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PathGEN chip can detect more than 70,000 microbes

August 27, 2013 | Analysis | By BioSpectrum Bureau



Dr Christopher Wong, founder and director, PathGEN Dx, Singapore, has dedicated his research to studying genomics since 2001 when he joined A*Star's Genomics Institute of Singapore (GIS) under mentor of eminent scientist Dr Edison Liu. During his research in GIS, Dr Wong worked on a niche avenue of genomics-based diagnostic tools and fostered academic and industrial collaboration to develop technology and products for diagnostics, prognostics and theranostics in the fields of cancer and infectious diseases.

As the chief scientific officer of biomarker development division at Genome Institute of Singapore, Dr Wong spearheaded many projects that elevated genomics research to be more patient centric and oriented towards detection of diseases. He, along with his team, demonstrated that genomic transcription signatures can be used for diagnostic, prognostic and therapeutic predictions for diseases such as breast cancer.

Dr Wong's efforts have always been focused on taking genomics research out of intensive laboratory studies and enable it be optimally utilized in the healthcare system so that it can be used to manage diseases. Dr Wong, who had a zeal to create a platform that had direct utilization of detecting diseases in hospital pathology laboratories, developed a pathogen chip called PATHChip that can detect more than 50,000 virus and 20,000 bacteria genomes from patient samples in one test. This technology led Dr Wong to form his company, PathGEN Dx, in 2011.

"Infectious diseases due to viral and bacterial pathogens are the single most important cause of death in children, as well as a considerable contributing factor in adult death and morbidity. Leveraging on genomics for pathogen detection, PathGEN Dx has developed a kit for comprehensive detection of pathogens in a single reaction. Unfortunately, clinical features and current laboratory methods do not readily identify the etiologic agent, a deficiency with the potential for misdiagnosis, mistreatment, overuse of antibiotics and the rapid spread of infectious disease. PathGEN Dx was formed to address the need for improved diagnosis in order to enable selection of the best therapeutic options for patients," added Dr Wong.

PathGEN PathChip Kit is designed to be used in private laboratories, research institutions, contract research organizations (CROs) and pharmaceutical companies, where test results would be useful in rapidly driving laboratory research and research findings would lead to clinical applications and interventions. PathChip Kit comprises proprietary reagents, a custom GeneChip and automated software that detects the presence of more than 70,000 viruses and bacteria from a wide variety of human samples and provides a report on co-infecting pathogens within two days. The chip uses a novel amplification methodology that enables efficient amplification of a large set of pathogens simultaneously in one PCR reaction and can also amplify unknown or novel pathogens with a high rate of success.

Highlighting the plans for expanding the reach of pathogen chip, Pathgen Dx aims to develop and commercialize rapid turn-around diagnostics for the comprehensive detection of clinically relevant pathogens for the global healthcare community. Dr Wong is also looking ahead to work with bio-engineers to adapt this technology to miniaturized fluidics systems with the goal of producing a rapid diagnostic device for use at home or clinic.

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"The objective is to take the disease detection chip to large number of hospitals in and outside Asia. We are in process of building partnership with experienced distribution channels in the US, Europe and Asia Pacific as well as our own strong sales team," Dr Wong mentioned.

Having developed a molecular diagnostic kit, Dr Wong is now exploring relations with potential investors that will help the home-grown company to expand its R&D avenues and initiate registration processes in different geographies. Dr Wong believes in having a good relationship with the industry in order to enable a laboratory enclosed research to get adopted for large scale utilization.

Affymetrix analysed the potential of Dr Wong's genomics-based diagnostic chip and decided to partner with PathGEN Dx in 2012 for production. Having set a channel to get closer to the market, PathGEN kit is comprised of proprietary reagents, an automated software package, and a contract manufactured GeneChip microarray from Affymetrix. The product is designed to detect viral and bacterial genomes from a wide variety of human samples, annotate the genomic information and identify co-infecting pathogens.

Between 2011 and 2012, Dr Wong was granted $111,313 (S$142,582) for developing the chip that can detect protein, RNA and DNA targets simultaneously in a single chip for infectious disease diagnostics and prognostics and $184,172 (S$235,906) for validation of the chip. The next step, according to Dr Wong, is to get FDA approval for a wider adoption of the technology in a number of countries, particularly in public health laboratories, universities, hospitals and pathology labs. The company is courting venture capital (VC) firms to fund clinical trials for an anticipated FDA submission.