Adventures pay off for science institute

Risk-taking, teamwork help 3-year-old unit create waves in new field of cell mechanics

It comprises a 220-strong group of experts including engineers, physicists, chemists and biologists working in an open lab environment, equipped with more than 20 of the world’s most powerful microscopes to dissect the workings of the cell at a molecular level.

Mechanobiology is the understanding of biology from the perspective of mechanics. Movement is essential for every aspect of life – from forming embryonic tissue to the constant renewal of the intestine lining.

Stem cells, for instance, can become any cell the body needs, but what they actually transform into depends on the physical properties of their environment. If they are on soft surfaces, for example, they become nerve cells. If they are on hard surfaces, they become bone cells.

Knowledge of cell mechanics has been the missing link holding back the understanding of how genes and proteins interact, how diseases happen and how to prevent or treat them.

MBI deputy director G.V. Sivashankar explains: “Cells are not committed in a hard-wired way. They interact mechanically as well as chemically, and we still know woefully little about these mechanical processes which rely on force, shape and size parameters, not just chemistry.”

Over the last three years we have gained an enormous advantage in being able to understand the basic and physical aspects of cells and diseases.”

Such work challenges in an environment that tolerates failure and encourages risk-taking, stresses Prof Sheetz.

He encourages scientists and students to do what he calls a “Friday afternoon experiment” – an idea which has a very low chance of succeeding, but could be a major success if it works.

“They can spend most of their time on the safe experiments, an investment that will almost always by nature have a lower yield.”

“But Friday afternoons are for taking risks and going for a beer afterwards.”