Identifying new targets in leukemogenesis using computational approaches

Kaiser Jamil
Bhagwan Mahavir Medical Research Centre, India

Acute Lymphoblastic Leukemia (ALL) is a hematopoietic cancer predominant in children and involves many aberrant pathways. There is a need to identify novel targets to improve our understanding of disease biology and for developing new therapeutics. Hence, the aim of our study was to uncover new genes as targets using \textit{in silico} approaches. We first analyzed Oncomine microarray database to profile the top 10\% overexpressed genes of significance. These were then prioritized using ENDEAVOUR, DIR and TOPPGene online tools to identify novel candidate disease genes. Thirty training genes, overexpressed in ALL were retrieved from PubMed literature search to train the tools. Further, the functional association networking of the prioritized and training genes was investigated using STRING protein interaction database. The network was then analysed using cytoHubba tool to identify highly connected hub genes. From our analysis of Oncomine database, 530 genes were shortlisted which on prioritization revealed fifty four genes to be significant candidate leukemogenic genes. Our hub analysis of the protein network led to identification of two novel genes, \textit{SMAD2} and \textit{CDK9}, which were not implicated in leukemogenesis earlier. Filtering out from several hundred genes in the network we also found \textit{MEN1}, \textit{HDAC1} and \textit{LCK} genes to be important hubs, which re-emphasized their important role in leukemogenesis. This is the first report on these five additional signature genes in leukemogenesis. Our findings suggest that these genes could serve as new targets for developing novel therapeutics and also as biomarkers in leukemogenesis, which could be important for prognosis and diagnosis.

Biography

Kaiser Jamil, is a distinguished Scientist, having worked in 4 renowned Institutions like IICT, CCMB (both premier Institutes of CSIR), University of Sydney (Australia) and at University of Paris (France). During her career as an active researcher, head of Biology and Biotechnology division of IICT, she established multidisciplinary research in biology and expanded into newer areas of R&D. She has published more than 200 papers in peer reviewed journals of repute. She joined CCMB (1971), working on Ultrastructure and Biochemistry of mammalian reproduction, later in 1982 she moved to IICT as Head of Biology and biotechnology division and handled International Projects from TNO (Netherlands) and Commonwealth Science Council (UK), and went on to establish a Regulatory Toxicology Lab and set up an Electron Microscopy lab. After her superannuation from IICT, she was awarded Emeritus Scientist by CSIR-(till 2005), continued her research, at Genetics Department, Mahavir Hospital and Research Center, as HOD. She then became Research Director of Indo-American Cancer Research Institute (2006-2008) and established a Cancer Biology Lab and Stem Cells lab, and continued her work in Cancer biology. Presently she is engaged in Cancer Biology Projects with an aim to discover Cancer Biomarkers. She has patented her work on Cancer Prognosis- ‘Possible Outcomes in Multi-Factored Diseases’ US patent (2104/CHE/2009), besides several other patents from IICT. She is presently (from 2009- till date), Dean and Honorary Professor for the Centre of Biotechnology and Bioinformatics at Jawaharlal Nehru Institute of Advanced Studies (JNIAS) Hyderabad and has established Biotechnology, Molecular Biology and Bioinformatics Centre at JNIAS, besides her additional charge at Mahavir Hospital and Research Centre, as HOD genetics department. Awards and Honors: she is a life member and Fellow of several Academies, Scientific Associations in which she is holding executive positions, She was one of the top 20 Scientists of the country to be honored with the Award of “Modern Medicare” for her work in cancer research in the area of Pharmacogenomics. She has been a Task force member in committee’s at the Department of Biotechnology (DBT)- Govt. of India, and ONES, New Delhi and Advisor at Union Public Service Commission (UPSC)- Govt. of India- New Delhi Recently she was honored with the Lupin Visiting Fellowship Award by IICT- Mumbai- Jan2011, and received Distinguished Scientist Award from Pentagram Research Centre in Feb 2012 and was honored as FELLOW of EMI at July2012. She is the first woman from India to be elected as President of Third World Organization of Women In Science- OWSD- (TWOWS) with its headquarters in Trieste- Italy which she served from 2005-2010, with a National Chapter of TWOWS for Indian women.

kj.bmmrc@gmail.com