

## HEALTH AND LIFE SCIENCES

# Breaking barriers

**Nano particles and silicon chips will revolutionise health care**

By Jacob P. Koshy

**Y**et again, nanotechnology takes centre stage. This time it is designer drugs and recalcitrant genes. Sheetal Soni, a researcher at Delhi University, has developed hydrogel nano particles capable of penetrating the Blood Brain Barrier (BBB). The BBB is an extremely dense layer of endothelial cells that prevent foreign bodies from reaching the most-sensitive areas of the brain. It also blocks drugs that target brain tumours, Alzheimer's, epilepsy, stroke and Parkinson's disease. Worse, these drugs, which bounce off the BBB, may move on to target the wrong genes and cause side-effects.

Thanks to Sheetal and her research guide Dr Amarnath Maitra, it is possible to encapsulate the drug in nano particles, nearly 1,000 times smaller than present-day drugs, and tunnel them through the nanoscopic crevices in the endothelium. "Using particles

to penetrate the barrier is not new," says Sheetal, "but the particles we have developed are non-toxic, work well in hydrophilic and hydrophobic media, and are bio-degradable."

"As of now, the conventional methods to get through the BBB are brain surgery or intravenous means, which are both risky and expensive," says Sheetal. Now it is possible to do away with them, and use drugs.

However, even though the nano particles are able to penetrate the BBB, they are not able to stay long enough within the brain, to work effectively enough. "This property is called efflux," says Sheetal, "and we are working in that direction—on how to increase the nano particles' retentive abilities."

Hydrogel nano particles are also being tested for possible side-effects. *The American Journal of Drug Delivery* and the UK-based *Journal of Drug Targeting* have published Sheetal's work.



**Health check:** The Silicon Locket

Another breakthrough in health care is a portable device which can continuously monitor ECG without being intrusive. Developed by IIT, Mumbai and Tata Consultancy Services, the wearable device, called Silicon Locket, can monitor, record and store ECG signals. The signals can later be downloaded to the patient's computer and transferred to a remote doctor's computer or medical database. If there is any abnormality in the patient's ECG, the locket will automatically connect to a mobile and SMS the doctor.

"Currently, trials are being conducted with the Silicon Locket and it will soon be available commercially," said Dr V. Ramagopal Rao of IIT, Mumbai. The indigenously developed patient-monitoring device costs only one-fourth the price of the imported ones. ■



## Silicon to fight cancer

**A**biotech firm, Polyclone Bioservices, has developed a diagnostic tool based on microarray technology for detection of cancer-related diseases. A microarray, also known as biochip, is collection of microscopic genes on glass or a silicon chip.

The Bangalore-based firm has identified thousands of genes responsible for cancer. They have also analysed how genes function at different stages of tumour and how they respond

to treatment. The company has put these genes on a biochip, which can be used as a reference tool for diagnosing different types of cancer.

Polyclone will develop biochips for three types of cancer—oral, leukaemia and cervical. "They are precise as they focus on molecular level," says Naveen Kulkarni, CEO, Polyclone Bioservices, who started the biotech firm about a year ago.

So far, biochips have been used for research and drug discovery. It is perhaps for the first time that a company is bringing biochips as a diagnostic tool at hospitals and pathological labs within a year.