

HistoIndex finds success with laser-based liver disease and cancer detectors

| BY AMY TAN |

Dr Gideon Ho, CEO of HistoIndex, has always thought of his work as something out of the science-fiction series *Star Trek*. This is because his medical diagnostics company offers a laser-based scanner that takes the guesswork out of detecting liver diseases.

Liver fibrosis is usually the result of an underlying disease such as Hepatitis B and refers to the accumulation of tough and fibrous scar tissue in the liver. The human body forms scar tissue in response to an injury but, in the case of fibrosis, the healing process generates too much of it and disrupts the liver's ability to function.

"The current gold standard for determining the extent of liver disease is a biopsy where a tissue sample only one-cell thick is extracted from the body," explains Ho. The cell is then stained with chemical dyes and examined under a microscope by a pathologist. "The microscope has been used for the last 50 years and there has been no advancement in technology in this area," he says.

The dyes are taken up by different cells and allows for a visual contrast that will inform a pathologist's diagnosis. The problem with this method is that the discrepancy in diagnoses is very high, with different staining techniques and solutions leading to different visual results. "Pathologists usually rely on their years of experience but all this can be very subjective. An uncertain opinion is the worst kind of opinion you can get," observes Ho.

Breaking new ground

Since his days as a scientist with A*STAR's Institute of Biotechnology and Nanotechnology (IBN), Ho and a team of medical researchers have been looking for ways to help pathologists make more accurate diagnoses. The breakthrough came when they discovered a stain-free approach called Genesis 100 that uses an infrared laser beam to pass through the tissue sample to determine its level of health.

As the tissue sample is analysed by the laser, a quantitative report is generated in real-time on a computer monitor screen. This report includes a high-resolution map of healthy versus non-healthy tissue, with a cell-by-cell analysis to give an objective diagnosis. This technology is also groundbreaking because of the speed with which a diagnostic report can be produced. Results can be obtained in a matter of minutes compared to the hours and sometimes days that a traditional biopsy would take. In addition, the technology also provides a prognosis so that patients know what will happen to them in the future while their treatments can be better tailored to address their needs.

This method was patented by IBN in 2006 and licensed to HistoIndex



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for commercialisation. Together with co-founder Dean Tai, who was also a scientist with A*STAR, Ho founded HistoIndex in 2010. Four years before the company was formed, Ho and Tai spent their time making prototypes of the Genesis 100 and validating it on animals and, subsequently, humans.

One of the earliest challenges they faced was the search for the right manufacturer to produce the machine for them. "Building the Genesis 100 was not easy because it's the world's first fully automated, quantitative, 3-D digital pathology system and no one had ever seen one, let alone built one, before," says Ho.

Thus, HistoIndex required a manufacturer who had expertise in the area of laser optics and a lot of patience as it involved much iteration. "We tried using a local manufacturer and they basically produced scrap metal for us, so we had to go to Ireland where some of the best lasers and optics in the world are produced," he says. According to Ho, the laser is the most critical component. "You need a powerful laser to collect the information from the cell but it can't be so strong that it burns the tissue."

For this innovative technology, HistoIndex succeeded in getting a \$1 million grant from A*STAR and another \$1 million from angel investors such as Koh Boon Hwee. Under SPRING's Startup Enterprise Development Scheme (SEEDS), HistoIndex received an additional dollar-to-dollar match of what it received from its angel investors. "When we were starting HistoIndex, Dean and I always joked that we could write a book because we had maxed out the amount of government funding a start-up can receive," says Ho.

After developing the Genesis 100 prototype, HistoIndex put the system through clinical validation and con-

ducted multi-centre trials. Ho and Tai also brought a team of 40 key opinion leaders comprising doctors, researchers and clinicians on board. "We work with them intimately because this cannot be done in a silo. You really need to understand the needs of the clinicians and doctors," says Ho.

Working with these experts was one of the main reasons why HistoIndex was able to tackle the regulatory hurdles to obtain approvals from the relevant authorities in its target markets. Genesis 100 is also patented in the US, Japan, Singapore, the UK, Germany and France, which are the company's major markets. HistoIndex also has the trademark and copyrights to the software that Genesis 100 runs on.

The Genesis 100 has a price tag of €330,000 (\$570,710) and is being sold to research institutes, hospitals, contract research organisations and universities. With increasing demand for Genesis 100, HistoIndex imported the technological know-how from Ireland to Singapore some one-and-a-half years ago. "It is more cost-efficient to manufacture Genesis in Singapore," says Ho.

Desired results

This machine was so well-received that HistoIndex recently created a second version called the Genesis 200. The latter has morphed in such a way that it now caters to all kinds of organs (not just the liver) and also helps in diagnosing cancer. The Genesis 200 costs the same as the Genesis 100 and is currently the company's most popular product.

Ho highlights that one of the main reasons why the company decided to sell both machines at the same price is to enable customers who already own the Genesis 100 to do a direct swap for the Genesis 200. "The Genesis 100 is a huge capital investment, people don't change these machines very often, so, we have to give them a big incentive to [get the new machine]."

To help out those who may not be able to afford the Genesis, HistoIndex has introduced a fee-for-service model as a source of revenue. Through this model, clients can enlist HistoIndex's services to scan and issue reports on specific tissue samples. On average, it costs between US\$200 and US\$250 to scan a slide

of tissue while analysis of the results comes at an extra charge of about US\$100 per slide.

"The fee-for-service model makes our technology available to customers who do not want to make such a major capital investments. At the same time, it enables us to push the adoption of our technology into the multi-organ fibrosis and cancer markets," he says. Ho believes that the fee-for-service model will continue to grow and make up 50% of the company's revenue in the near future.

Within two years of HistoIndex's incorporation, the company recorded more than \$1 million in annual revenue. This year, Ho expects more than 50% growth in revenues. "It's quite a big thing for the company to cross the \$1 million mark for our revenue. Currently, 90% of our revenue comes from equipment and 10% from our fee-for-service model," reveals Ho.

He believes that the reason the company has been able to sell its technology so well is because of his and Tai's background in bioengineering and their ability to converse fluently in English and Mandarin. Katarzyna Zarychta, HistoIndex's vice-president for sales in Europe, also has a PhD in Biomedical Optics and can speak four languages. The trio make up the company's sales team.

Ho notes that he is constantly on the lookout for more PhD holders to join the sales team as they can better explain the technology to the company's customers. "Many of our customers are doctors and they hold PhDs themselves. They can sense a salesperson from afar and if you don't have the clinical knowledge, they will become very averse to you and not give you any attention," says Ho. "On the other hand, if you can demonstrate how the technology can help them in their work, they will share the difficulties they encounter with you and use your services. It's much more effective this way. We're not selling an everyday product but a high-end diagnostic tool."

While having a PhD holder explain the Genesis technology to customers has worked well for the company, Ho laments that it is difficult to convince more PhD holders to join his sales team. "People don't study for years to obtain a PhD just to do sales. It's a challenge to convince them to give up their careers in research to do sales," he says. To appeal to potential candidates, Ho is offering confirmed staff stock options in the company.

Despite the intricacies that may be involved in selling the technology, Ho points out that the technology is user-friendly and technicians only require two days of training to use it. "Ease of use is very important for a machine like this. If you can play *Angry Birds*, you can definitely handle the Genesis," says Ho.

Future plans

When it comes to research, Ho says



The Genesis 200 helps in diagnosing cancer as well as fibrosis

Restless workers on the hunt in the US exploit social media

| BY VICTORIA STILWELL |

When Mark Gozzo got a request from a stranger to connect on LinkedIn, he considered it just another chance to expand his professional network. In a month's time, the invitation had turned into a new job.

"I wasn't super-actively looking, but somebody happened to reach out to me and I hopped over," says 24-year-old Gozzo, who cut his commute in half when he started his new position in January at a creative staffing agency in Raleigh, North Carolina. While workers have always recognised the importance of networking, "there are so many outlets to do it these days, more so than a couple of generations ago".

Both employed and unemployed workers are finding it easier than ever to keep up a perpetual job search using an array of social media and online recruitment platforms, while employers are also taking advantage of more access to candidates and their backgrounds. That's poised to increase the frequency of labour-market musical chairs as Americans become emboldened by an improving job market to seek out better positions.

"The more information that people have, the more efficient the labour market should be in matching people with the optimal job for their skillset," says Stephen Stanley, chief economist at Pierpont Securities LLC in Stamford, Connecticut. "The fact is, you're probably going to see more churn."

Some 77% of employers used networking websites to recruit potential job candidates last year, up from 56% in 2011, according to a 2013 study by the Society for Human Resource Management, a trade group representing human resource professionals. That's a testament to social media's growing importance as the economy improves. In 2008, during the recession, just 34% of employers used networking websites to recruit.

Social networks

As for those looking for work, 21% found their "favourite or best" position through online social networks such as Facebook Inc, LinkedIn Corp, or Twitter Inc, according to a report released in February from social recruiting platform Jobvite Inc. So-called social job-seekers tend to be younger, wealthier and are more likely to be employed full-time, the study found.

"There's almost an explicit understanding now that anyone is available to be contacted for any new opportunity at any time," Dan Finnigan, the San Mateo, California-based chief ex-



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ecutive officer of Jobvite, said in an interview. "The enabling technologies of the Internet have created a situation where everyone's always looking for a job. It's taken the stigma away."

Less competition for work may also give job-hunters a better shot at finding a new position as the economic recovery grinds on. About 2.5 unemployed people were competing for every opening in February, near the lowest level since July 2008 though still up from 1.8 when the recession began in December 2007.

At the same time, the quit rate for private employment, which shows the willingness of non-government workers to leave their jobs, was at 1.9% in February, near its highest level since October 2008, Labor Department data shows. Federal Reserve Chair Janet Yellen sees the figure as "a sign of the health of the economy", she said in a March 19 press conference at the conclusion of a two-day Federal Open Market Committee meeting.

"When workers are scared they won't be able to get other jobs, they show a reduced willingness to quit their jobs," says Yellen. "Quit rates now are below normal pre-recession levels, but on the other hand, they have come up over time, and so we've seen improvement."

Employers in the US boosted payrolls in March by 192,000 after a 197,000 gain in February that was larger than first estimated, a Labor Department report showed recently. Private employment, which excludes government jobs, surpassed the pre-recession peak for the first time.

Rosier outlook

A rosier economic outlook may give some employees an impetus to change jobs, especially younger workers who were spooked by the re-

cession and stayed with their companies as opportunities became scarce, according to Harry Holzer, a professor of public policy at Georgetown University and a former chief economist for the US Labor Department.

Because workers experience their largest earnings growth in the first five to 10 years of employment, more job-shopping may also mean improved incomes, Holzer says.

The tenure of the US labour force has increased over the past decade, largely reflecting a workforce whose median age rose to 42.3 years old in 2012 from 39.4 years old in 2000, according to data from the Bureau of Labor Statistics. Older workers had been with their employers for more than double the time as their younger counterparts in 2012, and as the economy improves, that difference might grow.

Social media can remove some of the frictions in the job-search process as the economy continues to mend by bringing the "right opportunity to the right person", says Dan Shapero, LinkedIn's vice-president of talent solutions and insights.

Workers today are "more visible to the world, they're more accessible to companies", says Shapero, who is based in Mountain View, California. "Technology platforms are getting very good at matching people to jobs."

That comes at a time when Americans' attitudes about job availability has been improving, according to Conference Board data. The difference between those who said jobs are hard to get and respondents who said employment opportunities were abundant in March was near the smallest since August 2008, the New York-based private research group said last month.

A labour market that's gaining strength means that job searches for the employed and unemployed alike have a greater chance of paying off. People who are frequently looking for opportunities are also more likely to remain attached to the labour force, "and that's ultimately good for potential GDP", Neil Dutta, head of US economics at Renaissance Macro Research LLC in New York, says in an interview.

Even so, it may be already-employed workers who benefit the most from online platforms. Four out of five employers used social networking sites with the primary goal of recruiting so-called passive job candidates — those who aren't intensely searching for a new position and might not otherwise apply or be contacted, according to the survey by Alexandria, Virginia-based Society for Human Resource Management.

Wells Fargo & Co is among those that see social media's value, especially in recruiting such candidates.

"We want them all, but if you talk to people in talent acquisition, the holy grail in recruiting is the passive job-seeker," says Aaron Kraljev, employment branding manager for the bank in Portland, Oregon. It's crucial to "get access to those job-seekers that are revered in their current roles, whose current employers want to hang on to".

Top talent

Wells Fargo does "a great deal in the social space", says Kraljev, using LinkedIn, Facebook and a dedicated Twitter account for careers to reach out to prospects. Recognising the competition for top-level talent, the bank also deploys online job advertisements on Sunday nights and Monday mornings to attract the highest volume of applicants. The bank sees its greatest number of ad clicks in the first quarter of the year, says Kraljev.

Ultimately it may be something at the intersection of the personal touch and a computer screen's glow that cinches the decision to switch. For Gozzo, who worked at an advertising agency for almost two years before taking his new position helping companies find creative talent, the animated office environment at his current employer helped seal the deal.

He's happy in his new job, though he still goes to LinkedIn to check out moves that colleagues and contacts are making. While his grandfather worked for Honeywell International Inc for some 30 years, careers today are more fluid, he says.

"People yearn to gain connections," Gozzo says. "Everyone wants to feel wanted." — Bloomberg LP

The runway to success is long for a medtech company

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the company is not short of technological ideas. In fact, one of the unintended consequences of the fee-for-service model is that the company receives requests from customers to perform diagnosis on tissues that Ho never thought the Genesis technology could be used for.

For instance, he received fat tissues from a customer in Paris who wanted them analysed. "I didn't know what they were looking for

and they told us they were looking at analysing diabetes in fats," he says. According to Ho, once people become obese, their tissues become more fibrous and even if they lose weight, the tissues remain fibrous. "You can lose weight but that doesn't mean you're healthy because your tissues remain the same," he says.

Another popular use for the technology that Ho discovered through the company's customers is the analy-

sis of collagen, a protein that makes up nearly 30% of the protein content in the human body. "Our machine looks at collagen in its detailed form and it's able to count the number of collagen fibres," says Ho. This function is particularly popular among cosmetic companies that use this data to formulate anti-wrinkle and anti-ageing solutions.

Currently, the bulk of tissues that are sent to HistoIndex are still for the diagnosis of cancers. "We have

about 20 to 30 different organ tissues sent to us for diagnosis and the common ones are for the diagnosis of liver, prostate, breast and cervical cancers," says Ho.

HistoIndex is currently investing in R&D and given the cost-intensive nature of the company's work, Ho is expecting to break even in 2015. "The runway to success is so long for a medtech company. Our investors know what they're investing in and know that they won't see the money until

five to seven years later," says Ho.

For his part, Ho wishes HistoIndex would invent the lightsabre that is seen in the Star Wars franchise. "I've always been dreaming about it but laser is such an infinite thing that if you were to shoot a laser beam up, there's no telling how high it would go and you may hit a bird or a plane. There's also the problem of looking for a material that can withstand high melting point in order to contain the beam," he says.