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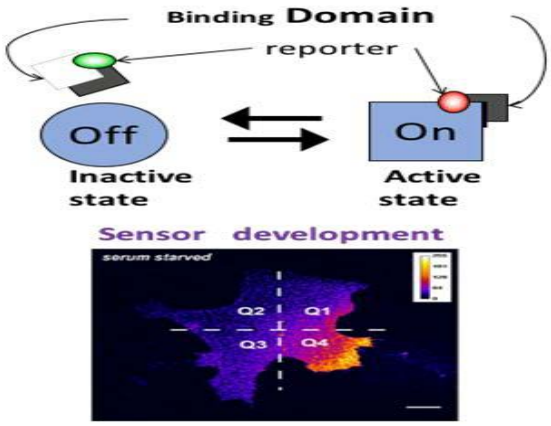
Sensing Molecules in Action inside Cells using Biosensor



Mukherjee *et al.*, *eLife*, 2020

Dr. Akash Gulyani and his team working on 'Probing cellular dynamics and neural regeneration' at the Institute for Stem Cell Science and Regenerative Medicine (inStem), an autonomus institute of the Department of Biotechnology, Govt. of India, has engineered a molecular probe (small DNA or RNA segments that allow identification and isolation of specific sequences from an organism) which can be visualised using microscopy. It has shown with remarkable specificity that how a protein called Fyn functions in live cells. The results have been published in a reputed peer-reviewed open access scientific journal *eLife* (Mukherjee et al., 2020, eLife).

The Fyn protein is involved in control of cell growth, and it remains crucial at understanding of cancer development. This protein is hyperactive in multiple cancers. The '*Fyn Sensor*' developed at Dr. Gulyani's laboratory has opened up a possibility of tracking Fyn in healthy and cancer cells and has provided huge insight into multiple aspects of cancer growth. Novel sensor such as the Fyn Sensor also finds application in the research for therapeutics that can block Fyn activity and possibly provide novel cancer treatment.

As we know that multiple parts in a machine operate together in synchronisation for generation of efficient output, and molecules inside our cells also function in pretty much similar manner. Molecules form small to large complexes with different partners in cells of tissues and organs in

our bodies which function in sync. What makes this machinery more complex is that these molecules typically reside in different compartments of the cells. It has remained as a mystery to cell biologists that how does these similar complexes, involving differing partners, control different functions and behaviour in cell. Also, providing any demonstration of such events has been challenging due to absence of probes (sensors) that can track and establish the location of molecules of interest, which act as a part of such functional complexes.

Many research groups are working on the aspects of locating or identifying the location of active protein complexes within a cell. The molecular probe 'FynSensor' engineered at Dr. Gulyani's laboratory is indeed a pivotal step forward in tracking the location of active molecules of interest inside the cell. The biosensors help in tracking specific changes in living systems simply by producing a signal upon detecting an activity. Engineering of such sensors are significant in development of therapeutics for cancer.

Dr. Bilqeesa Bhat
Project Scientist,
bhat.bilqeesa3000@gmail.com

Contact person:
Dr. Apurva, inStem, Bangaluru
E-mail: sarina@instem.res.in