ble Director, National Institute of Biomedical Genomics (NIBMG), Kalyani had elaborated the need of integration of basic science with medicine. Prof. Sankar Ghosh, Hon'ble Vice Chancellor, University of Kalyani further emphasized on the development of education hub at Kalyani integrating every discipline. Prof. Rajen Pandey, Hon'ble Vice Chancellor of the West Bengal University of Health Sciences (WBUHS) had suggested in developing excellence in academics and research for healthcare within the frame work of ethical guidelines.

In Scientific session, Prof Sourav Pal, Hon'ble Director, IISER, Kolkata, focused on integration of different disciplines of education is involved in the development of better world. Prof. Saumitra Das, Hon'ble Director, NIBMG elaborated the biology of Hepatitis C virus for the past two decades.

Prof. Sankar Ghosh, Hon'ble Vice Chancellor of University of Kalyani discussed the role of plasma circulating nucleic acids or cell-free nucleic acids (cf-NA) as a promising, less-invasive tool for early detection and monitoring of several human diseases including cancer, stroke, trauma, MI, autoimmune disorders, and pregnancy-associated complications. Dr. Mriganka Mouli Saha from COMJNMH, WBUHS, Kalyani showed the application of cell free fetal DNA (cffDNA) with total cell free DNA (cf-DNA) in maternal serum in predicting preeclampsia and IUGR.

Among various types of nanomaterials, semiconductor nanocrystals or quantum dots have found myriads of diverse applications. The simplest biofunctionalization of nanocrystals can be achieved using of bioactive thiols such as cysteine, glutathione, thioglycollic acid etc. as capping agent. Prof. Abhijit Saha, Centre Director, UGC-DAE-CSR, Kolkata presented some selective facile techniques using soft chemical and radiation chemical approaches to synthesize good quality colloidal nanocrystals. Prof. A. S. Ghosh from IIT, Kharagpur has inferred that copper nanoparticles (CuNPs has the ability to kill bacteria by arresting cell division; while thiol-stabilized CuNPs and biosurfactin stabilized silver nanoparticles serve as good candidates for inhibiting bacterial population.

Prof. Maitree Bhattacharyya, Director, JBNSTS, had explained that correlation among oxidative stress, autophagy markers and insulin resistance may provide an understanding of the molecular mechanism for the development of new therapeutic strategy for Type 2 diabetes mellitus. Dr. Priyadarshi Basu from NIBMG identified the NAFLD-initiating molecular changes including increased fatty acid import, development of cellular stress, and activation of PI3K-AKT pathway in the early stages of disease spectrum. Prof Suman Kapur from BITS-Pilani, Hyderabad showed a significant increase in urinary gallic acid concentration in obese subjects in comparison to normal and overweight subjects.

Dr. Amit Kunwar, from BARC, Mumbai showed that 3,3′-diselenodipropionic acid (DSePA), a selenocystine derivative prevent radiation pneumonitis through intraperitoneal route and also can retain its activity through oral route. The anti-pneumonitic effect of DSePA was attributed to the lowering of PMN-induced oxidants, maintenance of glutathione peroxidase activity and subsequent suppression of NF-kB/IL-17/G-CSF/neutrophil axis in the lung of irradiated mice.

Dr. Sandeep Singh from NIBMG, Kalyani showed that the oral tumor cells were phenotypically divergent and exhibited distinct cellular properties of cell proliferation, invasion and drug resistance. Dr. Sutapa Mukherjee from Chittaranjan National Cancer Institute, Kolkata concluded that reversal of acquired chemoresistance by phenethyl isothiocyanate targeted aurora kinases potentiated breast cancer cells towards paclitaxel induced apoptosis. Dr. Pritha Ray from ACTREC, Mumbai revealed the crucial role of IGF1R signaling in promotion of chemoresistance and metastasis in epithelial ovarian cancer cells. Dr. Abhijit De from Tata Memorial Centre, Navi Mumbai had suggested that future drug design or screen strategy should aim at STAT3 pathway to completely abrogate the oncogenic function of STAT3.

Dr. Kartiki V. Desai, NIBMG, Kalyani discussed the use of genomic data to identify potential targets, studying their biology and to find potential gene based signatures that could be prognostic, (or even better) and predictive of treatment response. Dr. Ashwin Dalal from the CDFD, Hyderabad discussed on Next Generation Sequencing in diagnosis of genetic disorders.

NuRD, an ATP-dependent chromatin remodeling complex, regulates epigenetic architecture and cellular identity. Dr. Amitava Sengupta from CSIR-IICB reported that *MBD3* loss in human primary acute myeloid leukemia is associated with leukemic NuRD. However, loss of specific subunits of NuRD complex in human primary AML cells associates with nucleation of neo-oncogenic chromatin remodelers, which augments Rac GTPase signaling and survival of AML cells.

The blood brain barrier (BBB) is the major challenge for glioma treatment. Dr. M.K. Ghosh from CSIR-IICB, encapsulated indole derivative 3,3′-diindolylmethane in PLGA nanoparticles and tagged with novel peptide designed against SSTR2 receptor on its surface for targeted delivery to the tumor site by crossing BBB.

Dr. Rituparna Sinha Roy from IISER, Kolkata have engineered protease-stabilized facial lipopeptides for intracellular delivery of siRNA in functional form for breast cancer treatment by gene silencing in MAPK/ERK signaling pathway. They have also designed ionophore gramicidin inspired peptides encapsulated doxorubicin as 2 in 1 cancer nanotherapeutics.

While Dr. Indranil Halder from COMJNMH, Kalyani had discussed on Molecular Diagnosis of Tuberculosis, Dr. Bhaswati Pandit from NIBMG, Kalyani, suggested that plasma cytokines and chemokines could be used as immunological markers for diagnosing the disease and monitoring effective anti-tuberculosis therapy.

miRNAs have emerged as important diagnostic biomarkers for a host of diseases including cancer. Dr. Partho Sarothi Ray from IISER, Kolkata had shown that the time-dependent biphasic expression of miR-125b, an oncomiR, contributes to the pulsatile expression of p53 in response to DNA damage. Dr. Neelam Shirsat from ACTREC, Mumbai had identified several miRNAs associated with medulloblastoma. Expression of these miRNAs brings about reduction in malignant potential of medulloblastoma cells, by reducing anchorage-independent growth and/or invasion potential and thus has therapeutic potential. She also studied circulating miRNAs in sera from prostate cancer patients for early detection and during follow-up of the patients in the course of treatment in addition to PSA.

Dr. Malancha Ta from IISER, Kolkata investigated the impact of physiological fever-like temperature on Wharton's jelly-derived mesenchymal stem cells (WJ-MSCs) and concluded that NF-kB pathway might be playing an active role in determining the thermosensitivity of WJ-MSCs under febrile temperature condition.

Dr. Snehasikta Swarnakar from CSIR-IICB, found that the increased activity of MMP-3 and -9 with disease progression in human. Ectopic tissues from stages III and IV human endometriosis patients showed increase in MMP-13 and MMP-7 activity as compared to non endometriotic individual. MMP-7 upregulation is associated to endothelial-to-mesenchymal transition through EGFR-ERK1-AP1 signaling pathway thereby accelerating endometriosis progression to late stage. Furthermore, epidermal growth factor receptor (EGFR) is required for MMP7 upregulation. Dr. A.V.S.S. Narayana Rao from BARC attempted towards developing a method for determining the EGFR gene status. Dr. Radhakrishnan R Nair from Rajiv Gandhi Centre for Biotechnology (RGCB), Trivandrum, has analyzed over 1000 patients with Chronic Myeloid Leukemia, undergoing therapy by tyrosine kinase inhibitors (TKIs), and monitored treatment response using quantitative reverse transcriptase polymerase chain reaction (qrtPCR) with a simple blood draw.

Prof. S. P. Dandekar, showed potent anticancer activity of honey against cervical cancer cells. Dr. K Indira Priyadarsini from BARC, explained the unique biological activities of curcumin due to three important functional groups: an aromatic o-methoxy phenolic group, α, β –unsaturated diketo moiety and a seven carbon linker. New analogues with modifications on both o-methixy group and the diketo structures of curcumin have been developed to

overcome the properties limiting its potential due to low bioavailability and fast degradation.

Dr. Sudip Kumar Datta from AIIMS, New Delhi showed that two important genes are activated by vit D are Nrf2 and the anti-ageing gene Klotho, both of which have multiple roles in maintaining the integrity of cellular signalling systems. Vitamin D, by binding to the Vitamin D receptor, also activates target genes including calcium binding protein calbindin-D proteins, which plays a crucial role in the intestinal absorption of calcium.

Finally to aware of the statistical issues in relation to these tests, Dr. Avijit Hazra from IPGMER, Kolkata discussed the pitfalls, beyond those associated with statistical calculations, in the evaluation of diagnostic tests.

Approximately 150 students, researchers, scientists and faculty members from various parts of India attended and actively participated in this program. The symposium was supported by the CSIR, DAE-BRNS, DBT, Immunology Foundation and MCI. Dr. Tanmay Saha and Dr. Mrityunjoy Halder compered the entire program. The symposium ended with vote of thanks.

Subir Kumar Das
Professor & Head
Department of Biochemistry
College of Medicine & JNM Hospital
The West Bengal University of Health Sciences
Kalyani, West Bengal- 700 064, Kolkata, India