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Targeted drug therapies

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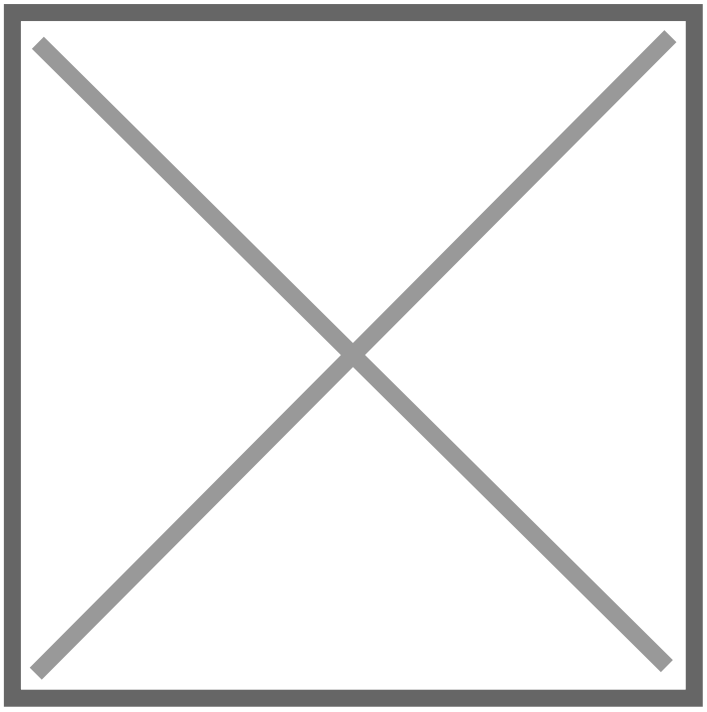
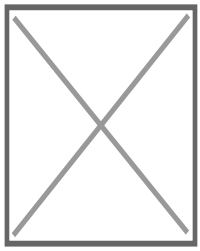
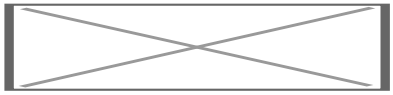




Dr Shireen Vali, CSO, CellWorks Group



CellWorks, one of the fast growing companies in India, was recently awarded the Emerging Company of the Year 2011 award for outstanding contribution to the field of bioinformatics and systems biology sector by the Government of Karnataka. Spearheading the research division of this organization is Dr Shireen Vali, who co-founded the company with her husband, Mr Tahir Abbasi, and Mr Pradeep Fernandes.

Following her graduation from Osmania University, Dr Vali went to the US where she carried out preliminary research work in the City of Hope National Medical Center, California. Dr Vali then received her PhD in neurobiology from the University of California and since then she has been actively involved in elucidating the pathways involved in various diseases. Her post-doctoral work at Stanford University focused on cystic fibrosis following which she worked in the field of cancer biomarkers.

Dr Vali came back to India in 2003 and joined the Institute of Bioinformatics and Applied Biotechnology (IBAB) as a faculty member. It was here that the idea for CellWorks was incubated.

Dr Vali's research interests mirror those of the organization's, which consist of elucidating pathways involved in complex diseases and using systems biology to create disease models that can then be used to design targeted drug therapies akin to personalized medicine.

Dr Vali has worked towards setting up co-culture systems of various disorders, such as rheumatoid arthritis, cancer and wound healing consisting of systems involving over eight cell types, including osteolclasts, T cells, endothelial cells, epithelial cells macrophages and dendritic cells.

On the approach they have adopted in discovering drug therapies, Dr Vali says, "We carry out retrospective validations with data that is existing but has not been used to build or align the systems and also, prospective validations with global collaborators, who have tested their predictions."

Focus on rheumatoid arthritis has yielded two combination drugs, one of which has completed animal trials and the other is entering the preclinical stage. Cancer, a multiphenotypic disorder presents a major challenge, one that is tackled in a unique manner, explains Dr Vali.

“We have enabled the co-culture systems to incorporate all the components such as angiogenesis and metastasis by using the cellular models in the tumor system. Focusing on specific cancer types, which are epithelial in origin, we profile the tumor based on the key mutations and these mutations are overlaid on the system to generate a dynamic tumor state, which matches in terms of mutations with those found in certain cell lines. Based on the different types of mutations, the tumor has differential sensitivity to different drugs and using this information we are able to customize the drug profile for a patient or a group of patients,” says Dr Vali.

Collaborations with different institutions, such as Astra Zeneca, City of Hope San Diego, University of Cancer UK and National Institute of Singapore, have resulted in many publications in reputed journals. One study carried out in collaboration with National Institute of Mental Health and Neuro Sciences, Bangalore studied the effect of curcumin for treatment of Parkinson’s using a virtual dopaminergic neuron consisting of astrocytes and microglia, which helped ascertain the effects of curcumin. This system gave many insights on how to correlate the effect of curcumin.

Talking about the road ahead, she says, “In the next five years, I would like some of our drug combinations to be in the later phases of clinical trials. It is an aggressive strategy, but one which will help us get therapies out in the market as soon as possible to help the people suffering from these diseases.”

— **Manasi Vaidya** in Bangalore