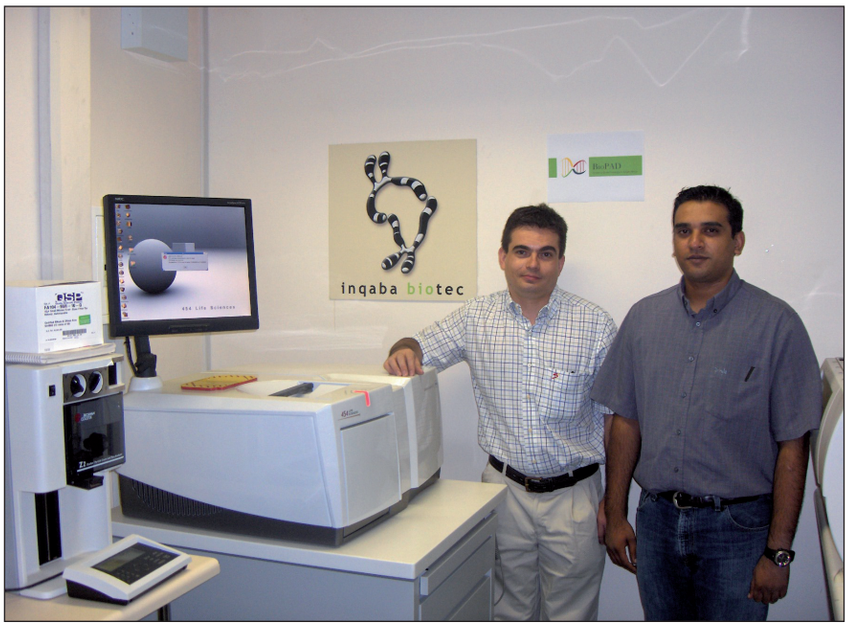
SA'S GENETICISTS TO ACCESS REVOLUTIONARY TECHNOLOGY



Dr Oliver Preisig (left), CEO inqaba biotec, and Arshad Ismail, GS Manager, inqaba biotec.

A cutting-edge 'genome sequencer', the first of its kind in Africa, was set up in Pretoria this March, slashing vital research result times from a year to 2 days and helping local scientists pinpoint causes for dangerous drug resistances such as in TB.

It may well contribute to solving the enduring enigma of the XDR TB outbreak at Tugela Ferry in KwaZulu-Natal last year when XDR cases uniquely outnumbered MDR cases – with nation-wide implications for vital TB prevention.

The R6 million high-tech instrument will almost certainly save lives by providing new avenues for diagnostic advances in medicine and biotechnology, according to Dr Oliver Preisig, CEO of the private South African genomics company inqaba biotec (www.inqababiotec.co.za).

For example, it can sequence the whole genome of various TB strains, enabling researchers to pinpoint which difference is responsible for the new phenotype creating the antibiotic resistance. Using this information, scientists can design a simple diagnostics test that can be used in the laboratory to identify the TB strain, enabling them either to develop or use more accurate, appropriate and effective antibiotics.

Solves 'enduring mysteries'

It may well contribute to solving the enduring enigma of the XDR TB outbreak at Tugela Ferry in KwaZulu-Natal last year when XDR cases uniquely outnumbered MDR cases – with nation-wide implications for vital TB prevention.

Besides the speed with which local geneticists can now look forward to results (the current 'GS20' system will be upgraded to the more powerful GS FLX later this month, reducing the genome sequencing of a bacterium from a week to 2 days), the new equipment will cut costs from on average R1.5 million per genome to R200 000.

Genome sequencing can show a predisposition to a variety of illnesses, including breast cancer, disorders of haemostasis and liver disease and was previously only done at large sequencing centres overseas, taking more than a year.

Preisig said local universities, the CSIR and the MRC were showing 'great interest'.

'We're not here to make money with this sequencer – the exposure is much more important for us, though obviously it needs to be sustainable and carry the costs of insurance, maintenance, involved personnel and repeats of failed runs,' he said.

Inqaba biotec has teamed up with BioPAD (Department of Science and Technology), a state-funded biotechnology trust aimed at brokering partnerships to help South Africa obtain an effective mix of technical and business expertise in biotechnology and benefit the entire region. Preisig said the machine was able to look for mutations, say from cancer cells, at uniquely low percentages of occurrence.

Going 'deeper' than ever before

Until recently traditional sequencers based on the Sanger method were only able to look for mutations occurring at a frequency of above 20%. The new genome sequencer can probe 'ultra deep' to frequencies of as low as 5%. 'At the end of the day, what you get out of it is simply amazing,' Preisig said.

Since the first genome sequencer was installed in March this year, inqaba biotec had sequenced the genome of a plant pathogenic bacterium and at the time of writing had mycoplasma, thermophilic bacterial and a viral (veterinary) genome lined up.

'Because we're a private company with links to all the universities as a service provider, each institution can use us, rather than compete against one another with individual machines,' he added.

Genome sequencing can show a predisposition to a variety of illnesses, including breast cancer, disorders of haemostasis and liver disease and was previously only done at large sequencing centres overseas, taking more than a year. The local machine can perform sequencing runs more than 60 times faster than conventional commercially available platforms.

A counter to rapid disease spread

Asked why speed was so important, Preisig said that with today's mobility having shrunk the globe, it was easier for new strains of pathogens, such as drug-resistant TB, to 'wreak havoc' in a much shorter time.

'The ability to sequence a whole genome at reasonable cost means that causes for drug resistance can be pinpointed easily,' he added. The technology's sensitivity in detecting rare cell mutations also promotes the possibility of much earlier cancer identification.

Comparing the genome sequences of two or more individuals of the same species can also provide clues to the reason for difference and explain why one individual is more prone to a disease than another. The GS technology can provide many more genome sequences to compare with one another and find 'differences that matter'.

Said Preisig: 'If we look back, we can analyse DNA from fossils with the aim of resolving evolutionary questions like the current groundbreaking discoveries with regard to sequencing of the Neanderthal.' The company's name *inqaba* means 'rare and precious' in Xhosa. It was initiated and funded by a handful of scientists from South Africa, the USA, Germany and Switzerland.

Preisig, who is Swiss-born, said a Swiss government loan aimed at facilitating investments in developing and emerging countries played a 'crucial part' in the start-up years of the company.

Chris Bateman